1. Research Papers

Lung Cancer Detection using Lung Cell Images Taken under FOLDSCOPE

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Vanita D. Jadhav, Dr. Lalit V. Patil

Abstract

As a result of rising population and pollution, there has been a significant increase incancer-causing substances, necessitating the need to detect cancer at an early stage sothat it can be treated more effectively. The steps to treat or prevent cancer or other tumours are designed to cause little or no death, which is why a system to anticipatethe early stages of cancer and the precautions that will be taken to prevent it fromspreading further is needed. We've chosen to develop a technology that can identifylung cancer in early stage. Lung cancer is divided into phases, and in order to treat it,we must first study each step thoroughly. Lung cancer is divided into four stages. The early stage of cancer is absolutely undetectable, so we must utilize micro scopic detection for a preliminary inspection, which is highly expensive and limited in number. Because these devices have a limited reach in rural and small suburban regions, they must operate under the assumption that we are suffering from cancer andnever truly know if we are.As a result, early detection of cancer makesit easier tocure it, and the patient suffers less as a result of the disease. Because the tumour is small and difficult to detect even at the microscopic level, microscopic analysis of this malignancy some times provides false results. It will be easier to notice such events the next time if we keep track of them, and the chances of making an error will be minimised. This is where our system and technology come into play. It's easier to train the machine for intangible instances of findings that can't be neglected in real life because we're using machine learning to build a computer-aided design system forearly lung cancer diagnosis. Our approach is entirely built on data investigation of various cancer circumstances ranging from early stage to late stage lung cancer. We are using lung cell images taken under FOLDSCOPE.

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LungSeg-Net: Lung field segmentation using generative adversarial network

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Highlights

- The proposed end-to-end conditional generative adversarial network for accurate lung segmentation is named as LungSeg-Net which processes the input lung CT slice and gives lung segmentation map without any post-processing.
- The proposed LungSeg-Net consists of multi-scale dense feature extraction module which extracts the robust multi-scale features.
- The proposed LungSeg-Net is effective for lung segmentation and its performance is invariant to the presence of dense abnormalities (due to ILD patterns) in lung CT scan.

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Abstract

Automatic lung segmentation is an essential step towards the Computer-Aided Diagnosis of the lung CT scan. However, in presence of dense abnormalities, existing methods fail in accurate lung segmentation. In this paper, a generative adversarial networks-based approach is proposed for improving the accuracy of lung segmentation. The proposed network effectively segments the lung region from the surrounding chest region hence, named as LungSeg-Net. In the proposed LungSeg-Net, the input lung CT slices are processed through

the trail of encoders which encode these slices into a set of feature maps. Further, a multi-scale dense-feature extraction (MSDFE) module is designed for extraction of multi-scale features from the set of encoded feature maps. Finally, the decoders are employed to obtain the lung segmentation map from the multi-scale features. The MSDFE makes the network to learn the relevant features of dense abnormalities whereas the iterative down-sampling followed by the up-sampling makes it invariant to the size of the dense abnormality. The publicly available benchmark ILD dataset is used for the experimental analysis. The qualitative and quantitative analysis has been carried out to compare the performance of the proposed network with the existing state-of-the-art methods for lung segmentation. The experimental analysis show that the performance of the proposed LungSeg-Net is invariant to the presence of dense abnormalities in lung CT scan.

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Research Article

Two-Stage Hybrid Approach of Deep Learning Networks for Interstitial Lung Disease Classification

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High-resolution computed tomography (HRCT) images in interstitial lung disease (ILD) screening can help improve healthcare quality. However, most of the earlier ILD classification work involves time-consuming manual identification of the region of interest (ROI) from the lung HRCT image before applying the deep learning classification algorithm. This paper has developed a two-stage hybrid approach of deep learning networks for ILD classification. A conditional generative adversarial network (c-GAN) has segmented the lung part from the HRCT images at the first stage. The c-GAN with multiscale feature extraction module has been used for accurate lung segmentation from the HRCT images with lung abnormalities. At the second stage, a pretrained ResNet50 has been used to extract the features from the segmented lung image for classification into six ILD classes using the support vector machine classifier. The proposed two-stage algorithm takes a whole HRCT as input eliminating the need for extracting the ROI and classifies the given HRCT image into an ILD class. The performance of the proposed two-stage deep learning network-based ILD classifier has improved considerably due to the stage-wise improvement of deep learning algorithm performance.

1. Introduction

As the risk of lung cancer incidences among patients with interstitial lung disease (ILD) is high [1], identifying the specific type of ILD becomes essential to develop appropriate therapy plans. In the healthcare industry, data-driven decision-making [2] is becoming popular due to its ability to quickly gather and analyze complete and accurate data. It makes the decision-makers choose an appropriate treatment, predict future events, and plan long-term action. ILD classification problems can be linked with diagnosing a particular type of ILD, forecasting the spread of ILD and further implementing preventive measures.

The HRCT image-based processes are the preliminary screening approach for the quick visualization of normal and abnormal cases of any disease. In addition, the data-driven decision-making approach for ILD classification can become effective for the early detection of ILD. The image-based classification approach involves feature extraction and labeling the ILD class to train the classifier. Feature extraction involves efficient shape, texture, and colour extraction for spatial and frequency-based image analysis. These methods include gray level values [3], texture feature extraction, statistic filters such as gray level cooccurrence matrix and run length [4], edge features such as Gaussian and Wavelet filters [5], and spatial and shape features [6]. However, these features will not capture the features of deep learning proposed by deep learning algorithms.

With the advancement in deep learning algorithms, feature extraction in medical image analysis has become more reliable. These algorithms are used for solving various applications in the domain of detection [7], segmentation [8], and classification [9]. Deep learning algorithms such as AlexNet [10], VGG [11], and GoogLeNet [12] help to obtain deep feature vectors. However, this architecture needs a massive amount of data for training and testing, which becomes difficult in medical fields and is sometimes tedious and time-consuming. This data scarcity issue, which may result

in overfitting, is resolved by transfer learning [13], which inherits or preserves the knowledge learned from a data-rich source domain. These features are labeled after appropriate feature extraction to implement the machine learning algorithms. The most frequently used supervised classification algorithms are support vector machine [4], K-nearest neighbor [14], Bayesian classifiers [15], linear discriminant analysis [16], and artificial neural network [3]. The most promising classifier for giving the great value of true positive rates and accuracy is SVM. A detailed review of deep learning approaches for solving various medical imaging problems has been covered by Santosh et al. [17].

Most ILD classification works are based on the regions of interest (ROI) patch-based image representation. Li et al. [18] designed a CNN with a shallow convolution layer to classify ILD automatically and efficiently to learn the intrinsic image features from lung image patches that are most suitable for the classification purpose. Song et al. [19] proposed a new locality-constrained subcluster representation ensemble model to classify HRCT images of ILDs. It helps in the separation between different classes for improving classification performance. Anthimopoulos et al. [20] proposed and evaluated Leaky ReLU activation function-based CNN for classification of ILD. The ILD of seven patterns shows a classification performance of about 85.5%. Doddavarapu et al. [21] proposed architecture for automatic ILD classification using CNN with three convolution layers, Leaky ReLU activation followed by maximum pooling layer and dense layer. The last fully connected layer has five outputs equivalent to five ILDs, which gives an accuracy of about 94%. Guo et al. [22] developed an improved DenseNet called small kernel DenseNet to improve ILD classification performance and show the significant performance improvement compared to earlier CNNs AlexNet, VGGNet, and ResNet.

A different approach based on whole X-ray images was demonstrated by Poap et al. [23] and Sahlol et al. [24] to detect lung diseases and TB diagnostics. Further, Khan et al. [25] proposed a framework to support automated segmentation and classification of lung nodules with improved accuracy using VGG-SegNet for nodule mining and pretrained DL-based classification to help automatic lung nodule detection. Finally, the approach of using whole HRCT images for ILD classification was proposed by Gao et al. [26], which brought out drawbacks of image patch-based methods. Though the technique had advantages for handling large-scale image processing and analysis, the success rate was comparatively low. The low success rate was due to unwanted noise introduced by the background of HRCT images. The present study explores a multistage deep learning network to improve the ILD classification performance. Earlier, this approach was demonstrated by Elsayed et al. [27] for emotion recognition in Arabic news headlines and by Zhong and Gu [28] for capturing complex malware data distribution.

The literature survey shows the following significant gaps that can be addressed through the proposed two-stage hybrid approach-based classifier: (a) use of ROI patch, which is time-consuming and needs manual expert intervention, (b) the small HRCT patches may not fully capture the visual details and spatial context, (c) the use of traditional image processing algorithms for lung nodule segmentation, and (d) most of the classifiers developed in the literature use directly ROI patches instead of developing the classifier right from the HRCT images. The highlights of the proposed two-stage hybrid approach for ILD classification have been given below:

(i) The proposed algorithm uses whole HRCT images to eliminate human expertise requirement for manual extraction of ROI of ILD-infected part of the lung

(ii) In the two-stage hybrid approach, at the first stage, a conditional generative adversarial network (c-GAN) with a multiscale feature extraction module has been used for accurate lung segmentation from the HRCT images with lung abnormalities. The lung segmentation removes the unwanted background from HRCT images, helping the next stage deep learning algorithm focus on the lung's ILD features

(iii) The ResNet50 has been used to extract the deep features from the segmented lung images in the second stage. In addition, the pretrained ResNet50 has been fine-tuned based on the transfer learning approach using the segmented lung images of different ILD classes

(iv) Finally, the support vector machine (SVM) utilized the deep features from ResNet50 to classify the six ILD classes, viz., normal, emphysema, fibrosis, ground glass, micronodules, and consolidation

(v) Overall, ILD classification performance gets improved due to selection c-GAN, which is suitable for lung segmentation and ResNet50, which is ideal for deep feature extraction. Also, improving the accuracy of deep learning algorithms at each stage will improve the overall performance

(vi) The performance of the proposed algorithm has been compared with earlier patch-based image input and whole image input algorithms

The paper has been organized in the following sections. The significance of the proposed two-stage hybrid approach for ILD classification is brought out through the literature survey in Section 1. Section 2 describes a two-stage hybrid approach of deep learning networks for ILD classification giving the details of deep learning algorithms used at each stage. The experiments that demonstrate the proposed two-stage hybrid approach and its performance analysis have been discussed in Section 3. The advantages and limitations of the proposed approach are discussed in Section 4. Finally, the conclusions of the proposed work have been given in Section 5.

2. Architecture of Two-Stage Hybrid Approach of Deep Learning Networks

Most of the existing ILD classifiers involve manual identification of regions of interest (ROI) as a prerequisite to screen potential disease. Further, the patches of ROIs have been

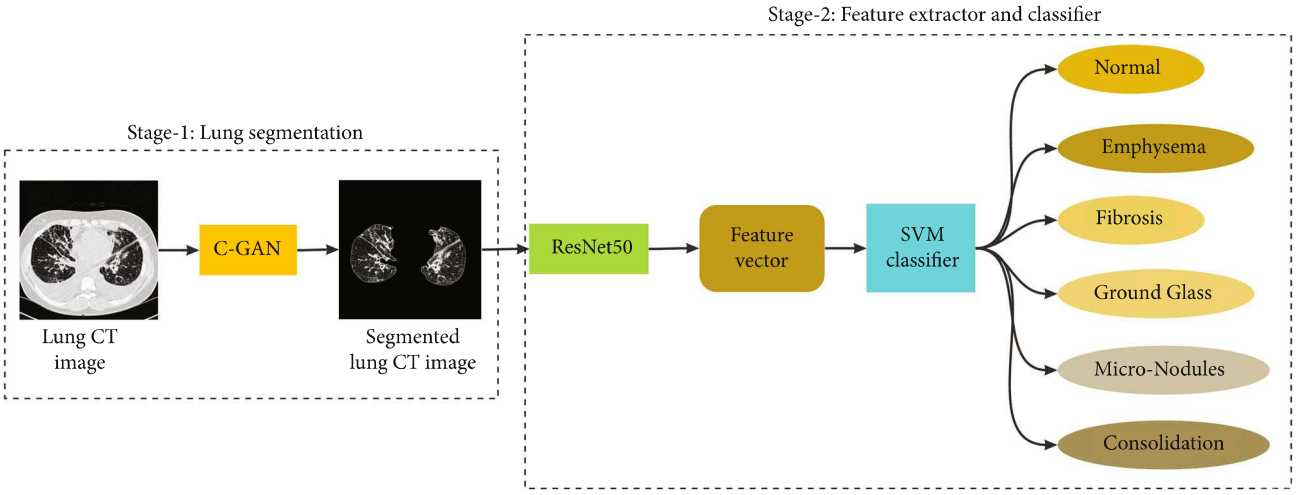

Figure 1: Architecture of the two-stage hybrid approach.

given as input to the deep learning algorithms for mapping the ILD classes. In this study, the two-stage architecture of a deep learning algorithm has been proposed, which connects two separate deep learning algorithms utilized for deep feature extraction and ILD classification. Figure 1 shows the two-stage hybrid approach of deep learning networks for ILD classification, which takes the whole HRCT images as input and gives the ILD class label as output. The first stage deep learning algorithm segments the lung part from given HRCT images by removing background noise. Therefore, the segmented lung HRCT images from the first stage have been given as input to the second stage, where the features have been extracted using another deep learning algorithm. Further, in the second stage, the memory-efficient classifier support vector machine (SVM) has been used to classify ILDs based on the features obtained by the second stage deep learning algorithm. The following paragraphs have given brief descriptions of the deep learning networks used in the proposed algorithm.

2.1. Stage 1 c-GAN for Lung Segmentation. Conditional generative adversarial network (c-GAN) is advantageous to use for the segmentation purpose due to its two main subcomponents, viz., generator (G) and discriminator (D) [29]. The role of the generator is to generate fake images using latent samples. At first, the generator generates the images using random pixels. Further, the generator has been trained to map these random variables to recognizable images, which can fool the discriminator (D). The generator (G) maps the input lung HRCT slice (x) with the reference lung segmentation map (y) as $G : \{x, z\} \longrightarrow y$, whereas the discriminator (D) discriminates between the generator output and the reference lung segmentation map. Figure 2 shows the architecture of the proposed c-GAN, which consists of encoder/decoder blocks and multiscale feature extraction (MSFE) module. The encoder/decoder blocks have been formed by convolution/deconvolution filters of size 3×3, followed by the ReLU nonlinear action function. These blocks encode the input lung HRCT slices into feature maps that have been further normalized using the instance normalization [30] approach. The feature maps have been further downsampled in the encoder blocks for increasing the receptive fields. The upsampling of these features has been performed in the decoder blocks by the factor of 2 for maintaining the symmetry of the network.

The role of MSFE is to extract features which take care of dense abnormalities in the lung HRCT scans of different sizes, shapes, and textures. Most of the existing lung segmentation algorithms fail to include these dense abnormalities present, especially at the lung border. The inclusion of MSFE in the proposed algorithm captures the feature due to variation in the appearance of abnormalities. The MSFE includes inception blocks in which the input feature maps pass through three convolution layers of the filter size, i.e., 1×1, 3×3, and 5×5, followed by the ReLU and instance normalization. As shown in Figure 2, the proposed c-GAN segmentation architecture consists of six MSFE modules. The first three MSFE modules process the multiscale features through a simple convolution layer with a stride factor of 2. The remaining three MSFE modules maintain symmetry by processing these features through a simple deconvolution layer with the upsampling factor of 2. Thus, the MSFE module architecture helps network uniform appearance (i.e., size, shape, and texture) of the dense abnormalities on lung CT slice by capturing the prominent edge information in the output lung segmentation map.

The training of the proposed c-GAN network has been performed by calculating the losses of the generator and discriminator. The discriminator loss is the sum of losses of the real and fake images. The generator and discriminator variables have been updated separately.

The proposed c-GAN network has been trained by solving the objective function:

$$G^* = \arg \min_G \max_D \mathscr{L}(G, D), \tag{1}$$

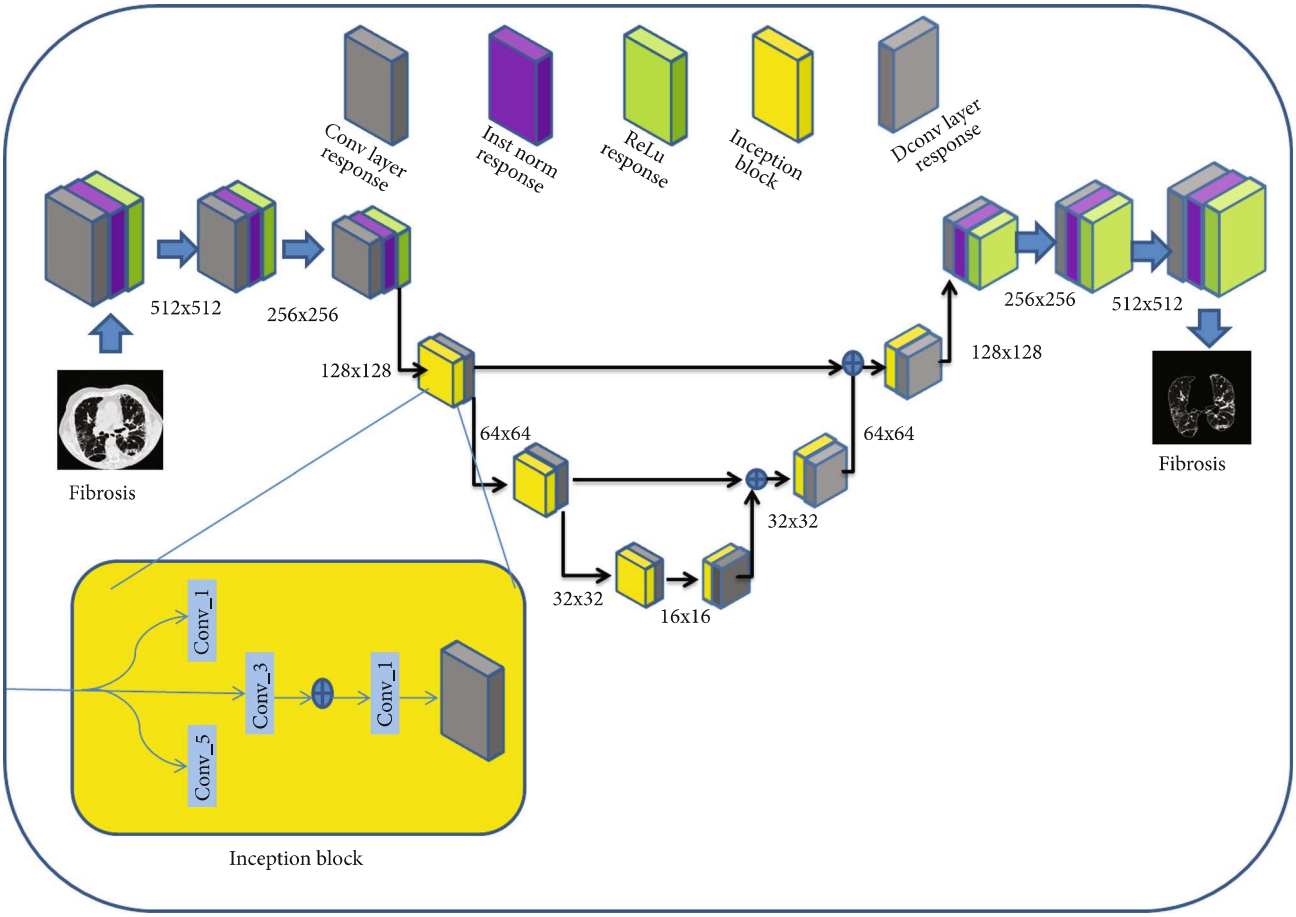

FIGURE 2: Conditional generative adversarial network (c-GAN) used for lung segmentation at stage 1.

using Adam's stochastic optimization approach. The overall loss function is given by

$$\mathscr{L}(G, D) = \ell_{\text{cGAN}}(G, D) + \lambda \cdot \ell_{L1}(G). \tag{2}$$

The multiobjective probabilistic function of conditional GAN $\ell_{\text{cGAN}}(G, D)$ and the traditional loss $\ell_{L_1}(G)$ can be expressed as [26]

$$\ell_{\text{cGAN}}(G, D) = \mathbb{E}_{x,y}[\log D(x, y)] + \mathbb{E}_{x,z}[\log (1 - D(x, G(x, z)))],$$
$$\ell_{L_1}(G) = \sum_{i,j} \left\| G(x, z)_{i,j} - y_{i,j} \right\|_2. \tag{3}$$

The training is aimed at training the discriminator to maximize the probability of the training data and to minimize the probability of the data sampled from the generator. Simultaneously, the generator has been trained on the opposite objectives as maximizing the probability that the discriminator is assigning to its samples.

2.2. Stage 2 ResNet50 for Feature Extraction and SVM for Classification. As shown in Figure 1, the segmented lung image received from stage 1 has passed through ResNet50 for deep feature extraction. ResNet50 is a pertained CNN based on feature transmission to prevent gradient vanishing, such that a much deeper network than those used previously could be effectively trained [31]. Based on the principle that the deeper network is more powerful than a shallow network, ResNet50 includes a 50-layer residual network architecture with 177 layers. The ResNet50 has been pretrained on a subset of the ImageNet database (http://www.image-net.org), and the architecture details are shown in Table 1.

Like any other deep network, the ResNet50 network consists of all the components like convolution, pooling, activation, and fully connected layers stacked one over the others. The only differentiator that makes it a residual network is that the identity connection between the layers. The identity connections resolve the problem of vanishing gradient problem. The residual blocks get skipped at once, and gradients will reach the initial layers, which will help to learn the correct weights. In ResNet50, the ReLU function is placed after the addition operation, which helps in changing the gradient values as they enter inside the residual block. As shown in Table 1, the ResNet50 architecture has four levels which can take input images of $224 \times 224 \times 3$. The network performs the initial convolution and max pooling with kernel sizes of 7×7 and 3×3, respectively.

Further, level 1 has three residual blocks containing three layers, each performing convolution operations at all

Table 1: Details of the ResNet50 network for extracting deep features at stage 2.

Layer name	Optimal size	Sublayer
CONV1	112×112	7×7, 64, stride 2
		3×3 max pool stride 2
CONV2_x	56×56	$\begin{bmatrix} 1 \times 1, 64 \\ 3 \times 3, 64 \\ 1 \times 1,128 \end{bmatrix} \times 3$
CONV3_x	28×28	$\begin{bmatrix} 1 \times 1,128 \\ 3 \times 3,128 \\ 1 \times 1,512 \end{bmatrix} \times 4$
CONV4_x	14×14	$\begin{bmatrix} 1 \times 1,256 \\ 3 \times 3,256 \\ 1 \times 1, 1024 \end{bmatrix} \times 6$
CONV5_x	7×7	$\begin{bmatrix} 1 \times 1,512 \\ 3 \times 3,512 \\ 1 \times 1, 2048 \end{bmatrix} \times 3$
	1×1	Average pool, 1000-d fc, softmax
FLOPs		3.8×10^9

three layers. These three layers are 1×1, 3×3, and 1×1 convolutions to form bottleneck design. Thus, there are three identity connections between the three blocks of level 1. The convolution operation between level 1 and level 2 has been performed with stride 2, which doubles the channel width, whereas the size of inputs has been reduced to half. Similarly, for the next two levels, while progressing from one level to another level, the channel width has been doubled, and sizes of inputs have reduced to half as height and width.

The deep features obtained from a particular layer of the ResNet50 are fed to SVM classifier for ILD classification. The network extracts various classification-related deep features in each layer and pass to the next layer. The activation is in GPU with a minibatch size of 64, and GPU memory has enough space to fit the image dataset. The output from the activation function has been used to fit in SVM training. The SVM [32] used here is based on the function "fit class error-correcting output codes (fitcecoc)," which returns the fully trained multiclass error-correcting output of the model. The "fitcecoc" uses binary SVM models with One-Vs-All, and error-correcting output coding design enhances the performance of classification models. As the proposed algorithm utilized several deep features obtained from ResNet50, the SVM classifier is a suitable option due to its memory-efficient approach of handling high-dimensional spaces.

3. Experiments

Performance analysis of the proposed ILD classifier has been demonstrated using an ILD database prepared by Depeursinge et al. [33]. This database includes the lung HRCT slices with annotations that have been prepared by a discussion with the radiologists, research physicians, and computer scientists during the four years of the project period. The selected ILD database provides a common platform for evaluating automated ILD analysis systems, which 108 HRCT scans with annotated lung field maps. The images of six classes considered in the study have been taken as normal, emphysema, ground glass, fibrosis, micronodules, and consolidation for the analysis. The training dataset has been prepared by taking the ILD dataset out of 108 HRCT scans, whereas the remaining dataset has been used to validate the proposed optimal lung segmentation network. The network was trained using about 4000 HRCT slices created by the data augmentation approach, which considers the *flip left*, *flip right*, *flip updown*, *image transpose* operators to increase the training dataset size. Other parameters of the model are similar to [21].

3.1. Lung Segmentation Performance. Lung segmentation performance of stage 1 c-GAN network has been obtained in the form of dice similarity coefficient (DSC) and Jaccard index (J), which has been given as

$$\mathrm{DSC} = \frac{2\,|\,G(x) \cap y\,|}{|G(x)|+|y\,|}, \qquad J = \frac{\mathrm{DSC}}{2 - \mathrm{DSC}}. \tag{4}$$

Usually, the lung segmentation performance deteriorates in the presence of ILD due to the dense abnormalities present in the lung HRCT images of different sizes, shapes, and textures. Table 2 shows the average lung segmentation performance analysis of the c-GAN carried out on 22 lung CT scans from the ILD database, compared with the existing state-of-the-art deep networks, *viz.*, *NMF* [34], UNet [35], ResNet [31], VGG16 [10], and MobileNet [36]. The tables show that the performance of c-GAN and other existing networks depends on the ILD present in the HRCT image. The c-GAN method used in this work outperforms other existing methods for lung segmentation. The performance analysis shows that the c-GAN network gives near-perfect lung segmentation than the ground truth. In contrast, other methods fail to include lung abnormalities accurately.

3.2. ILD Classification Performance. In the second stage, the segmented images labeled with six ILD classes as normal, emphysema, fibrosis, ground glass, micronodules, and consolidation have been used to extract the deep features using pretrained ResNet50 mapping to the ILD classes. Figure 3 shows representative images of original HRCT and segmented form for all the six ILD classes. The overfitting on image recognition training has been minimized by increasing the number of images in the database by augmentation. In addition, it has been ensured that the labels of the augmented images are being preserved. During the augmentation process, the CT images of $512 \times 512 \times 3$ have been

Table 2: Comparative performance assessment of average DSC and J for c-GAN and existing methods for lung segmentation.

Disease	Performance	Present study	NMF [34]	UNet [35]	ResNet [31]	VGG16 [10]	MobileNet [36]
Fibrosis	DSC	0.9566	0.7681	0.9485	0.9126	0.9295	0.9040
	J	0.9290	0.6600	0.9117	0.8681	0.8742	0.8330
Ground glass	DSC	0.9558	0.8335	0.9534	0.9351	0.9444	0.9291
	J	0.9282	0.7473	0.9191	0.8987	0.8975	0.8706
Emphysema	DSC	0.9378	0.9214	0.9629	0.9261	0.9452	0.9380
	J	0.9204	0.8917	0.9340	0.8975	0.8963	0.8841
Consolidation	DSC	0.9712	0.8775	0.9500	0.9440	0.9479	0.9436
	J	0.9466	0.7963	0.9148	0.9076	0.9031	0.8954
Micronodule	DSC	0.9812	0.9678	0.9807	0.9674	0.9751	0.9586
	J	0.9645	0.9391	0.9627	0.9379	0.9523	0.9210

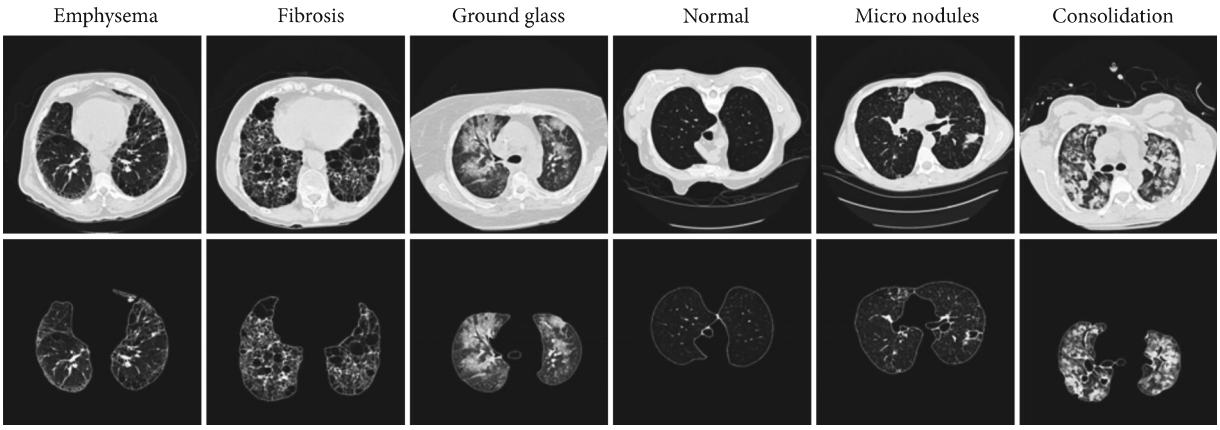

Figure 3: Examples of HRCT of six ILD. (The first row shows original HRCT images and the second row shows respective segmented image.)

resized to $224 \times 224 \times 3$. These images have been passed to pretrained ResNet50 for extracting the deep features. At this stage, appropriate feature layer selection becomes essential for improving the performance of the classifier. In the pretrained network, the weights of earlier layers are frozen, which were not updated during the fine-tuning stage. Therefore, the transfer learning techniques used for ResNet50 become advantageous for such problems as it removes the drawback of the shortage of radiological images required to improve deep learning performance. The transfer learning process effectively develops classification algorithms with less training data of medical images.

Before the detailed performance analysis of the classifier, the influence of feature layer selection on the classifier accuracy has been studied. Out of the trials conducted using the selection of feature layers as fcc1000, res5c_branch2b, res5c_branch2c, avg_pool, and bn5c_branch2a, SVM classifier gives the best result for the deep features selected at bn5c_branch2a.

The classification performance is measured using the performance parameters recall, precision, F-score, and accuracy given below:

$$\begin{aligned} \text{Recall} &= \frac{\text{TP}}{\text{TP} + \text{FN}}, \\ \text{Precision} &= \frac{\text{TP}}{\text{TP} + \text{FP}}, \\ F\text{score} &= \frac{2\text{TP}}{2\text{TP} + \text{FP} + \text{FN}}, \\ \text{Accuracy} &= \frac{\text{TP} + \text{TN}}{\text{TP} + \text{TN} + \text{FP} + \text{FN}}, \end{aligned} \tag{5}$$

where TP is the number of true positives for the classification of ILD. Similarly, FP is the false positives, TN is the true negatives, and FN is the false negatives.

Statistical consistency of the proposed algorithm has been analyzed using 30 different cycles of randomly selected groups of HRCT images. The confusion matrices of the classifier obtained for the 30 cycles are presented in a 95% confidence interval (CI) in Table 3. This table shows the mean values and their variations for 95% confidence interval for the six ILD classes considered in this study. The table shows that the normal class, which is healthy, gives the

Table 3: Confusion matrix of the proposed classifier (mean and variation values with 95% confidence interval).

Actual cases	Prediction (%)					
	Emphysema	Fibrosis	Ground glass	Normal	Micronodules	Consolidation
Emphysema	93.24 ± 1.66	5.56 ± 1.36	0.37 ± 0.34	0.00	0.37 ± 0.34	0.46 ± 0.46
Fibrosis	0.55 ± 0.23	89.26 ± 1.54	4.43 ± 0.91	0.22 ± 0.14	0.77 ± 0.46	4.76 ± 0.77
Ground glass	0.28 ± 0.26	5.27 ± 1.37	84.44 ± 2.17	4.70 ± 0.87	2.23 ± 0.84	3.08 ± 0.66
Normal	0.05 ± 0.06	0.16 ± 0.13	2.57 ± 1.14	94.65 ± 1.59	2.55 ± .70	0.02 ± 0.05
Micronodules	0.02 ± 0.04	0.26 ± 0.19	4.56 ± 0.73	3.45 ± 0.85	90.64 ± 1.42	1.06 ± 0.41
Consolidation	0.10 ± 0.08	9.84 ± 1.21	4.67 ± 0.67	0.21 ± 0.19	1.07 ± 0.43	84.12 ± 1.29

Table 4: ILD classifier interactive performance analysis of the proposed algorithm.

	Emphysema	Fibrosis	Ground glass	Normal	Micronodules	Consolidation	Avg
Precision (%)	98.94	80.89	83.57	91.68	92.84	89.96	89.65
Recall (%)	93.24	89.26	84.44	94.65	90.64	84.12	89.39
F-score (%)	96.00	84.87	84.00	93.14	91.73	86.94	89.45
AUC	0.9960	0.9769	0.9811	0.9969	0.9948	0.9793	0.9875

highest accuracy of 94.65% (with 95% CI variation of 93.06%-96.24%) and gets slightly mixed with by about 2.55% with ground glass and micronodule disease. On the other hand, the lowest accuracy is for the consolidation, 84.12% (with 95% CI variation of 85.41%-82.83%), which gets confused with fibrosis and ground glass. However, the classification performance of the proposed classifier for the consolidation class has been considerably improved due to the segmented image inputs compared to the whole image input classifier [26], which was just 46.67%.

Further, Table 4 shows the interaction of six ILD classes for the proposed classifier obtained as precision, recall, and *F*-score values from the mean values of confusion matrix of Table 3. The average values of the precision, recall, and *F*-score are 89.65%, 89.39%, and 89.45%, respectively. Figure 4 shows the ROC curves for the six classes, and their AUC values are given in Table 4. The ROC plots and AUC values indicate that the classifier is well trained, and classification results are obtained with a sufficient classification margin.

Table 5 compares the performance of the proposed two-stage hybrid ILD classifier with the earlier works in the literature. Most of the methods have used lung image patches of size 32×32, and only one method proposed by Gao et al. [26] used the whole images for ILD classification. Most of the earlier patch-based ILD classifiers have considered only five classes and have not included the consolidation class. Most of the existing patch-based ILD classifiers give average values of *F*-score, and accuracy for five classes is less than about 78%. Recently developed patch-based classier developed by Doddavarapu et al. [21] provides average values of *F*-score, and accuracy for five classes is about 94%. The proposed classifier shows nearly matching performance by giving the accuracy of about 90% to classify six classes. Thus, the proposed classifier performs better even with six ILD classes. A similar work of developing an ILD classifier using whole HRCT images to classify six ILD classes was developed by Gao et al. [26]. The average values of *F*-score and accuracy for this classifier are 66.83% and 69.23%, far lower than those of the proposed classifier. The proposed algorithm's accuracy is improved due to automatic preprocessing of unwanted noisy parts of HRCT images by the lung segmentation process performed at stage 1.

3.3. Implementation of the ILD Classification Process. A PC with 4.20 GHz Intel Core i7 processor and NVIDIA GTX 1080 8 GB GPU was used to train the two-stage hybrid approach of deep learning networks for ILD classification. For the segmentation training using around 4000 images, the c-GAN network, which is a shallow network, took about 2000 seconds. On the other hand, it takes approximately 19.20 seconds for the training of ResNet50 for deep feature extractions using around 1000 images, and SVM training took around 17.85 seconds. During testing of the two-stage hybrid approach, the total time required per image was about 0.7 seconds which is the sum of about 0.5 seconds taken for stage 1 and about 0.2 seconds taken for stage 2. Therefore, the time requirement analysis indicates that the two-stage hybrid approach of ILD classifier did not take much additional computational time compared to giving the advantage of improved classification accuracy.

4. Discussion

The proposed ILD classification approach is based on utilizing the whole HRCT images. Though this approach has the advantage of eliminating the dependency on human expertise required for manual extraction of ROI of ILD, it will not be able to mark the specific region infected by ILD. The time needed to scan many HRCT images using the ROI approach will be high. However, the proposed approach will monitor the whole image to classify it into a particular

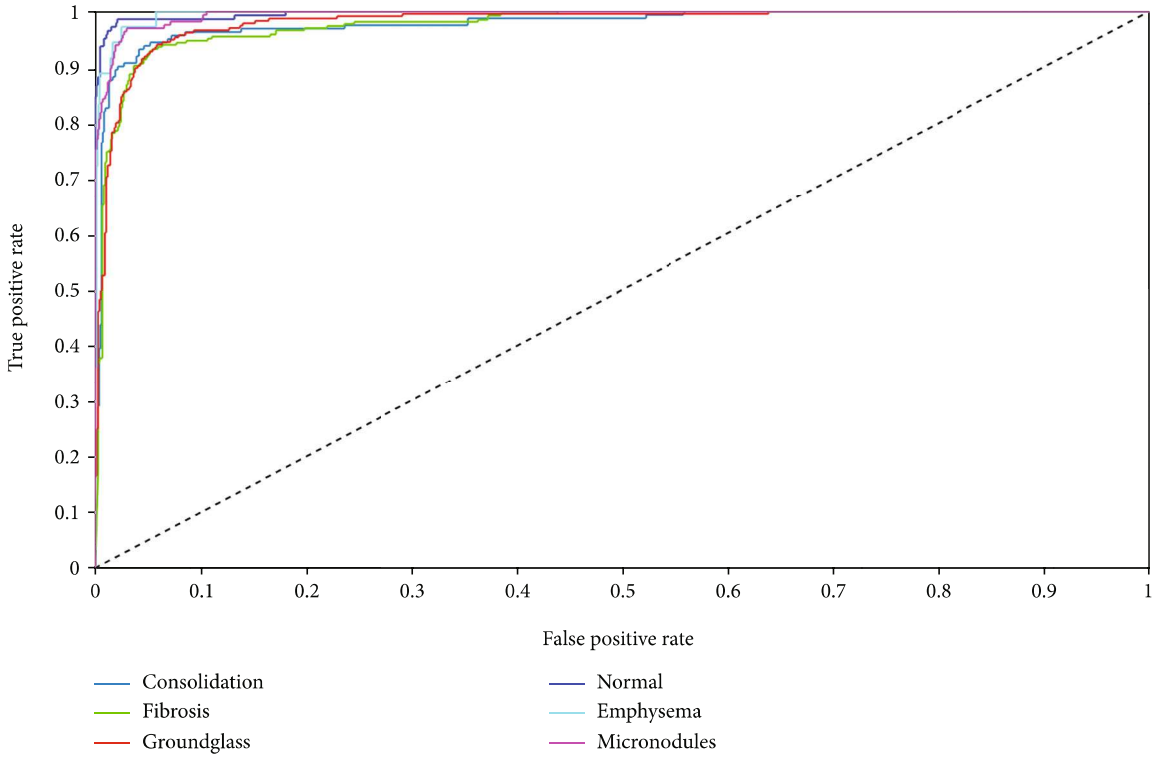

Figure 4: ROC plots of SVM classifier for the six ILD classes.

Table 5: Comparison of the proposed classifier with the earlier CNN-based classifiers.

Method	Image input type	*F*-score (%)	Accuracy (%)
Li et al. [17]	ROI patch	66.57	67.05
LeNet [37]	ROI patch	67.83	67.90
AlexNet [38]	ROI patch	70.31	71.04
Pretrained AlexNet [38]	ROI patch	75.82	76.09
VGGNet [10]	ROI patch	78.04	78.00
Doddavarapu et al. [21]	ROI patch	94.65	94.67
Gao et al. [26]	Whole HRCT	66.83	69.23
Proposed two-stage hybrid classifier	*Segmented HRCT*	**89.45**	**89.39**

ILD class. The proposed ILD classifier has been developed by assuming that the given input HRCT image has only one type of ILD. However, the ILD classifier needs to be improved for handling the input images with multiple ILDs, which should bring out all the classes or severe classes of the given image. Another limitation of the proposed algorithm is that it is helpful to classify only five significant ILDs and will not work for several other ILDs which are not considered in this study.

5. Conclusions

A two-stage hybrid approach of deep learning networks has been proposed to screen interstitial lung disease (ILD) using whole HRCT images. Improving the accuracy of deep learning algorithms at each stage has improved the classifier's overall performance. At the first stage, the lung segmentation removes the unwanted background from HRCT images, helping the next stage to accurately extract ILD features from the lung image. Deep features from the segmented lung images have been extracted using ResNet50. The multiclass support vector machine algorithm utilizes the deep learning features to classify into six ILD classes, viz., normal, emphysema, fibrosis, ground glass, micronodules, and consolidation. The performance of the proposed algorithm has been compared with earlier patch-based and whole image-based algorithms. The highest classification accuracy of 94.65% has been obtained for the healthy class, which helps in reducing the chances of false alarm situations. The lowest classification accuracy of 84.12% has been obtained for the consolidation class, which is far better than other whole image-based algorithms. The proposed algorithm, which has considered six ILD classes, performs considerably better than existing algorithms with five classes and gives far better

performance than a similar whole image-based algorithm. The proposed approach brings out the potential of improving the overall performance by choosing the appropriate CNN for a given task and improving accuracies at each stage of the functions. Furthermore, the additional time required for the proposed multistage CNN is negligible.

Data Availability

No data were used to support this study.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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AUTOMATIC ENERGY BILL SHOWING ON SINGLE PHASE ENERGY METER

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ABSTRACT
This paper presents the way of billing which shows that there is no need of any human being for billing purpose. It can be done automatically with the help of microcontroller program. In this paper a cost effective novel single phase digital energy meter is developed with the help of Microcontroller which is capable of calculating true value of active, reactive, apparent power, power factor and energy consumed. The designed meter is simple, portable and easily reconfigurable according to specific need. The parameters calculated are transmitted to the billing on energy meter display. In this for the we communicate to eliminating the need for the utility personnel calculate meter reading without any manual calculations. This data gets logged in and is used for generating bills and can also be used for analysis in the order to improve the power quality and understand the load and use pattern. The detailed bill generated easily and show to display of single phase energy meter.

Introduction

An electricity meter we are using for the measurement of what quantity of electric energy taken by a residence, business, or an electrically powered device. There are two types of meters-electromechanical and Electronic. The most commonly used electrical energy meter is known as electromechanical induction watt-hour meter. The operation of electromechanical induction meter is to count the number of revolutions of a non-magnetic disc which is electrically conductive. The power can be measured by this device because it is proportional to the speed of rotation. The energy can be measured by number of revolutions because both are proportional to each other. The LCD or LED display is used to show how much energy is consumed by electronic meter. Electronic meters along with billing can also use for record parameters of the load and supply for example current and maximum demand rate, voltages, power factor and reactive power used etc. In these days, the customers are unsatisfied services that are provided by the MSEB. Nowadays, an

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employee from electricity office visits every house periodically, takes the reading of meter and submits these readings at main office. These readings are used to generate the bill. Due to human interventions in all these processes there are chances of error. For instance, if the house is closed for a long time then the average of reading of meter is taken by the office. In such a case it is require that customer must go to the office to correct the bill. The traditional method of electricity billing process requires a large number of labors for the collection of data and billing. There are chances of losing the printed electricity bill in the mailboxes. If the weather conditions are not good the billing through human being is slowed down. Hence an Automatic Electricity Billing method can be used which is an effective method of data collection, data processing and calculation of bill. Automatic electricity billing is a technology in which information is collected from the energy meter. Bill is calculated from the meter itself.

Block diagram:

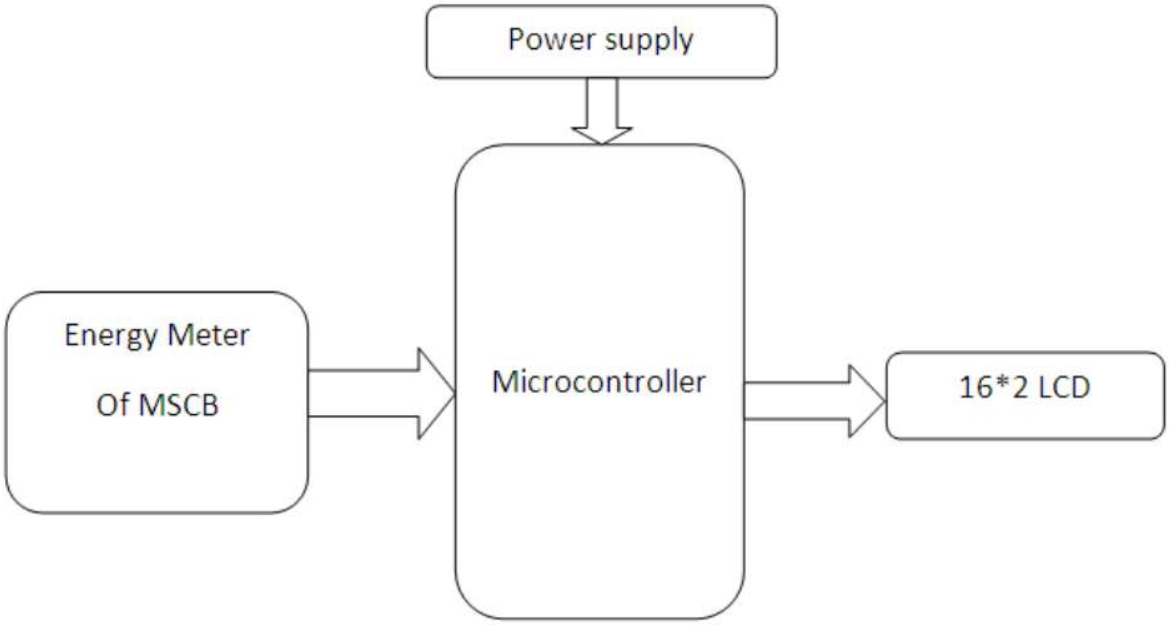

Figure 1: Block diagram of Automatic energy bill showing on single phase energy meter

This figure shows the block diagram of Automatic energy bill showing on single phase energy meter.Which indicates that the microcontroller AT89C51 Microcontroller is used for the energy

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meter.The microcontroller is supplied through electrical supply. The energy meter of MSEB which is provided in our primes is connected with microcontroller.There is 16*2 LCD display is provided for the display purpose.

Circuit diagram:

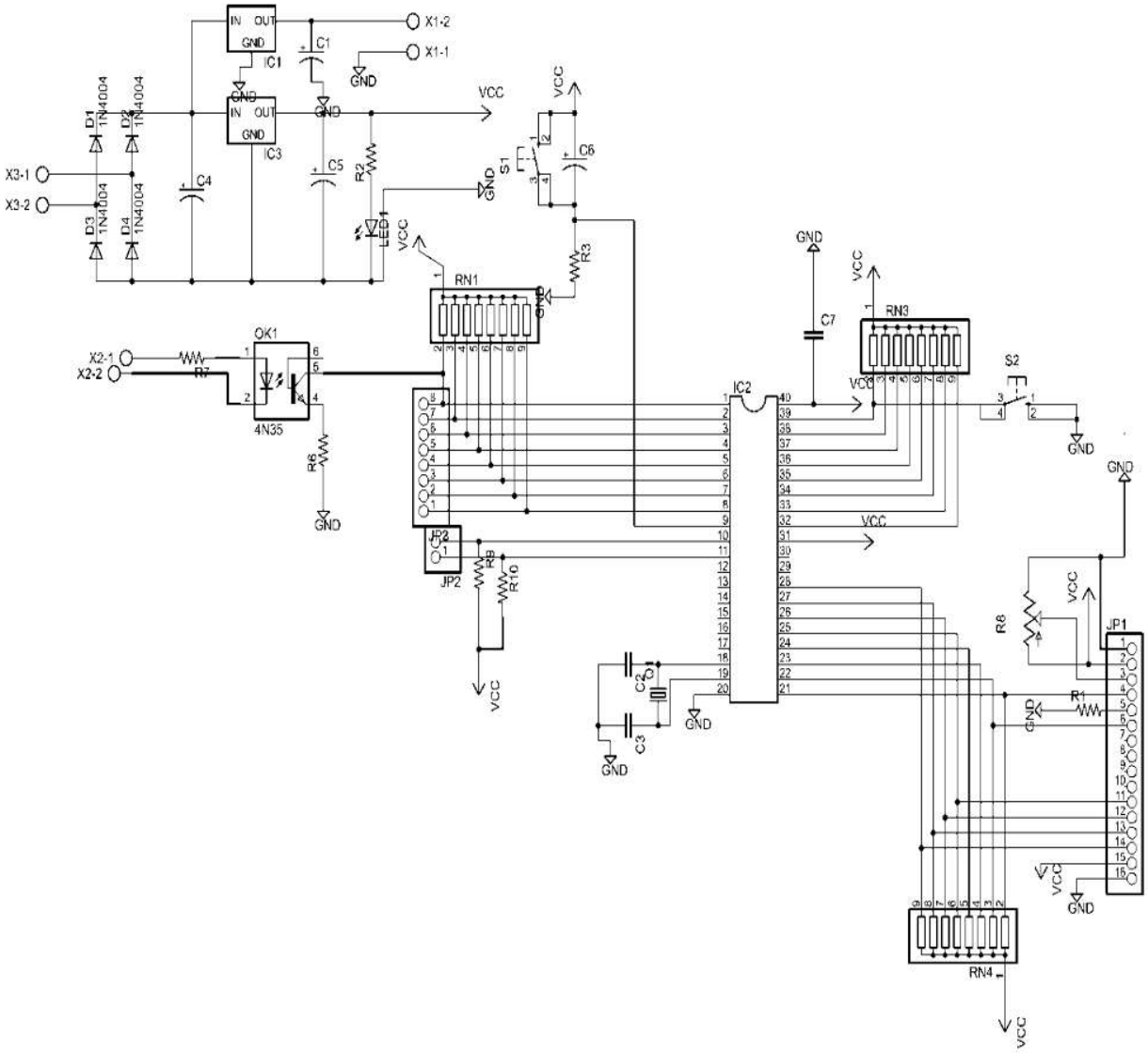

Figure 2: Circuit diagram of Automatic energy bill showing on single phase energy meter

The above figure shows the circuit diagram for Automatic energy bill showing on single phase energy meter. In this figure all the components are shown on the matlab Simulink .This Simulink model is the

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Simulink of the hardware model and hence give result equivalent to it. This model uses the no.of diodes,capacitors,regulator,resistors,LED,microcontroller etc.

System Development Working

Requirements

Electrical and thermal requirement

The PCB designer must be aware of the circuit performance in critical aspects of the same concerning electrical conditions and the environment to be used in.

Mechanical requirement

The designer should have the information about physical size of the board, type of installation of board (vertical/horizontal). The method of cooling adopted, front panel operated components etc.

Component placing requirement

All components are too placed first in a configuration that demands only the minimum length for critical conductors. These key components are placed first and the others are grouped around like satellites.

Component mounting requirements

All components should be placed parallel to one another as far as possible .i.e. in the same direction and orientation mechanical over stressing of solder should be avoided.

Layout Methodology

For proper layout design minimal steps to be followed are:

Get the final circuit diagram and component list.
Choose the board types, single sided / double sided / multilayer
Identify the appropriate scale for layout.
Select suitable grid pattern.
Choose the correct board size keeping in view the constraints.
Select appropriate layout technique, manual / automated.

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Document in the form of the layout scale.

Art Work

Art work is scaled configuration which is accurate of the printed circuit from which the master pattern is made photographically.

Art Work Rule

Rules followed while selecting art work symbol takes:
There should be Minimum spacing between conductor and pad is 0 / 35 mm in 1:1 scale.
There should be Minimum spacing between parallel conductors is 0.4 mm in 1:1 scale.
The non-PTH solder pad area should not be less than 5 sq.mm.
For maximum temperature rise of 20 °C. The width of current carrying conductors should be determined.

General Art Work Rules

It is assume that conductors are parallel to any one of the edge of the board when there is higher conductor density. When conductors are placed in other direction preference should be given to the 45° direction or to the 30° / 60° direction. Whenever conductors have a sufficient space they can be run in any direction so as to achieve sorted possible interconnection.
Equally distributed spacing is to be provided when three or more conductors run along a direction and / or between two pads. Minimum spacing is provided when three or more lines run along a direction and / or between two pads. The diameter of solder pad required to be approximately 8 times the drilled hole.

Used software for programming:

We have used Micro c for programming and debugging in that 8051. The mikroC PRO for 8051 is a tool which powerful, feature-rich for 8051 microcontrollers. When we use it there is no need of compromising performance or control of 8051.It provide the programmer the easiest solution to developing applications for embedded systems,.8051 and C fit together well: 8051 is the most popular 8-bit chip in the world, used in a wide variety of applications, and C, prized for its efficiency, is the natural choice for developing embedded systems. MikroC PRO for 8051 Gives

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us a features of highly advanced which match with IDE, ANSI compliant compiler it also gives us broad set of hardware libraries, comprehensive documentation, and plenty of ready-to-run examples.

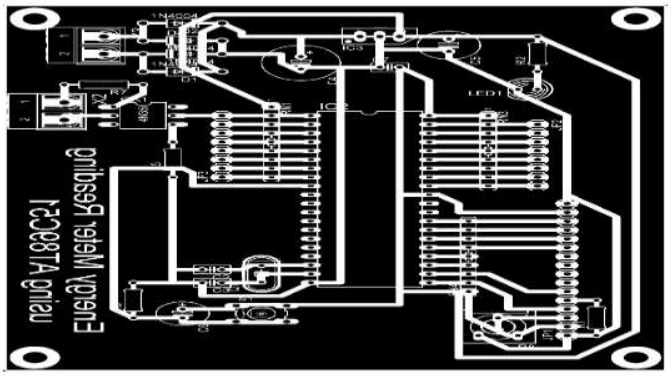

Figure 3: PCB layout

Component List.

Table 1: Component List

SR.NO	Name of component
1.	Energy Meter
2.	AT89C51 Microcontroller
3.	Opto Isolator
4.	Pull-up resistor
5.	Crystal oscillator
6.	Regulated Power Supply
7.	Diodes
8.	Capacitors
9.	Regulator 7805
10.	LED
11.	LCD 16x2
12.	PCB
13.	Variac
14.	Push Button
15.	Resistors

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Energy Meter:

Figure.4 Single phase energy meter

LED Pulse Generation On Meter

In electricity meters, the energy consumed is normally measured in fraction of kilowatt-hour (kWh) pulses. This information we can use to accurately calibrate any meter or to report measurement during normal operation. To serve both of these tasks efficiently, the microcontroller must accurately generate and record the pulses number. This is a general requirement to generate these pulses with relatively little jitter. Although time jitters are not an indication of bad accuracy, because when the jitter is averaged out, it can give a negative impression of the overall accuracy of the meter.

The sample code uses the average power to generate the energy pulses. The SD24 interrupt is accumulating the average power. This is nothing but it is converting it to energy. The pulse is generated when accumulated energy crosses a threshold. In the next interrupt cycle the magnitude of energy above this threshold is stored, and new energy amount is added. Because the average power tends to be a stable value, this way of generating energy pulses are very steady and free of jitter.

The threshold determines the energy tick specified by the power company and is a constant, for example, it is in kWh. In most meters, the pulses per kWh decide this energy tick. For example, in this application, we are setting the number of pulses generated per kWh to 1600 for active and reactive energies. The energy tick in this case is 1 kWh/1600. Energy pulses are generated and

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also indicated through LEDs on the board. There is control is provided over the pulse through Port pins are toggled for the pulses. The average power is in units of 0.01 W and 1 kWh threshold is defined as:

1 kWh threshold = 1 / 0.01 × 1 kW × (number of interrupts/sec) × (number of seconds in 1 hour) = 100000 × 3906 × 3600 = 0x14765AAD40.

AT89C51 Microcontroller

Advantages

It is a smaller computer

Has on-chip RAM, ROM, I/O ports...

Pin Diagram

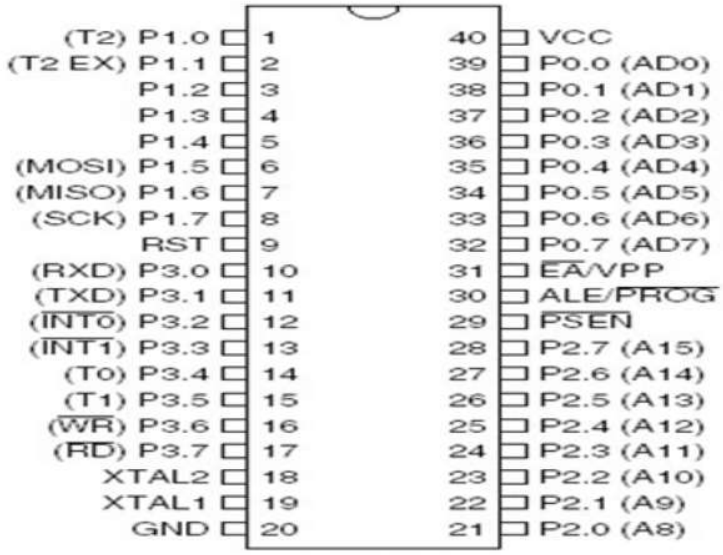

Figure.5 Pin diagram of AT89C51 Microcontroller

This figure shows the pin diagram of microcontroller AT89C51.This is the main component of the energy meter.The all other component is need not to be expalined in detail.The microcontroller is programmed using c-program.By using the program microcontroller works for automatic energy billing.Here is the progamming for the microcontroller is provided.

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C Programing

Program

Version:0.9 StartHTML:0000000105 EndHTML:0000013041
StartFragment:0000001197 EndFragment:0000013025

```
// Lcd module connections

sbit LCD_RS at P2_0_bit;

sbit LCD_EN at P2_1_bit;


sbit LCD_D4 at P2_2_bit;

sbit LCD_D5 at P2_3_bit;

sbit LCD_D6 at P2_4_bit;

sbit LCD_D7 at P2_5_bit;

// End Lcd module connections //////////////////


sbit RLY1 at P3_0_bit;

sbit RLY2 at P3_1_bit;

sbit SW1 at P1_0_bit;

sbit SW2 at P1_1_bit;

sbit SW3 at P1_2_bit;

////////////////////////////////////////////

char text1[] = "COUNT=       ";
```

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```
char text2[] = "UNIT =       ";

unsigned int x1,x2,Dinx;

char dig0,dig1,dig2,dig3,s1,s2;

bit d1,d2;


////////////////////////////////////////////////////////////////////////////

////////////////////////////////////////////////////////////////////////////

 void conv(void)

 {

 Dinx =x1;

 dig0 = (Dinx % 10) ;

 dig1 =((Dinx /10) %10) ;

 dig2 =((Dinx /100))%10 ;

 dig3 =((Dinx /1000) %10) ;


text1[7]=dig3+0x30;

text1[8]=dig2+0x30;

text1[9]=dig1+0x30;

text1[10]=dig0+0x30;

 }
```

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```
////////////////////////////////////////////////////////////////////////////////

void conv1(void)

{

Dinx =x2;

dig0 = (Dinx % 10) ;

dig1 =((Dinx /10) %10) ;

dig2 =((Dinx /100))%10 ;

dig3 =((Dinx /1000) %10) ;


text2[7]=dig3+0x30;

text2[8]=dig2+0x30;

text2[9]=dig1+0x30;

text2[10]=dig0+0x30;

 }

 ////////////////////////////////////////////////////////////////////////////////

void main()

{

P2=0x00;

P0=0x00;

P3=0x01;
```

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```
P1=0xFF;
 x1=0;
  x2=0;
 RLY1=0;
 RLY2=0;

 Lcd_Init();                    // Initialize Lcd
 conv();
   conv1();
 Lcd_Cmd(_LCD_CURSOR_OFF);          // Cursor off
 Lcd_Out(1,1,text1);                // Write text in first row
  Lcd_Out(2,1,text2);
 Delay_ms(100);

while(1)
{
 while(SW1 == 1);
          {
          //x2=0;
          x1=x1+1;
```

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```
        conv();
        conv1();
        Lcd_Cmd(_LCD_CURSOR_OFF);        // Cursor off
        Lcd_Out(1,1,text1);              // Write text in first row

    if(x1==3200)
       {
        x2=x2+1;
        conv1();
       x1=0x00;

      Lcd_Out(2,1,text2);

       }
       } while(SW1 == 0);
}
```

Conclusion

This paper present a model for Automatic bill calculating meter using 8051. It is demonstrated for measuring the electrical energy consumption of an electrical load for single phase system. This microcontroller based energy meter prototype which is implemented to provide upto 0.4 amp load from a 230 volt to neutral voltage. The process of reading of energy meter is done by LCD which is more simpler than that for analog meter . This energy meter has the potential to change the traditional billing system. This energy billing system is designed to help the energy

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distribution companies to reduce costs and increase profits, to improve metering and billing accuracy and efficiency, and to contribute the energy in a sustainable way. The test results obtained by the model is quite satisfactory and found to be having very much less error then the experimental tolerance level. This has been observed that the system is quite stable and do not show any error or instability during its operation.

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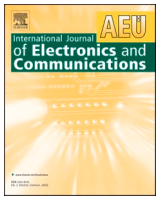

Regular paper

Flexible interconnected 4-port MIMO antenna for sub-6 GHz 5G and X band applications

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ABSTRACT

A flexible 4-port 4-element interconnected MIMO antenna is proposed for Sub-6 GHz 5G and X-band applications. The 4-element structure attains a low profile of $0.612\lambda^2$ (at 3.34 GHz) through careful placement of antenna elements. The elementary antenna top side is formed of an inverted E and inverted L-shaped conductive structure attached to both sides of the central feed line. Two hollow tilted square-shaped assemblies are added horizontally with the inverted L for performance enhancement. The bottom plane consists of a truncated ground with a vertical stub on the side for achieving wideband performance. The MIMO configuration along with polarization diversity is attained by positioning the elementary antenna symmetrically in a sequential rotational manner. The interconnection between ground planes is ensured by placing an I-shaped strip which is further modified by adding a slotted rectangular stub on the central vertical line for better isolation. The flexible antenna demonstrated minimum efficiency and maximum gain of 70% and 4 dBi, respectively in addition to accomplishing a bandwidth of (40%) 3.34–5.01 GHz and (3.31%) 8.9–9.2 GHz while satisfying the MIMO diversity performance in terms of envelope correlation coefficient (ECC) < 0.17. Finally, the antenna performance in terms of S-parameters and MIMO diversity parameters are tested by bending the antenna along the X and Y axis that demonstrated decent performance thus making the MIMO antenna worthy for its use in Sub-6 GHz 5G and X Band Applications with tight space requirements.

1. Introduction

5G is becoming increasingly popular owing to its use in connected services, which includes IoT, enhanced broadband in mobile devices, and communication that is mission-critical. 5G is designed to support forward compatibility and can flex to future services which are unidentified today. Not only that 5G makes our smartphones better but the technology can lead to novel experiences like AR (Augmented Reality) and VR (Virtual Reality) with uniform and faster data rates, low cost, and lower latency. 5G also helps in transforming industries with low latency, ultra-reliable links that can be used for controlling medical procedures, vehicles, and critical infrastructure remotely. 5G aids in providing seamless connectivity of embedded sensors for IoT applications thus providing low cost and extremely lean connectivity solutions [1]. Such applications demand higher bandwidth and data rates.

With the limitation in bandwidth resources and increasing high-speed data rate demands, multiple-input-multiple-output (MIMO) is emerging as the trivial solution owing to its distinctive advantages. MIMO technology improves communication quality, bandwidth, and data rates without using any extra power. Along with the multipath characteristics of wireless channels, the performance of MIMO structures also depends on the design and layout of the antenna. The designing of the antenna using MIMO technology needs careful geometry selection with higher inter-element isolation [2–3] and a common ground profile [4].

Separate [5] and connected ground 2 port [6–7] MIMO antennas are proposed however, the 2-port configurations fail to accomplish more users due to which design advancements in terms of more elements are needed. For the infrastructure using sub-6 GHz 5G band, the improvement of channel capacity and spectral efficiency requires MIMO structures with wide operating bandwidth [8–9]. Connected ground structures are more preferred looking at the practical utilization so interconnected connected 4-port [10–17] MIMO antennas are proposed in the literature. The 4-port non-conformable antennas have wide

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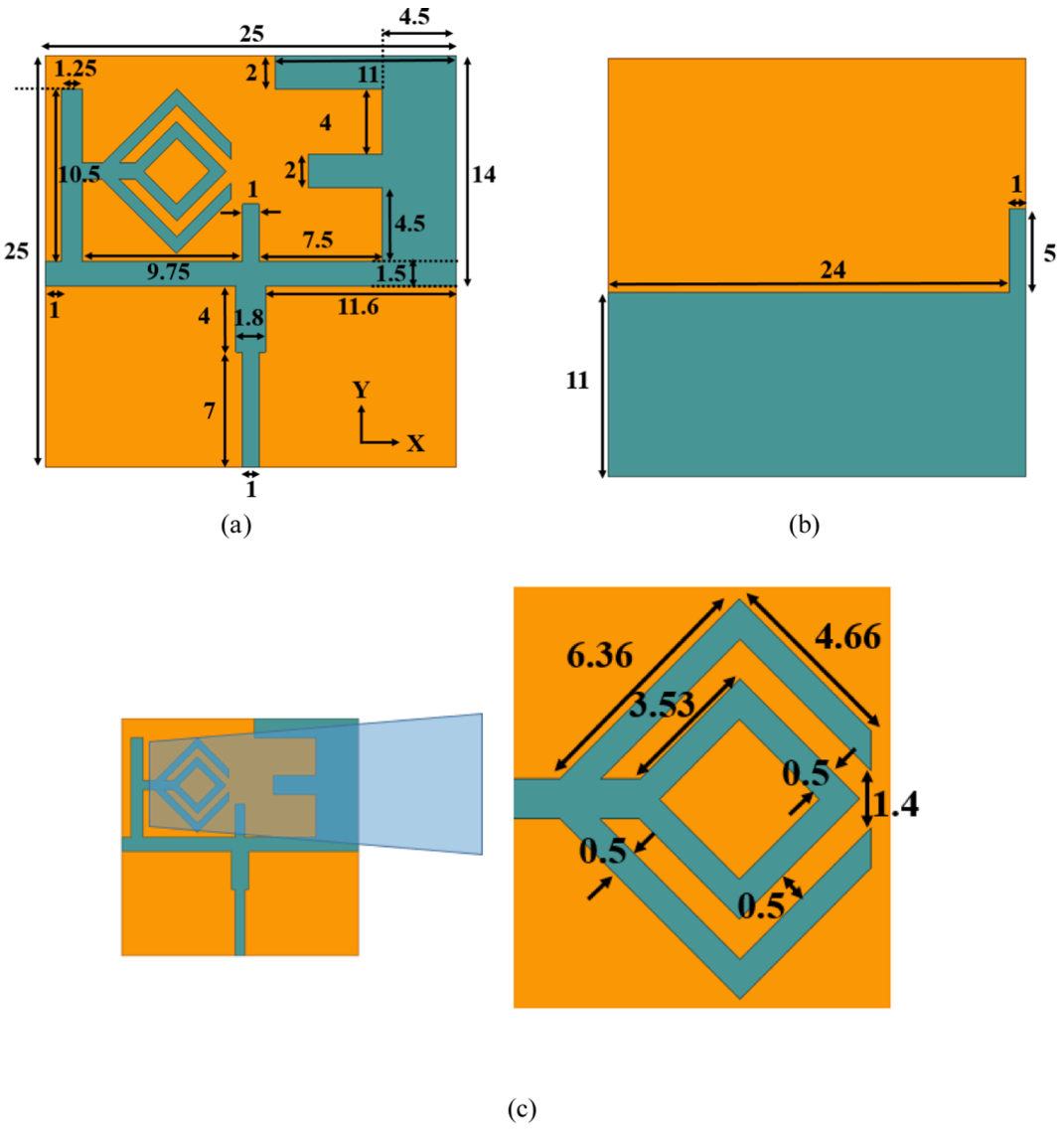
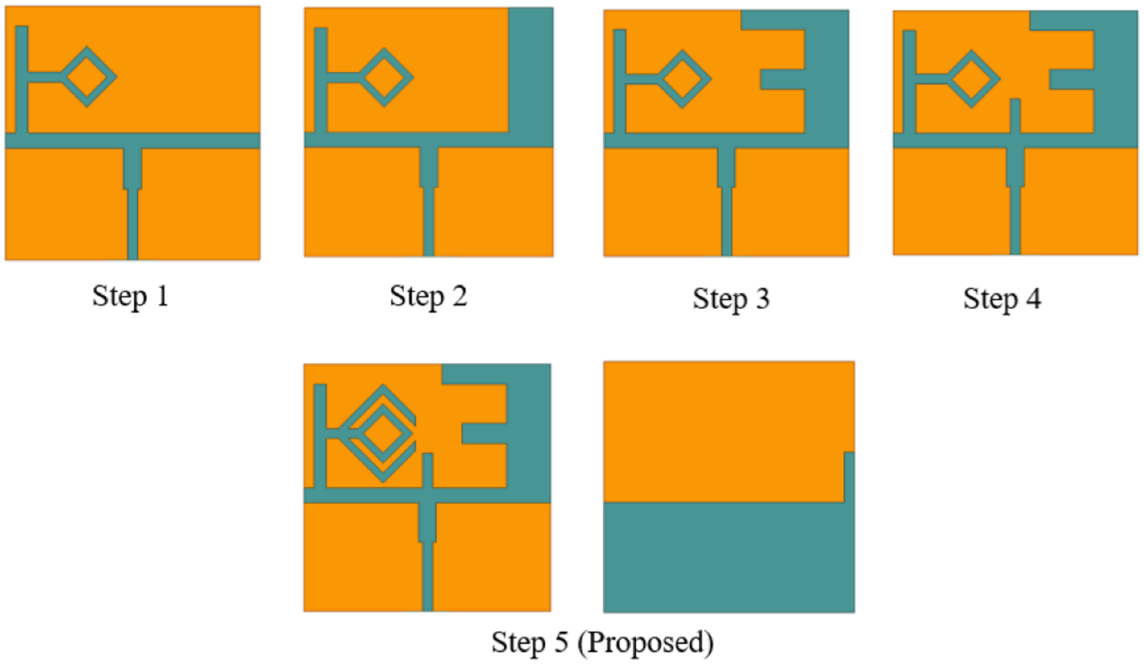


Fig. 1. Antenna geometry of single element flexible transparent antenna (a) Top View (b) Insight View (c) Insight View (Dimension in mm).

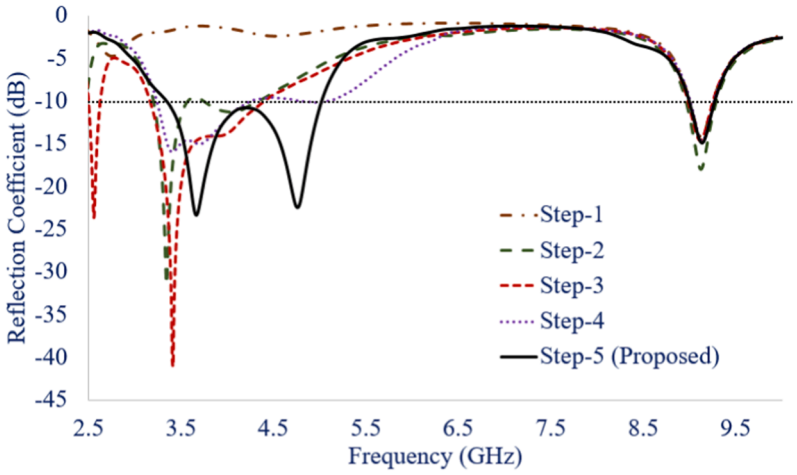
bandwidth and interconnected structure however, in applications where existing space in a system is less, flexible antennas can be a worthy solution that will not consume any extra space.

Flexible 2-port antennas [18–22] are proposed where the antenna in [18] is realized using flexible Kapton polyamide is demonstrated which incorporates a half-cut technique for size miniaturization and T-shaped stub for interconnection of the ground plane. Antenna shows the wideband and decent isolation performance however 2-element structure brings the limitation in accommodating more users. A flexible MIMO array using PDMS substrate is proposed in [19]. Antenna achieves high gain and isolation however single band operation (5.8 GHz) and 2-elements structure restraint its use for many applications. A wideband flexible wearable MIMO antenna is proposed in [20] however it is not covering the sub-6 GHz band and has a 2-port profile. A PET-based flexible 2-port MIMO is proposed in [21] for mm-wave (27.3 GHz – 40 GHz) applications. The higher frequency limits its use in the Sub-6 GHz band. A flexible Rogers based 2-port MIMO antenna working in triple-band regime is proposed in [22]. The antenna is flexible with common ground however the 2-port configuration brings limitations.

More user accommodation demands more antenna elements and to fulfil the demand, 4-port resonators are proposed. In [23], a flexible common radiator 4-port MIMO structure is realized using Roger's substrate that covers sub-1 GHz, WiFi-6, and sub-6 GHz 5G (NR) bands. The antenna shows decent MIMO performance however no bending analysis is carried out. A 4-pair conformal MIMO [24] resonating at 35 GHz is proposed although the lack of MIMO diversity analysis and higher resonating frequency makes it less useful for sub-6 GHz applications. In [25], a 4-port transparent MIMO resonator is proposed where the antenna is tested under bending conditions and also for MIMO diversity performance however the low conductivity of transparent material makes the gain and efficiency value very low which restricts its use where high gain is needed. It is observed that till now only three 4-port

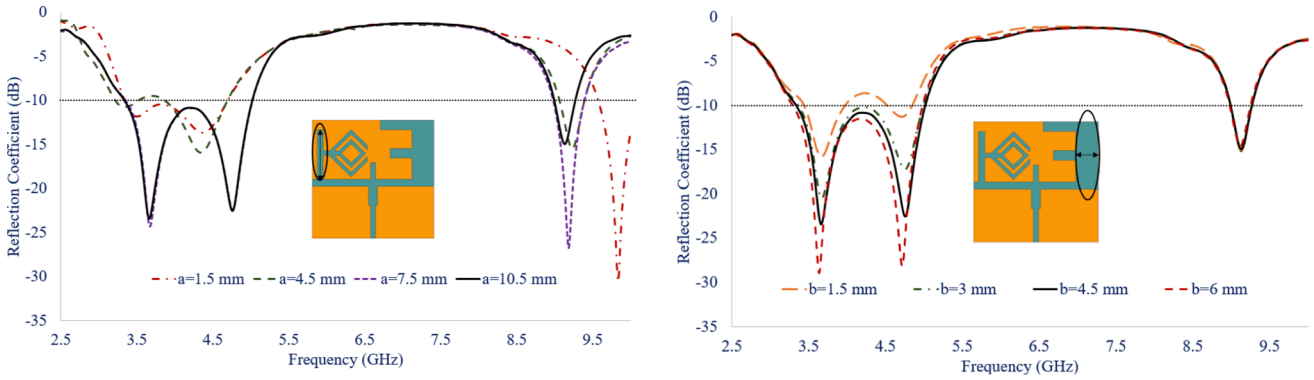


(a)



(b)

Fig. 2. flexible antenna (a) Evolution Steps (The ground plane is same for all the steps as shown in step 5) (b) Reflection Coefficient.



(a) (b)

Fig. 3. Parametric Variation of single element flexible MIMO antenna.

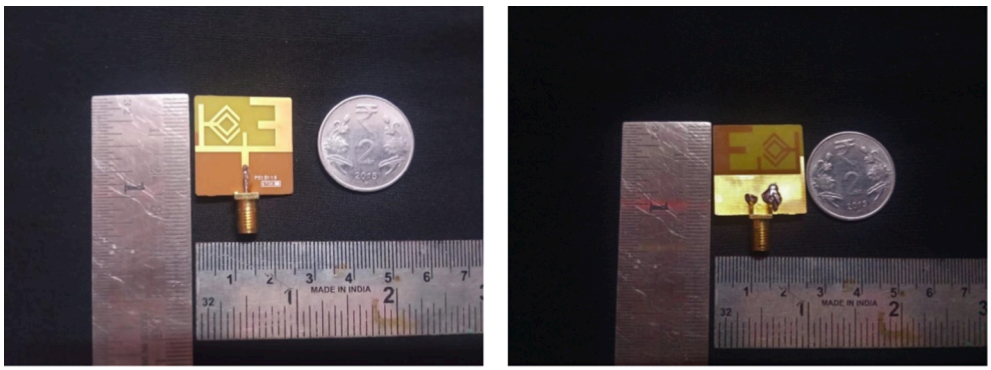


Fig. 4. Fabricated Antenna geometry of single element flexible MIMO antenna(a) Top View (b) Side View.

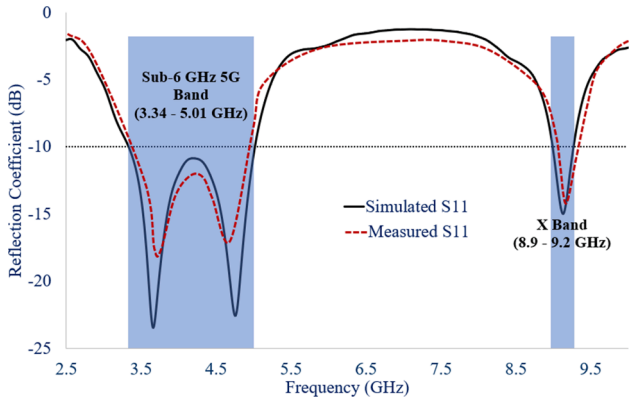


Fig. 5. Simulated and measured |S11| of single element flexible MIMO antenna.

flexible MIMO antennas are proposed where one lacks bending analysis, another one is proposed at mm-wave and the third one has low gain and efficiency due to the use of transparent material. So, the need for 4-port MIMO having a flexible substrate with high gain, wideband along with testing carried out under normal and bend situations is needed.

In this work, a flexible 4-port 4-element interconnected MIMO antenna is proposed for Sub-6 GHz 5G and X-band applications. The MIMO configuration along with polarization diversity is attained by positioning the elementary antenna symmetrically in a sequential rotational manner. The interconnection between ground planes is ensured by placing an I-shaped strip which is further modified by adding a slotted rectangular stub on the central vertical line for better isolation. The flexible antenna demonstrated minimum efficiency and maximum gain of 70% and 4 dBi, respectively in addition to accomplishing a bandwidth of (40%) 3.34–5.01 GHz and (3.31%) 8.9–9.2 GHz while satisfying the MIMO diversity performance in terms of envelope correlation coefficient (ECC) < 0.17. The typical performance of the MIMO antenna is validated under both normal as well as bend conditions by measuring the experimental values over the fabricated prototype.

2. Single element flexible antenna geometry and parametric analysis

Fig. 1 illustrates the elementary antenna geometry where the top side is formed of an inverted E and inverted L-shaped conductive structure attached to both sides of the central feed line. Two hollow tilted square-shaped assemblies are added horizontally with the inverted L for performance enhancement. The bottom plane is depicted in Fig. 1 (b) consists of a truncated ground with a vertical stub on the side for achieving wideband performance. The insight view of two square rings is shown in Fig. 1. (c). The 50 Ω impedance matching is achieved by optimizing the feedline.

The antenna structure simulation followed by optimization is

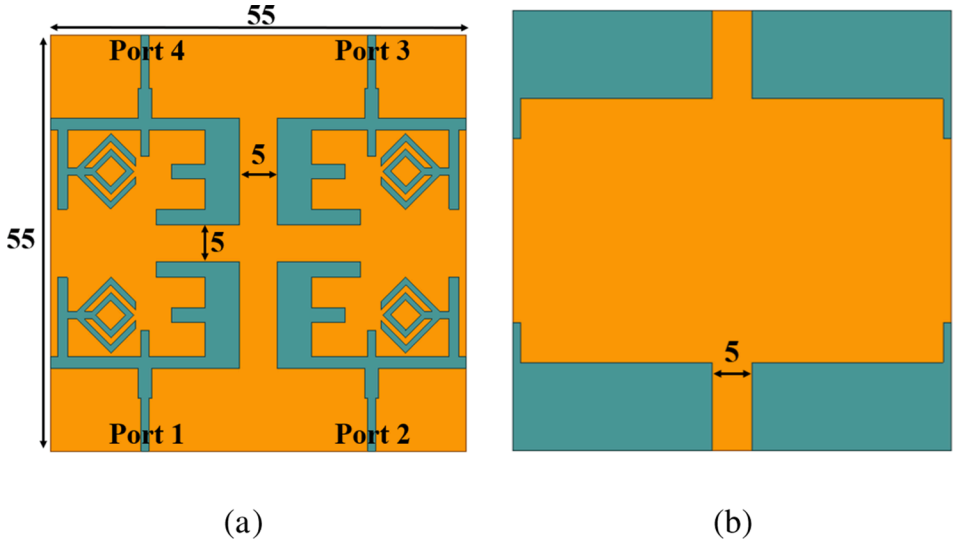


Fig. 6. Separate ground 4 elements flexible MIMO antenna (a) top view (b) back view (Dimensions in mm).

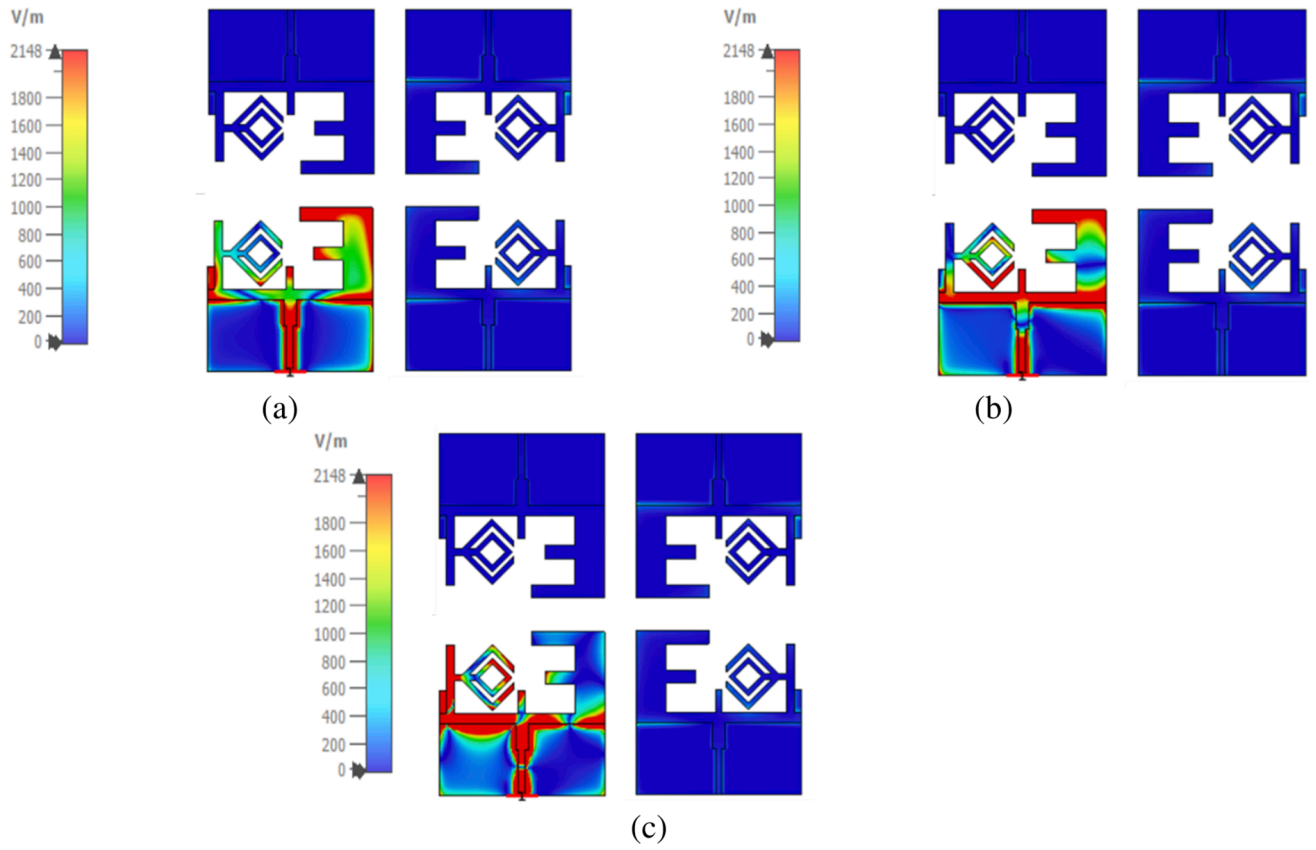


Fig. 7. Current Distribution for port 1 (Ant 1) excitation at (a) 3.65 GHz (b) 4.75 GHz (c) 9.10 GHz.

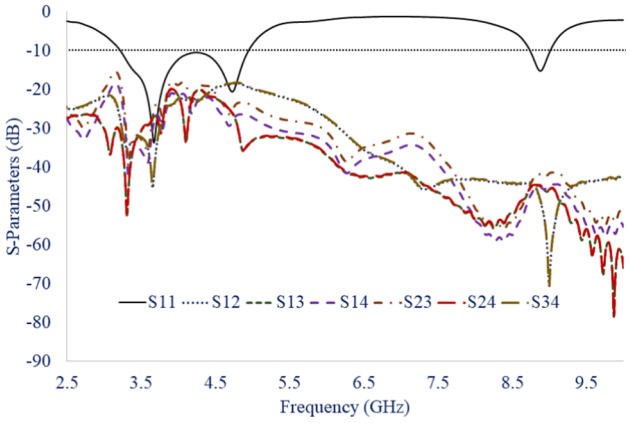


Fig. 8. S Parameters of 4 element antenna with separate ground.

executed using the CST MWS tool where the final elementary structure has a size of 25 × 25 mm^2 with a thickness of 0.2 mm that is printed on FR-4 substrate ($\varepsilon_r = 4.4$, $\tan\delta = 0.02$).

The antenna progression process is illustrated in Fig. 2 (a) which is explained by referring to the simulated reflection coefficient plot in Fig. 2(b). Antenna in Step 1 is realized by placing a horizontal line over the central feedline attached to a vertical line having a horizontally placed square-shaped structure connected through a rectangular stub.

Step 1 shows a single band response at the higher (X) band. The lower band (sub-6 GHz) is still not covered due to which a vertical rectangular stub is added opposite to the square-shaped structure (Step 2). A dual-band resonance is observed that covers sub-6 GHz and X band frequencies. However, in step 2, the reflection coefficient levels are not satisfactory due to which two horizontal strips are added to the vertical rectangular stub (step 3) that improved the reflection coefficient on the lower side with the generation of an additional band but impedance bandwidth deteriorated. To improve the bandwidth and remove the additional band on the lower side, a vertical strip protruding over the feedline is added (Step 4). Finally, the addition of another square-shaped ring and trimming of the edges from one end helped in achieving satisfactory resonant bands (3.34–5.01 GHz and 8.9–9.2 GHz) with wide IBW on the lower side (Proposed antenna). It should be noted that the ground plane is kept identical for all the steps as shown in step 5.

Two different parameters are studied in detail as it is observed from Fig. 2 that impedance bandwidth is very much sensitive in the sub-6 GHz band. The geometrical parameters of the proposed antenna are decided after analysing the reflection coefficient curves by varying the length and width of vertical stubs on the two corners as shown in Fig. 3 (a-b). It is observed that the impedance bandwidth is significantly affected in the sub-6 GHz regime. At the X band, the effect on reflection coefficient levels is observed with a negligible effect on the impedance bandwidth. The length and width of stubs are chosen as 10.5 mm and 4.5 mm for achieving the targeted bands and impedance bandwidth.

The fabricated top and ground plane view of the flexible antenna is

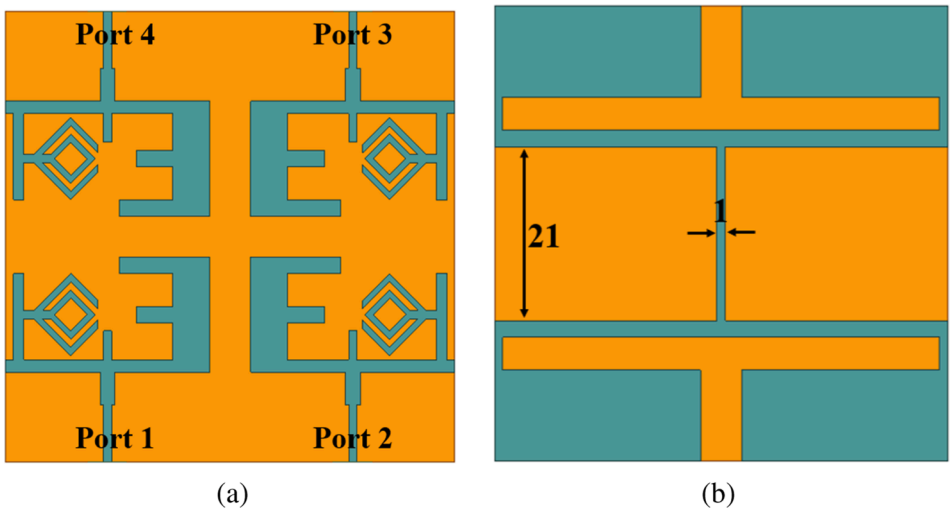


Fig. 9. Antenna geometry of 4 elements connected ground flexible MIMO antenna with isolation structure (a) Top View (b) Ground plane View (Dimension in mm).

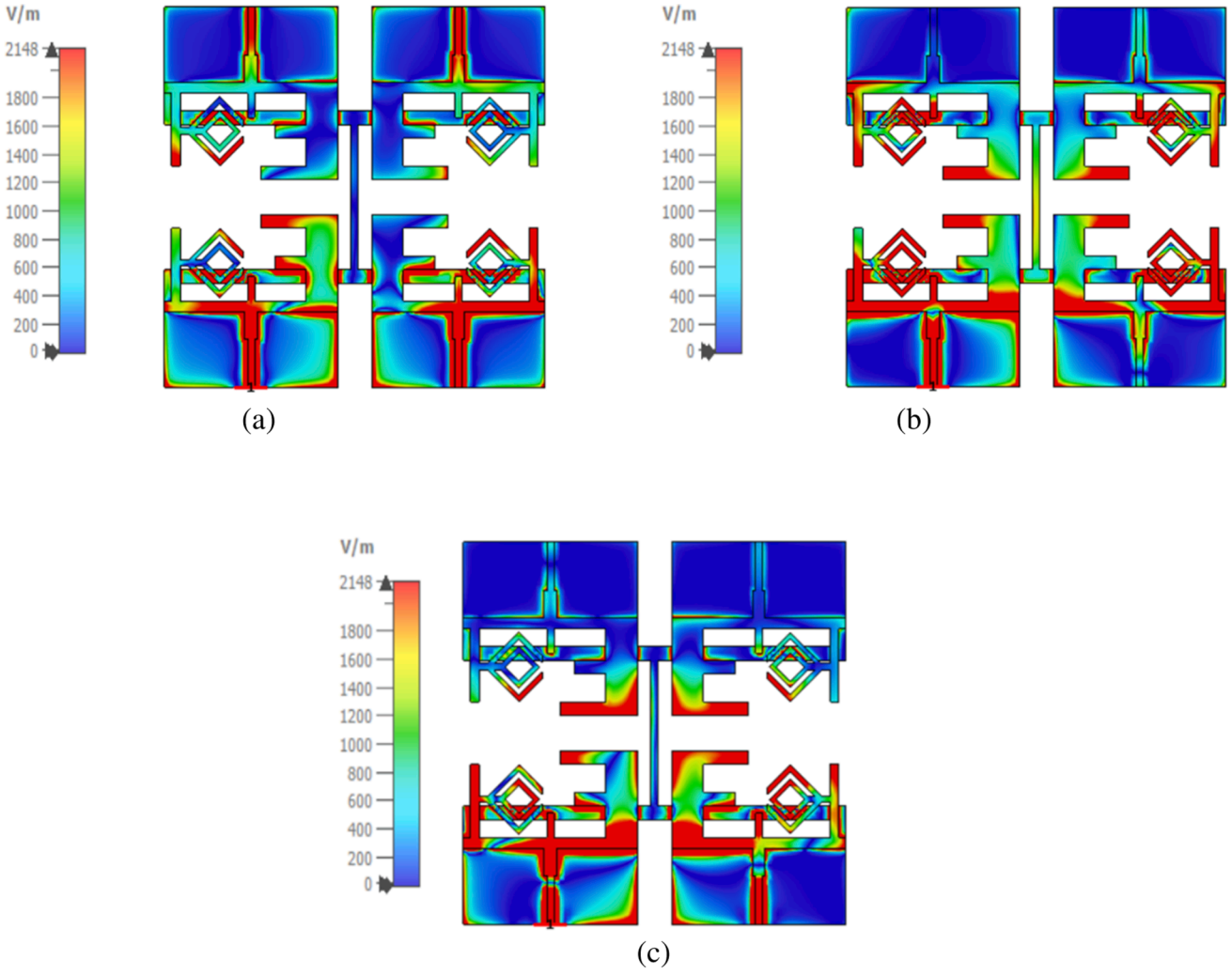


Fig. 10. Current Distribution for port 1 (Ant 1) excitation at (a) 3.65 GHz (b) 4.75 GHz (c) 9.10 GHz.

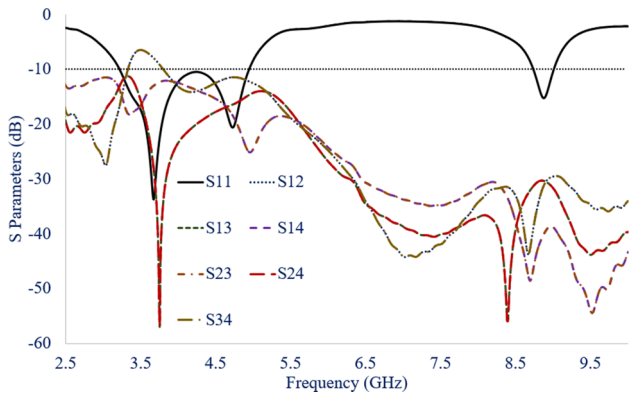


Fig. 11. S Parameters of 4 element antenna with the connected ground (Case 2).

shown in Fig. 4 which is experimentally verified using VNA. The elementary antenna achieves experimental impedance bandwidth of 38.84% (3.36–4.98 GHz) and 2.71% (9.1–9.35 GHz), respectively matches well with software results (Fig. 5).

3. 4-Port flexible MIMO antenna geometry

The 4-port flexible antenna realization is explained by discussing three cases. In all the cases the top side is the same where the 4 alike elements are placed in a sequential symmetrical rotational manner to achieve decent polarization diversity (Fig. 6 a). The ground plane in all three cases is different where case 1 has a separate ground (Fig. 6 b), case 2 has a connected ground and case 3 has a connected ground with an isolation enhancement scheme.

3.1. Case 1 (4-port separate ground structure)

The 4-port antenna (case 1) as shown in Fig. 6. is realized by arranging the single element resonator rotationally while maintaining symmetry. The ground plane is still detached as visible in Fig. 6(b). The edge-to-edge distance between the elements is 5 mm with an overall size of $55 \times 55 \times 0.2$ mm^3 (at 3.34 GHz).

Surface current distribution is plotted by exciting port of ANT 1 (terminating rest of the ports with 50 Ω load) at 3.65, 4.75, and 9.10 GHz to analyze the mutual coupling amid the antenna elements. The current distribution plot in Fig. 7. illustrates negligible coupling between the elements and ports which is obvious as the ground is not connected.

Fig. 8 depicts the S-parameters for case 1 design where the dual-band performance with impedance bandwidth of (3.34–5.01 GHz and 8.9–9.2 GHz) is observed. The isolation within horizontal, vertical and diagonal elements is more than 15 dB at the lower band while it is more than 45 dB at the X band by exciting port 1.

3.2. Case 2 (4-port connected ground structure)

The antenna realized in case 1 achieves decent isolation which is due to the separate ground structure. The applications using MIMO antennas demand common ground and as a result, the ground geometry is modified where I shaped strip is introduced that unites all the 4 ground planes as shown in Fig. 9 (a-b).

Surface current distribution is plotted by exciting port of ANT 1 (terminating rest of the ports with 50 Ω load) at 3.65, 4.75, and 9.10 GHz to analyze the mutual coupling amid the antenna elements. The plot illustrates that the inclusion of I shaped strip helps in achieving a connected ground structure but is unable to confine the current (Fig. 10) within the antenna element and port.

The insertion of I shaped strip on the ground plane leads to a connected ground profile however, the isolation along the horizontal direction deteriorates as observed in Fig. 11 due to a greater amount of current coupling as illustrated in Fig. 10. The vertical isolation is also not at a satisfactory level in the lower band. The impedance bandwidth for case 2 is (40%) 3.34–5.01 GHz and (3.31%) 8.9–9.2 GHz, respectively. The isolation within vertical and diagonal elements is more than 15 dB at the lower band while it is more than 45 dB at the X band by exciting port 1.

3.3. Case 3 (4- port connected ground isolation enhancement MIMO structure)

Even though the elements in case 2 are arranged in a progressive rotational manner, with elements parted by a distance of 5 mm (0.05λ), the chosen connected ground geometry leads to the higher coupling which demands a modification in the ground geometry with increased isolation.

The mutual effect among the antenna elements needs to be

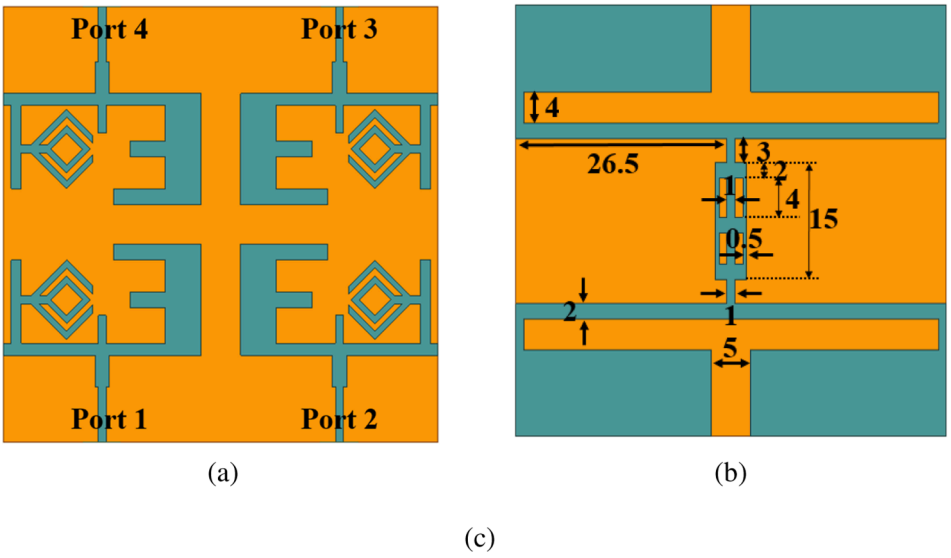


Fig. 12. Antenna geometry of 4 elements connected ground flexible MIMO antenna with isolation structure (Case 2) (a) Top View (b) 3D View (c) Layered View (Dimension in mm).

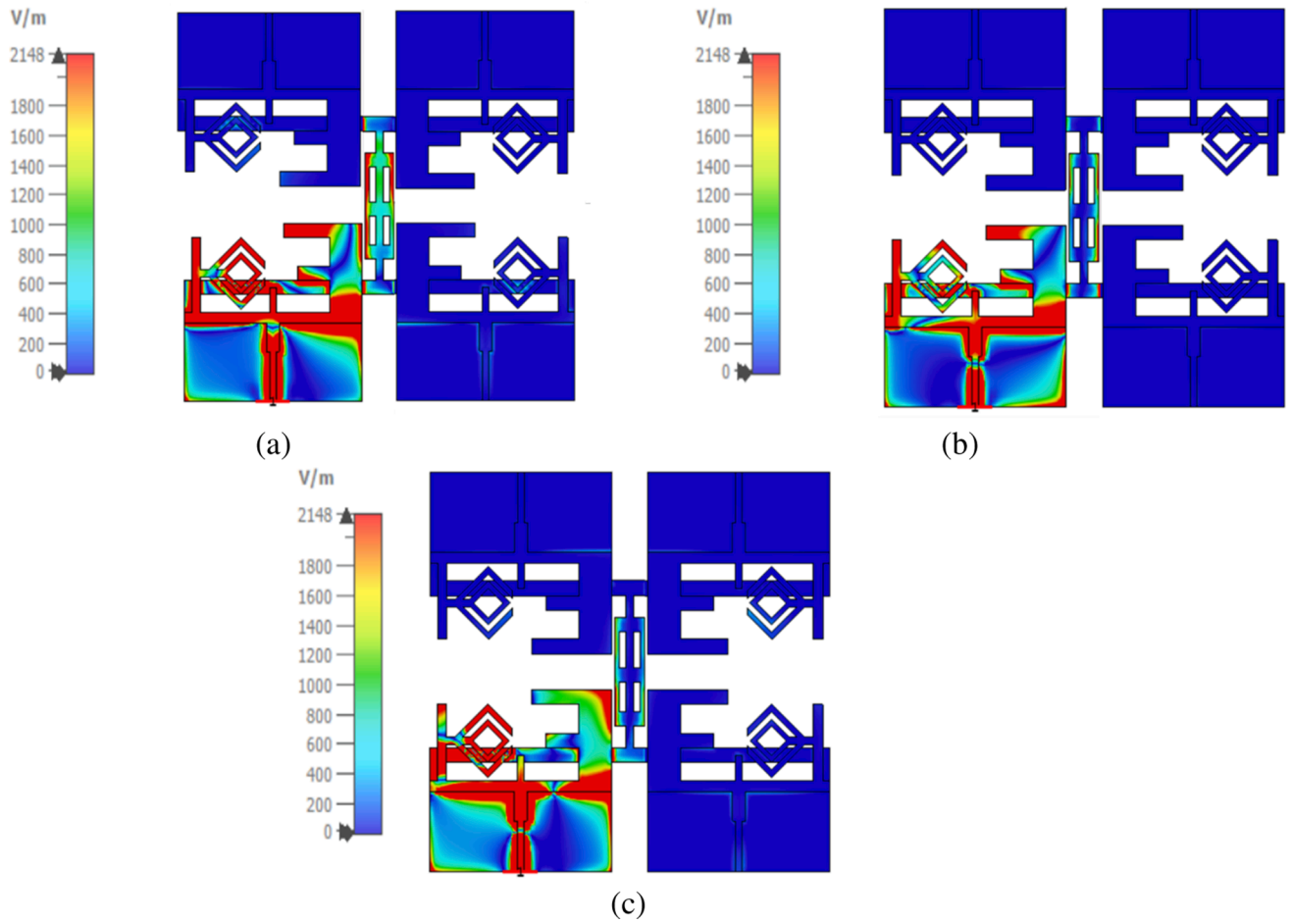


Fig. 13. Current Distribution for port 1 (Ant 1) excitation at (a) 3.65 GHz (b) 4.75 GHz (c) 9.10 GHz.

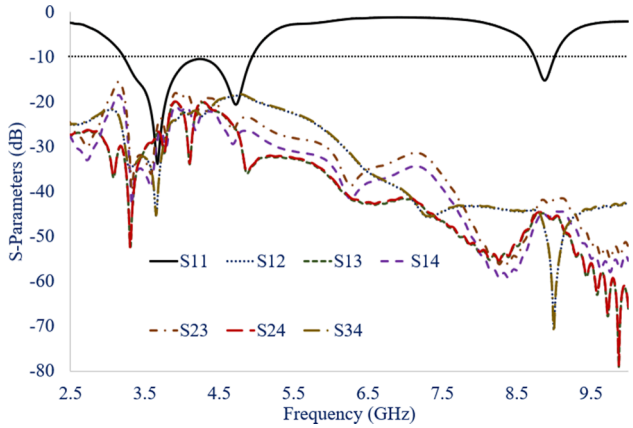


Fig. 14. S-Parameters of 4 element antenna with connected ground and isolation enhancement (Case 3).

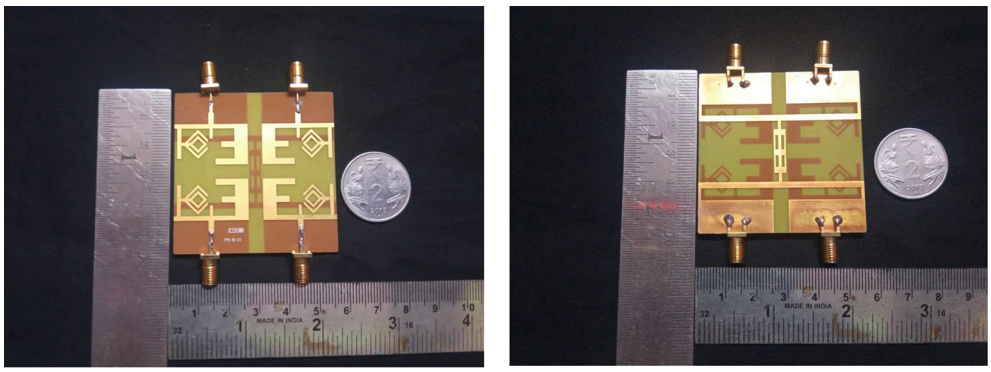
minimized for achieving superior efficiency and far-field radiation pattern. In Case 3, a flexible 4-port MIMO resonator with the modified connected ground with isolation enhancement structure is finalized. The interconnection between ground planes is ensured by placing an I-shaped strip which is further modified by adding a slotted rectangular stub on the central vertical line for better isolation as observed in Fig. 12.

Surface current distribution is plotted in Fig. 13 by exciting port of ANT 1 (terminating rest of the ports with 50 Ω load) at 3.65, 4.75, and 9.10 GHz to analyze the mutual coupling amid the antenna elements. The plot illustrates that the inclusion of slotted rectangular stub on the central I-shaped vertical line helps in achieving connected ground structure while it also helps to confine the current within the antenna element and port.

The S-parameters plot (Fig. 14) indicates that the inclusion of slotted rectangular stub on the central I shaped vertical line in the ground plane helped in improving the isolation with values better than 15 dB at the lower band and 45 dB at higher band along the horizontal direction, vertical direction and diagonal direction. The impedance bandwidth for case 3 is (40%) 3.34–5.01 GHz and (3.31%) 8.9–9.2 GHz, respectively which is similar to that of case 1 and case 2.

4. Results and discussions

The optimized isolation enhancement connected ground 4-port flexible MIMO resonator is printed on FR-4 substrate having 0.2 mm thickness, $\varepsilon r = 4.4$, and $\tan \delta = 0.0004$ as shown in Fig. 15. Scattering parameters are measured using Vector network analyzer (Anritsu ME7868) and radiation pattern along with Gain is measured in an



(a) (b)

Fig. 15. Fabricated Antenna geometry of 4 elements flexible MIMO antenna(a) Top View (b) Back View.

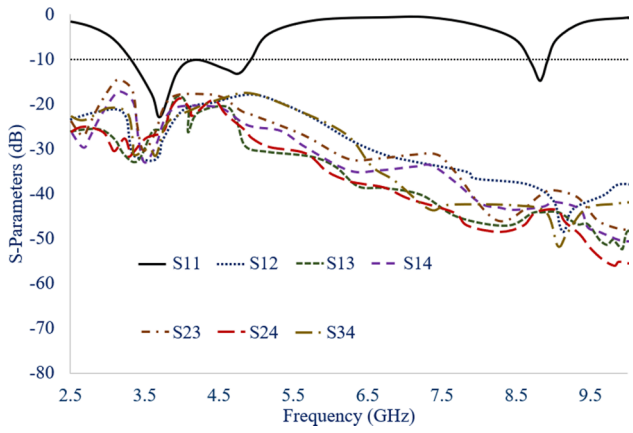


Fig. 16. Measured S-parameters of 4 elements flexible MIMO antenna.

anechoic chamber at 3.65, 4.75, and 9.10 GHz, respectively.

The measured characteristics in terms of scattering parameters are shown in Fig. 16. The measured results depict that impedance bandwidth for the targeted band (between 3 and 6 GHz for Sub-6 GHz 5G and X band) is achieved while ensuring the isolation levels >15 dB. Only |S11| is plotted for brevity where slight variation is observed in resonant peak which could be due to fabrication tolerances.

Fig. 17 shows the plot of far-field co and cross-polarized radiation patterns at 3.65, 4.75, and 9.10 GHz by providing the excitation across Ant. 1 (port 1) by terminating the rest of the ports through matched impedance across the E and H-plane. The radiation patterns are almost omnidirectional along the H plane with the dipole-shaped pattern along the E plane while maintaining the difference >15 dB amid co and cross-pol radiation patterns.

Gain greater than 4 dBi and 3 dBi with an efficiency of more than 70% is observed in Fig. 18 between 3.34 and 5.01 GHz and 8.9–9.2 GHz where almost identical results are achieved between experimental and simulated results.

4.1. MIMO diversity analysis

The practical utilization of the MIMO antenna needs careful analysis of diversity performance.

The evaluation of diversity capability is carried out using ECC for the system with multiple antennas. The resemblance among the received signals is evaluated using the ECC parameter. Lower ECC indicates lower mutual coupling where the safe threshold is 1. ECC value should be between 0 and 1. The ECC value should be evaluated using far-field parameters as suggested in [27–28]. The value of ECC can be calculated by referring to equation 1.

$$\rho_e = \frac{\left| \iint_{4\pi} [s_i(\theta,\phi)]^* [s_i(\theta,\phi)] d\Omega \right|}{\iint_{4\pi} |s_i(\theta,\phi)|^2 d\Omega \iint_{4\pi} |s_i(\theta,\phi)|^2 d\Omega} \quad (1)$$

where $s_i(\theta,\phi)$ is the 3D radiation port of the MIMO antenna when excitation is given to the i^{th} port. The asterisk indicates the Hermitian operator in a form of the product. Here for the measurement, the outdoor environment is considered. Fig. 19 illustrates that both the simulated and measured ECC value among the antenna elements is < 0.5 which maintains the safe level as suggested in [29].

4.2. Bending analysis

The bending performance is accomplished to check the MIMO antenna characteristics by bending the antenna over a cylinder of a radius of 20 cm along the X and Y axis as illustrated in Fig. 20. The bending angle is derived using equation (1), where θ is the bending angle in radian, W_{ant} represents antenna width and R is the radius of the imaginary cylinder [30].

$$\theta = \frac{W_{ant}}{R} \quad (1)$$

As the antenna has the same length and width values when placed on a curved surface, it provides the same curvature angles when the antenna is bent along the X-axis or Y-axis.

The antenna is tested in terms of S-parameters, ECC, gain, and efficiency. The fabricated prototype is shown in Fig. 21 where the antenna bending along the X and Y axis is visible.

The results in terms of S-parameters under bending circumstances reveal that up to the maximum bending radius of 20 cm, the antenna show nearly similar results as that under normal conditions. The measurements under bending conditions are carried out by holding the antenna over a Styrofoam ($\varepsilon_r = 1$) base. Nearly matching simulated and experimental impedance bandwidth is observed along the X-axis (Fig. 22) and Y-axis (Fig. 23), respectively under bend conditions.

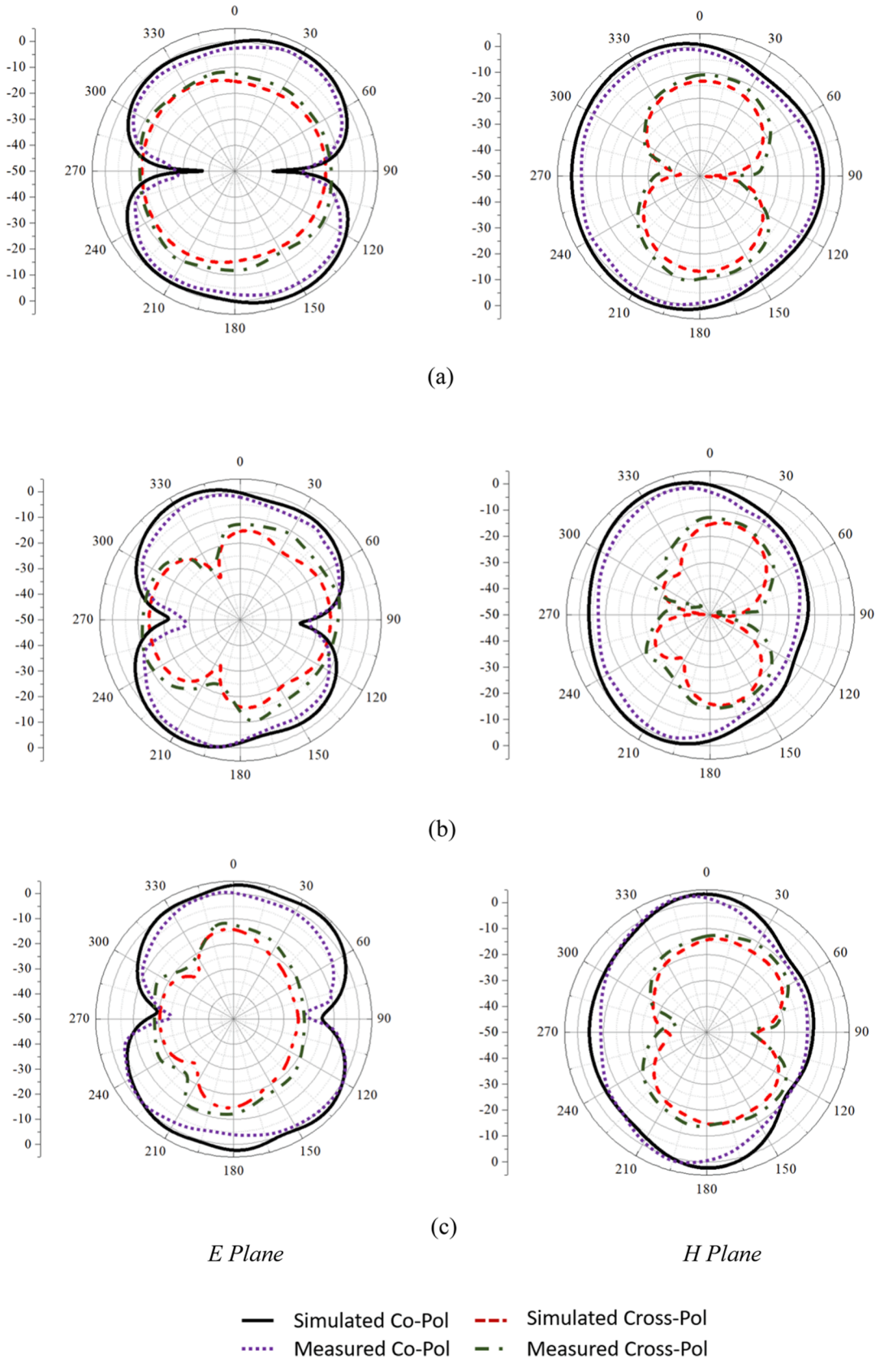


Fig. 17. Measured Co/Cross pol plot of 4 elements flexible MIMO antenna (a) 3.65 GHz (b)4.75 GHz (c)9.10 GHz.

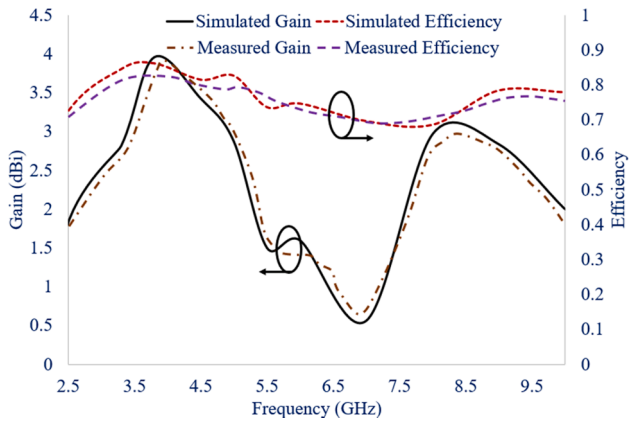


Fig. 18. Gain (Simulated and Measured) and Efficiency (Simulated) of 4 elements flexible MIMO antenna.

The isolation levels maintained a level greater than 15 dB between the elements under bending circumstances. The diagonal elements exhibited the lowest mutual coupling at the lower band whereas horizontal and vertical elements displayed the highest isolation at a higher frequency.

Gain and efficiency are also checked for the antenna as shown in Fig. 24. by bending the antenna in both the axis (x and y). It is illustrated that at the lower band the gain is more than 3 dBi which is similar to the gain under normal conditions however at the higher band the gain has significantly reduced. The efficiency of the antenna is still at a satisfactory level which is >68% at both bands.

Fig. 25 (a) shows that both the measured and simulated ECC of the antenna is <0.2 by bending the antenna along X-axis which is slightly greater than the antenna in normal conditions. The simulated and measured ECC are well below 0.15 for antenna bending along Y-axis as depicted in Fig. 25 (b).

The antenna is compared with the state-of-the-art flexible MIMO resonators in Table 1. The 4-port flexible antenna has a higher number of ports compared to [18–22]. The entire sub-6 GHz 5G band (3–6 GHz) is only covered by the proposed antenna except [25–26] however [25] has lower gain and efficiency due to the antenna being transparent whereas [26] has a greater size which occupies more area. The proposed antenna delivers flexibility, dual-band performance, low profile, high gain, 4 port connected ground configuration, with satisfactory ECC.

5. Conclusion

A flexible antenna with a 4-port MIMO configuration and common ground is successfully studied. Antenna yields dual-band performance with a 10-dB impedance bandwidth (IBW) of (40%) 3.34–5.01 GHz and (3.31%) 8.9–9.2 GHz which is applicable for sub-6 GHz 5G and X bands. The I-shaped strip that is further modified by adding a slotted rectangular stub on the central vertical line over the ground plane leads to isolation greater than 20 while it helped in achieving a common ground profile. Besides showing stable gain (3dBi and 4 dBi) at dual operating band, Omni-directional patterns, and ECC of < 0.017 are correspondingly demonstrated. The antenna displayed satisfactory transmission and scattering curves, gain, and ECC under the bending conditions thus making the proposed antenna a promising candidate for Sub-6 GHz 5G and X band applications.

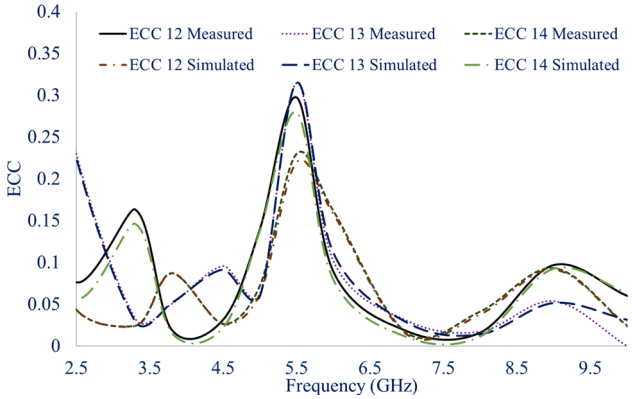


Fig. 19. Measured and Simulated ECC of 4 elements flexible MIMO antenna.

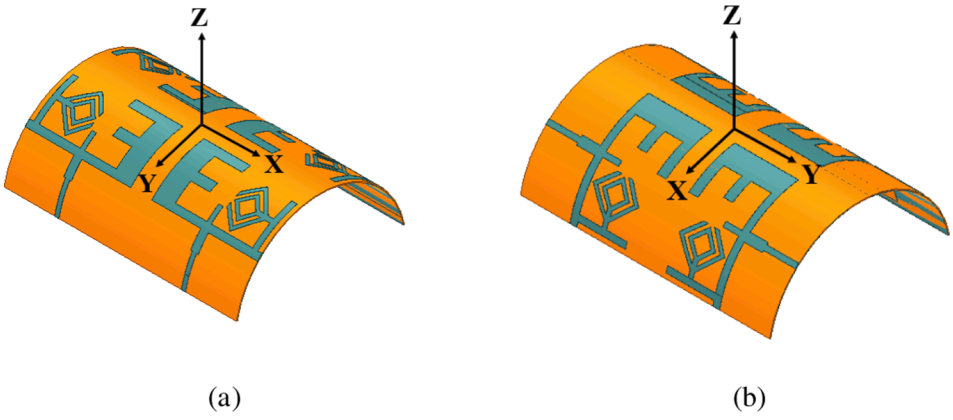


Fig. 20. Antenna Geometry (a) Bending along X-axis (b) Bending along Y-Axis.

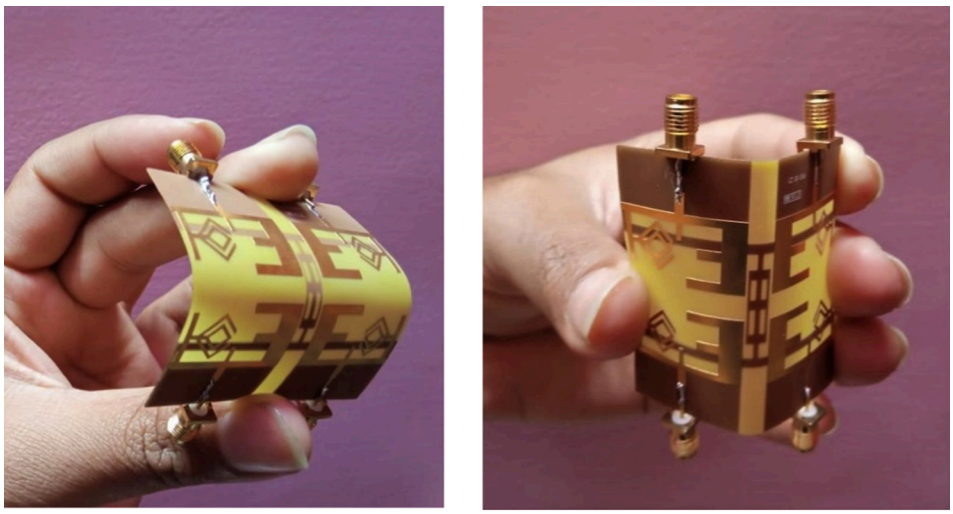


Fig. 21. Fabricated Antenna geometry (a) Bending along X-axis (b) Bending along Y-Axis.

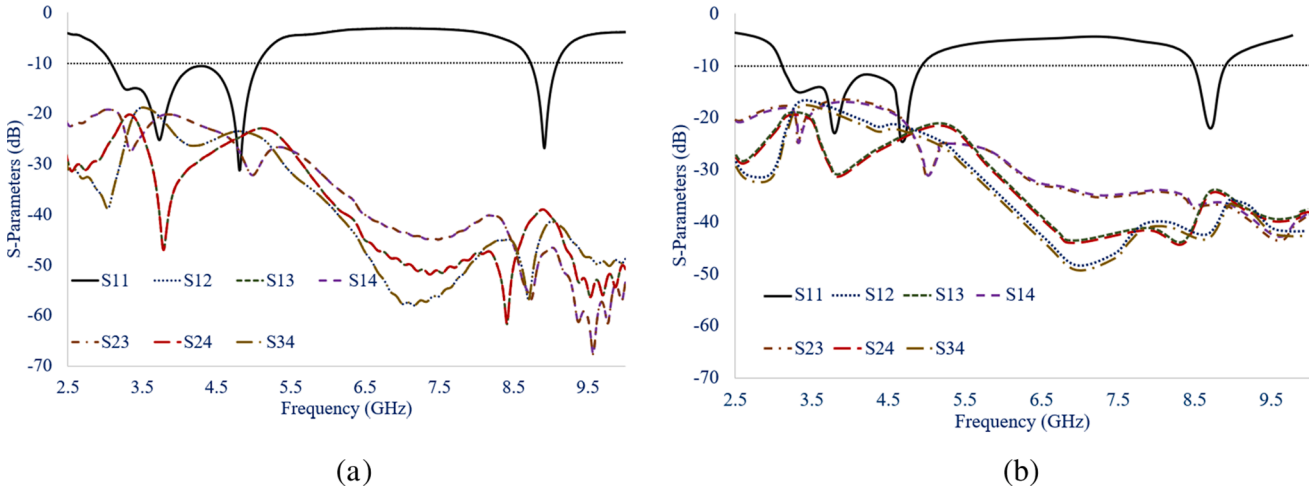


Fig. 22. S-parameters of 4 elements flexible MIMO by Bending along X-Axis (a) Simulated (b) Measured.

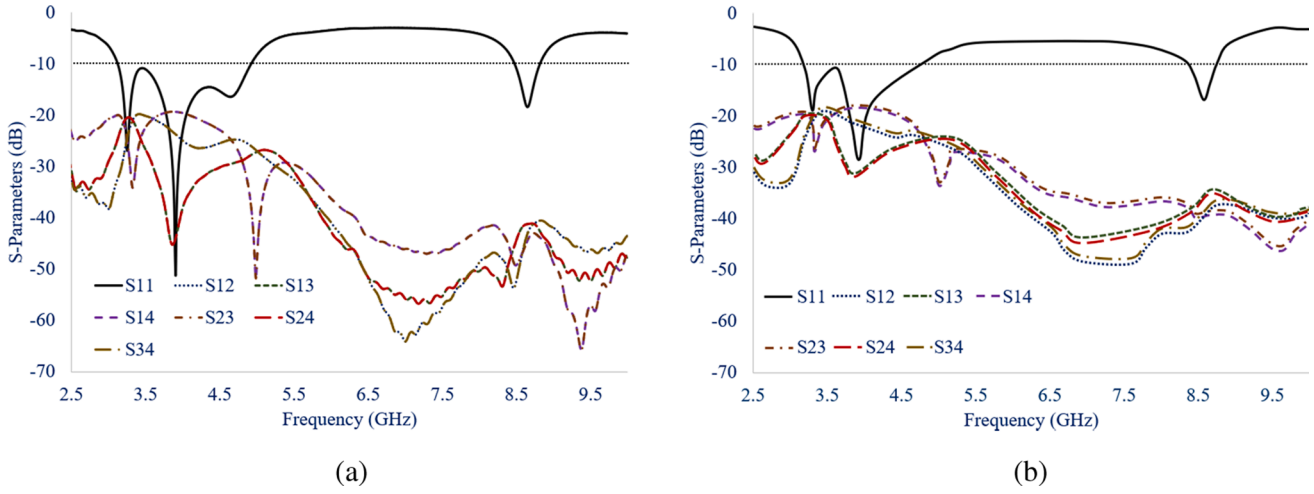


Fig. 23. S-parameters of 4 elements flexible MIMO by Bending along Y-Axis (a) Simulated (b) Measured.

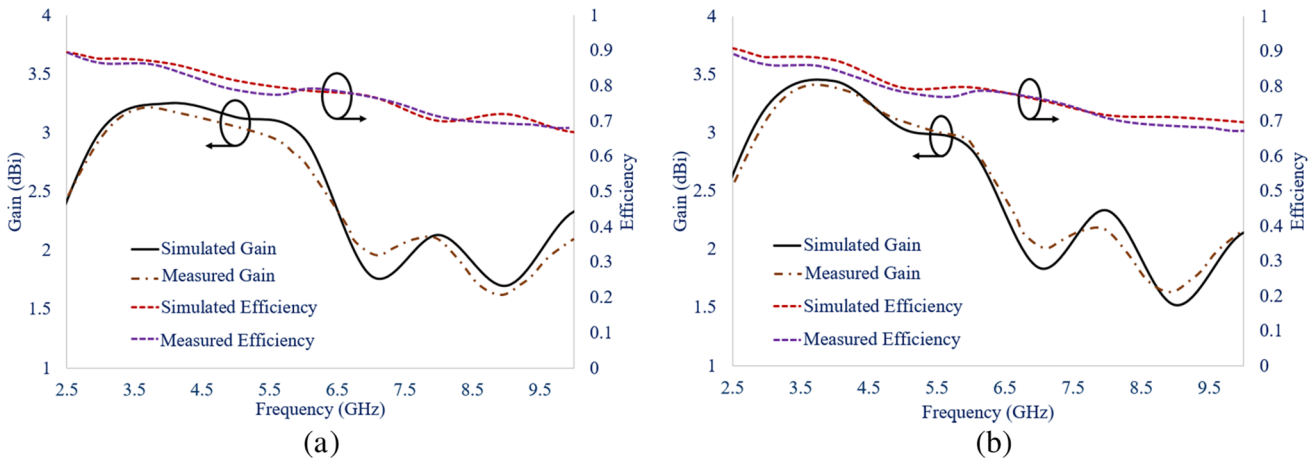


Fig. 24. Gain and Efficiency of MIMO antenna (a) bending along X-Axis (b) bending along Y-Axis.

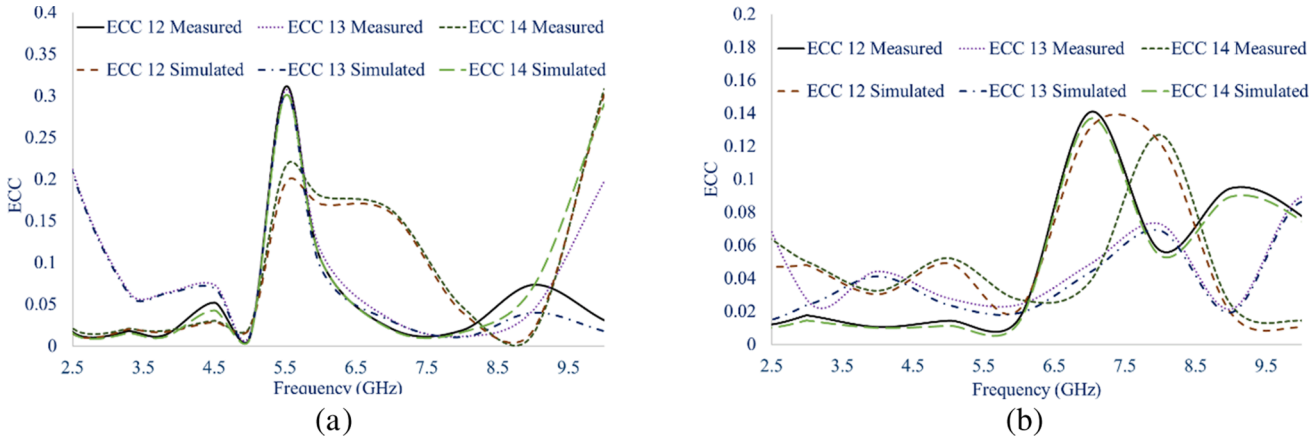


Fig. 25. Measured and Simulated ECC of 4 elements flexible MIMO antenna (a) Bending along X-axis(b) Bending along Y-axis.

Table 1
Comparative analysis of flexible MIMO antenna with other flexible MIMO antennas.

Ref	Size (mm^3)	SM	No. of Ports/ CG	Method	IBW	G (dBi)	E (%)	I (dB)	EED (mm)	ECC	YP
18	22 × 33	Kapton	2/Yes	Spatial Diversity with DGS	(122.14%) 2.9–12 GHz	2–3	NR	15	1.25	0.3	2019
19	126 × 70	PDMS	2/Yes	Spatial Diversity	500 MHz at 5.8 GHz centre frequency	11.5	72	31	14.5	1 × 10–6	2016
20	38.1 × 38.1	Felt	2/Yes	Polarization Diversity	20%	2.79	NR	12	NA	0.5	2018
21	11 × 25.4	PET	2/Yes	Spatial Diversity	(37.4%) 27.3–40 GHz	5.24	NR	20	NR	<0.01	2018
22	59 × 29	Rogers ULTRALAM 3850	2/Yes	Spatial Diversity with DGS	2.38–2.55 GHz, 3.37–3.60 GHz, and 4.92–5.37 GHz	3.79	NR	>19	21.1	0.05	2021
23	180 × 180	Rogers RO3003	4/Yes	Polarization Diversity	0.81–0.97 GHz, 1.66–1.68 GHz, 2.67–3.53 GHz, 5.4–5.95 GHz, and 6.73–6.88 GHz	-0.05,4.4, 6.9,5	70	10	NA	0.09	2021
24	Array Structure having 8 cell series	RT/ duroid5880	4/Yes	Spatial Diversity	11.6 % at 35 GHz centre frequency	13.3	NR	>40	NR	–	2017
25	66 × 45	Malinex	4/Yes	Spatial Diversity	(92.32%) 2.21–6 GHz	0.53	41	>15	11.08	<0.016	2021
26	70 × 145	FR-4	4/Yes	Spatial Diversity	2.37–5.85 GHz	4–5.5	85	>17.5	48/ 105	<0.5	2022
Proposed	55 × 55	FR-4	4/Yes	Spatial Diversity with DGS	(40%) 3.34–5.01 GHz and (3.31%) 8.9–9.2 GHz	4, 3	70	>20	5	<0.17	

SM: Substrate Material; CG: Connected Ground; IBW: Impedance Bandwidth; G: Gain; E: Efficiency; I: Isolation; EED: Edge to Edge Distance; ECC: Envelope Correlation Coefficient; YP: Year of Publication.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Design of Circularly Polarized Compact Size Wearable Antenna for UWB and 5G Application

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ABSTRACT

The proposed work shows the textile antenna design for the IEEE C band and future 5G communication. The proposed antenna #2 is compact with the size of $0.674\lambda \times 0.712\lambda$ and it is designed using jeans fabric as the dielectric substrate of $\varepsilon_r = 1.7$ and thickness = 4 mm. The values of the S11 parameter of the antenna are below −10 dB, with a high gain of around 15 dB. The antenna is radiating with two frequency bands from 4 to 18 GHz and 24 to 58 GHz; in addition to this, the proposed antenna acts as a notch filter for the 8–12 GHz frequency band. The bandwidth achieved for the antenna is 4 GHz and greater than 34 GHz. The bending analysis of the antenna has been carried out at a radius of 80 mm and an angle of 90°. The value of simulated group delays for the proposed antenna is constant and varies from 0.02138 to 0.4251 ns, and the measured values range from 0.0507 to 0.6425 ns. The proposed antenna can be used for WiMAX, 5G and GPS applications.

KEYWORDS

5G; bending performance; CST software; jeans; S11 parameter; notch filter and wearable antenna

1. INTRODUCTION

5G carries out various things and provides greater bandwidth and high downloading speed. Textile antennas can be partially or fully made up of textile materials. Textile materials are used as substrate materials, such as jeans, cotton, silk, and so on. They have a very low dielectric constant, so large bandwidth can be achieved using these materials. Textile materials are flexible, durable, and wearable fabric. The antenna has a compact size, lightweight, and small volume. Wireless body area network (WBAN) connected with the independent embedded-based system consists of different nodes with sensors fixed on the clothes or under the skin of the human beings. WBAN has many applications in defense, emergency service, consumer electronics, sport, remote health monitoring, and entertainment.

The designed antenna has lower efficiency on the body than the antenna, which is present in the air, and the radiation towards the body decreases approximately 10 dB. It decreases the bandwidth when operating frequencies shift. The UWB of the proposed antenna varies from 3.2 to 16.3 GHz, and the fractional bandwidth is 135% [1]. The proposed textile antenna for wireless data communication using smart cloth is examined under bent and flat positions [2]. A printed antenna is proposed using an entire ground plane radiating from 4 to 9.5 GHz for UWB frequencies and it is obtained by applying different bandwidth enhancement techniques and provides less impact on body tissues [3]. The antenna is designed for ultra-wideband (UWB) application with a radius of 15 mm; it has achieved an impedance bandwidth from 2 to 16 GHz [4]. The proposed coplanar waveguide (CPW) UWB antenna with the switchable function can work in multiple modes with good radiation patterns. The antenna can be used for multiple protocol communications: two-notch band characteristics are gained by SIS-HSIR and SIS-SIR [5]. The proposed embroidered textile antenna is in a circular shape with the T-slot and has a partial ground structure. The simulated textile antenna is fabricated using conductive and nonconductive wearable materials [6]. In embroidered wearable antenna electro conductive polyester yarn is used and −10 dB impedance, bandwidth from 2.7 to 10.62 GHz. The antenna has a steady gain and omnidirectional radiation pattern [7]. The proposed compact planar wearable antenna has 4.1 cm × 4.1 cm placed on different phantoms and human bodies fed by the microstrip line designed to resonate at ultra-wideband application. The wearable antenna radiates at the wide frequency and radiation of the antenna in all directions with an average gain of 3.11dBi [8]. The wearable ultra-wideband textile antenna provides the 13.08 GHz bandwidth. The textile material is used as the substrate,

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and this antenna is designed for medical applications [9]. The ultra-wideband antenna of compact size has been tested in the open air. The antenna's efficiency in free space is from 81.3% to 90.67% [10]. The proposed antenna radiates in the 3.4–12 GHz frequency, designed with a single planar patch for UWB communication. The results show a good bandwidth of 8.6 GHz with an omnidirectional radiation pattern, and the multiband antenna is designed for 5G application [11,12]. The proposed ultra-wideband (UWB) monopole antenna is designed with additively manufactured (AM) wearable fabric. It radiates from 3.1 to 10.6 GHz with −10 dB input impedance [13]. The proposed ultra-wideband flexible textile antenna with coplanar waveguide feed is designed with jeans substrate of dielectric constant 1.7. To increases the gain of the antenna, an Artificial Magnet Conductor (AMC) was used. The designed antenna shows the S11 parameter below −10 dB for the frequency range from 3 to 8 GHz [14]. The proposed monopole antenna was designed using a textile substrate. Using textile material, better characteristics have been achieved for the fabricate monopole antenna than for the conventional monopole antenna [15]. The designed reconfigurable wide slot antenna integrated with stepped impedance resonators, multiband communication and ultra-wideband ideal switches are used. The designed antennas provid the best antenna performance switching characteristics [16–18].

The TRAI (Telecom Regulatory Authority of India) has classified the 5G communication bands for India into three categories: low band (< 1 GHz), mid band (1–6 GHz) and high band or mmwave band (> 6 GHz) as per the study of 3GPP (3rd Generation Partnership Project). Also, TRAI has listed the 3-millimeter wave bands as n257 (26.5–29.5 GHz), n258 (24.25–27.5 GHz) and n260 (37–40 GHz) for upcoming 5G communication in India.

1.1 Textile Material Selection

Basically, in wearable antenna, two types of textile materials are used – natural and artificial. Natural materials are used commonly in all clothes, such as jeans, cotton, and so on and artificial materials are preferred using conductive copper/aluminum and textile threads, which form electro-textile synthetic material. As the theory says, the resonating frequency of the antenna is inversely proportional to the dielectric constant of the substrate used. With this concept, wearable textile antennas provide a wide bandwidth due to small values of dielectric constants for textile fabric. In this work, the textile antenna is designed and analyzed using jeans as the substrate material. The jeans material is smooth and flexible, so that it can be easily worn. The height of jeans substrate is selected in so that it will minimize the surface wave losses. The measurement of relative permittivity of jeans material has been carried out using a dielectric probe over the frequency range of 300 MHz to 20 GHz, and the relative permittivity (εr) found was nearly about 1.7.

The organization of the paper is as follows. Section 2 describes the antenna design and detailed configuration followed by results and discussions in Section 3. Section 4 compares simulated and measured results followed by conclusions in Section 5.

2. ANTENNA DESIGN AND CONFIGURATION

The ultra-wideband CPW fed-antenna is simulated using the CST microwave studio software. The proposed antenna #1 radiates from 3.2 to 16 GHz, and antenna #2 radiates at two frequency bands: 4–18 GHz and 24–58 GHz, and it acts as a notch filter for frequency band ranging 8–12 GHz, as shown in Figure 1. The proposed compact and wideband textile antenna #2 was designed using jeans fabric as a substrate ($\varepsilon_r = 1.7$) with a thickness of 4mm. The designed antenna's top patch and ground plane are made up of conducting material with a thickness of 35 microns and separated by the dielectric textile fabric of jeans material with reduced height 5–4mm [1].

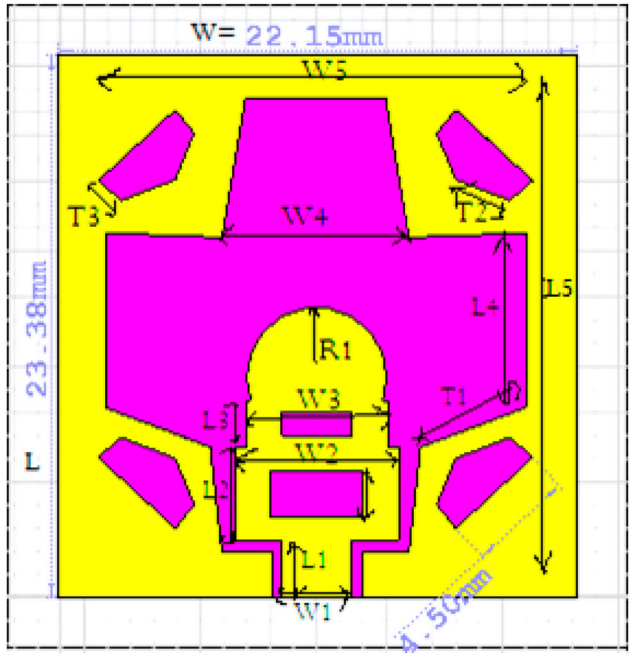


Figure 1: Measurements of the proposed antenna

Table 1: The dimensions of the designed antenna with optimized values

Parameter	W1	W2	W3	W4	W5	L1	T2	T3
Values (mm)	3	7	6.1	7.1	20	2.5	2.6	1.3
Parameter	L2	L3	L4	L5	R1	T1	T2	T3
Values (mm)	4	2.1	8.11	20	3	4.87	2.6	1.3

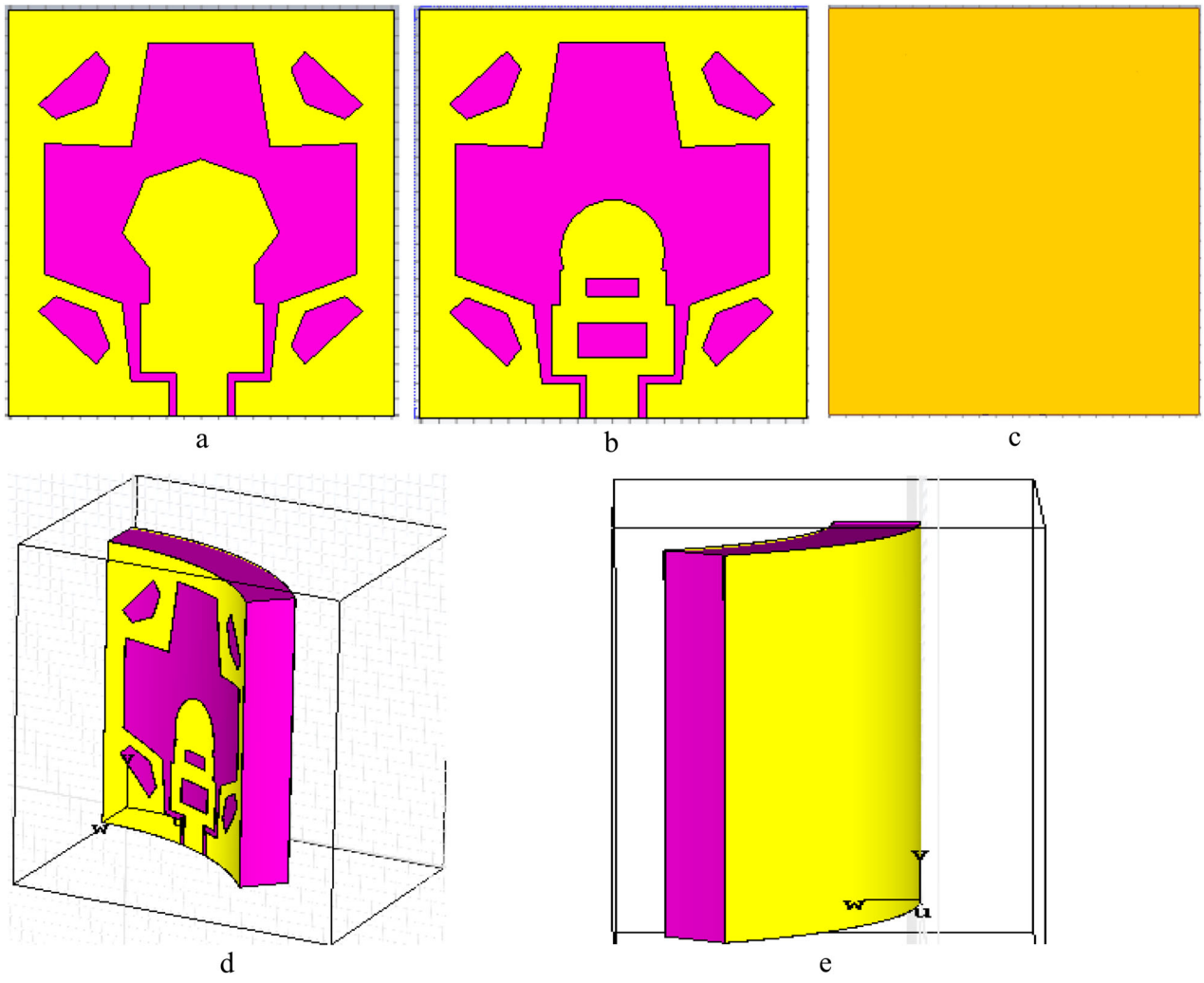


Figure 2: Picture of the proposed antenna: (a) top view of the antenna #1, (b) top view of the antenna #2, (c) bottom view, (d) top view of bending of the proposed antenna #2 and (e) bottom view of bending the proposed antenna #2

The proposed antennas were designed by cutting four slots at the corner of the rectangular patch of dimensions shown in Table 1 and are shown in Figure 2(a and b). After that, the conducting arm formed with rectangular and semicircular shapes is then designed in the middle of the top patch. The rectangular slots are added of size 4 mm × 2 mm and 3 mm × 1 mm and the polygon is replaced by a semicircle of radius $R = 3$ mm at the middle arm of the patch, as shown in Figure 2(b). Due to these slots designed on the top patch, the proposed antenna provided a wide range of operating frequencies from 4 to 58 GHz. The effect of variation of width W4 (4–7.5 mm) and length L4 (7–9 mm) was also investigated; the best results are analyzed at the given values shown in Table 1. Also, the bending performance of antenna #2 has been carried at a curvature radius of 80 mm and an angle of 90°, as shown in Figure 2(d and e). The bending radius matches the size of the human bicep (40–80 mm) of an arm, and the fabricated antenna can be worn on the human body. The antennas are designed with a full ground plane of 23.38 mm × 22.15 mm, as shown in Figure 2(c). The antennas provided a good and acceptable radiation pattern. The dimensions of antenna #2 are listed in Table 1, and the substrate specification is shown in Table 2. The top patch and ground planes of the textile antenna are fabricated using an adhesive copper

Table 2: Properties of the jeans material

Material	Value
Thickness, h (mm)	4
Dielectric constant, ε_r	1.7
Loss tangent	Normal

Table 3: Proposed antenna and their dimensions

	Dimensions of antenna (mm)	Slot 1 (mm)	Slot 2 (mm)	Radius of semicircle (mm)	Length and width variation (mm)
Antenna #1 [1]	23.5 X22	–	–	–	L5 = 6–7.5 W4 = 4–10
Proposed Antenna #2	23.38X 22.15	4 X 2	3X1	3	L4 = 7–9 W4 = 4–7.5

foil of 35 microns using the jeans material of 4 mm thickness. The proposed antennas are simulated using CST simulation software, and different antenna parameters, such as S11 parameter, VSWR, gain and efficiency, etc., are analyzed.

The proposed antenna #2 is simulated and fabricated by considering the novelty mentioned below:

1. The rectangular slots are added of size 4 mm × 2 and 3 mm × 1 mm and the polygon is replaced by a semicircle of radius R = 3 mm in the middle of the radiating patch.
2. The semi-rigid jeans as substrate material are used with $\epsilon_r = 1.70$ and a substrate height of $h_s = 4$ mm [1].
3. The proposed antenna#2 is implemented for a wide frequency range of 4–18 GHz and 24–58 GHz, and the variation of width W4 (4–7.5 mm) and length L4 (7–9 mm) are analyzed and observed its effect on the S11 parameter.
4. The bending analysis of antenna #2 has been carried out at a radius of 80 mm and 90 degrees, and its effect was observed on the S11 parameter.

Table 3 shows the comparison of antenna dimensions and their effect on antenna performance.

2.1 Textile Antenna Fabrication

The top and bottom planes of the antenna are made with an adhesive copper foil with a thickness of 35 microns. These two planes are separated by jeans fabric as the dielectric material of height $h_s = 4$ mm and $\varepsilon_r = 1.7$. The antenna is excited by the 50Ω SMA connector connected to the feed line with a thickness of 3 mm to radiating patch and ground plane. Figure 3(a and b) shows the top and bottom views of the fabricated antenna #2. The set up for the measurement of the S11 parameter of the fabricated antenna using VNA is shown in Figure 11.

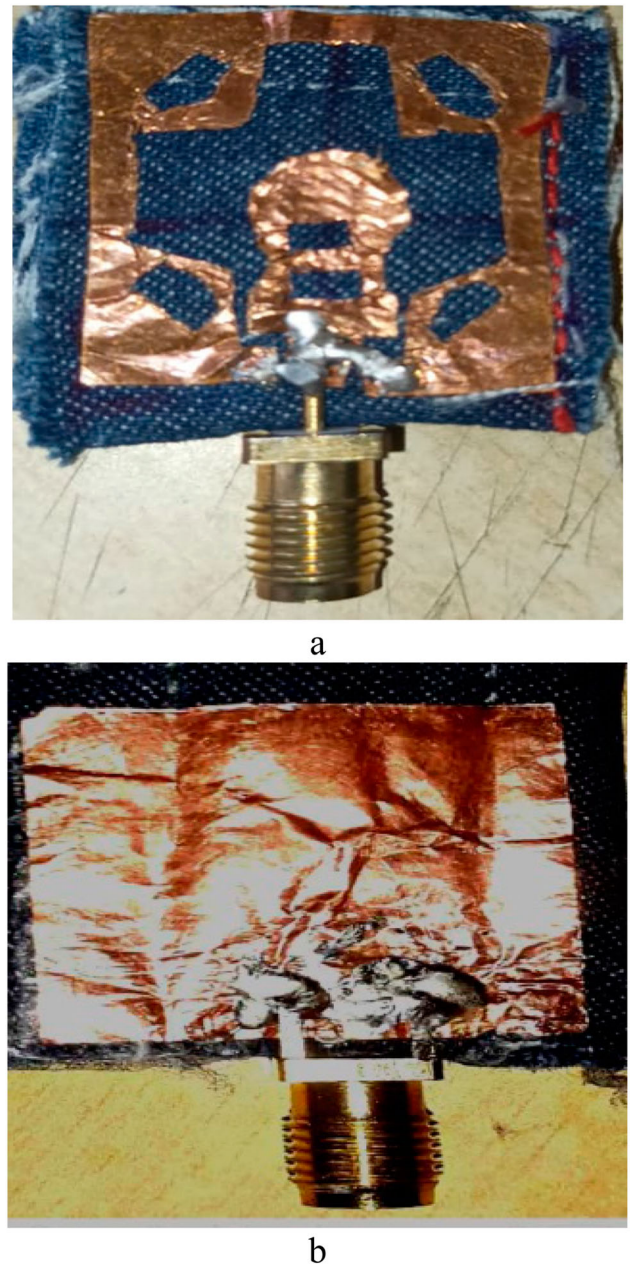
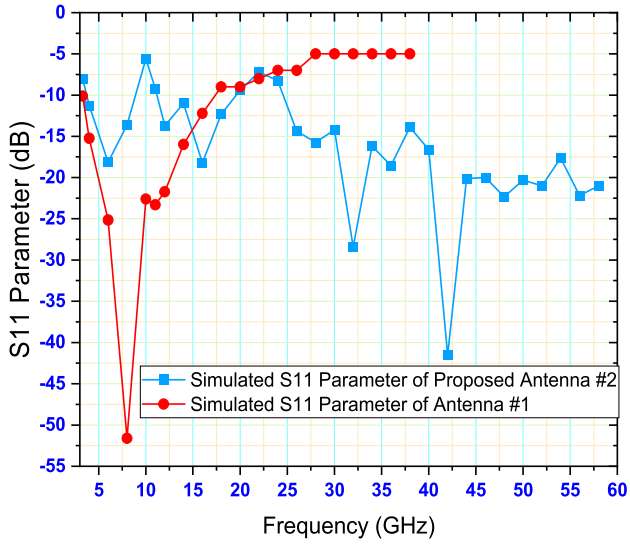


Figure 3: Pictures of fabricated antenna: (a) top view and (b) bottom view

3. RESULT AND DISCUSSION

The proposed antenna is analyzed and simulated with different antenna parameter variations (L5 and W4), and then fabricated. The simulated and measured S11 parameters, radiation plots and bandwidth, etc., are compared and discussed.



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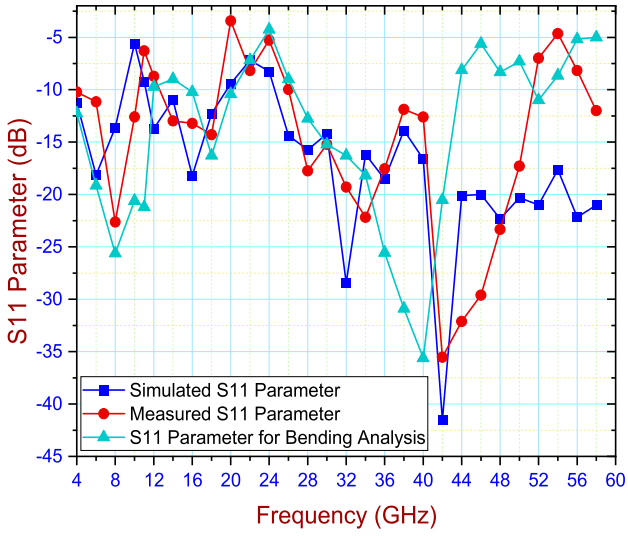

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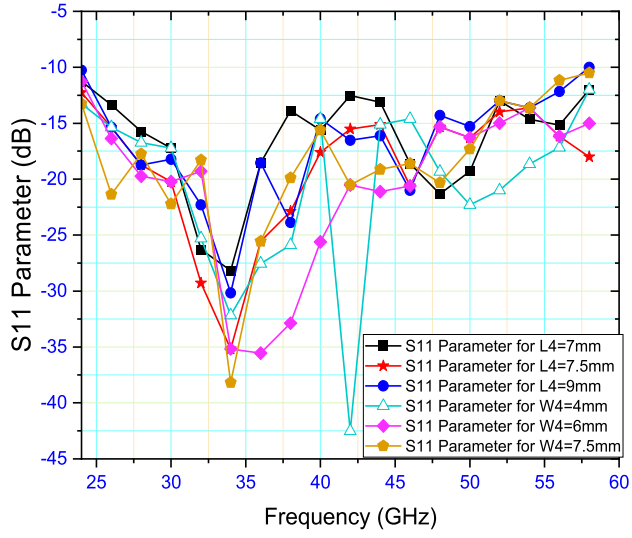


c

Figure 4: S11 parameter versus frequency plot of the proposed antenna: (a) simulated S11 parameter of antenna #1 and antenna #2, (b) simulated, measured and bending antenna #2, (c) S11 parameter for the effect of L4 (7–9 mm) variation and W4 (4–7.5 mm) variation

3.1 S11 Parameter

The S11 parameter is maintained below −10 dB for proposed antenna #1 over 3.3–16 GHz and antenna #2 over its operating frequency 4–18 GHz and 24–58 GHz. The simulated S11 parameter of antenna #1 and antenna #2 is shown in Figure 4(a) by red and blue color lines, respectively. The minimum S11 parameter value of −42.73 dB is obtained at 42 GHz indicating the best radiation of antenna #2. The bandwidth achieved for antenna #2 is 4 GHz at the first frequency band 4–8 and 34 GHz for the second frequency band 24–58 GHz. The large bandwidth of 34 GHz is achieved at the second frequency band due to slots is created on the top patch, polygon replaced by a semicircle with a radius of 3 mm and due to the use of jeans fabric of 4 mm thickness [1] with $\varepsilon_r = 1.7$ shown by the blue color line in Figure 4(b). The measured S11 parameter of the fabricated antenna #2 radiated over the frequency band of 4–58 GHz with an S11 parameter of −36 dB at 41 GHz shown in Figure 4(b) by the red color line. The S11 parameter for bending analysis of antenna #2 at 70–80 mm radius and 90° angle shown by green color in Figure 4(b) and comparison of values are listed in Table 3. The vertical bending of the antenna around the radius of 40–70 mm shows poor performance. The value of the simulated S11 parameter at various frequencies is shown in Table 4, and it is compared with base paper [1]. Also, the investigation has been carried out and

Table 4: Comparison of simulated and measured results of the proposed antenna #2

Parameters	Simulated	Measured
Frequency band (GHz)	4–8 GHz	4–9
Gain (dB)	24–58 GHz	25–50 GHz
Bandwidth (GHz)	13.8 at 54 GHz	13.3 at 56 GHz
Group delay (ns)	4 and 34	4 and 25
Fractional bandwidth (%)	0.0213–0.4251	0.0507–0.6425

achieved the best result for the variation of length L4 at 7.5–9 mm, as shown in Figure 4(c). When L4 = 7 mm, the S11 parameter is decreased after 35 GHz frequency and L4 = 7.5 mm, it is −35 dB at 34 GHz. The effect of width W4 variation was also analyzed for the values of W4 = 4 and 6 mm, at W4 = 4–7.5 mm a large bandwidth is achieved, as shown in Figure 4(c).

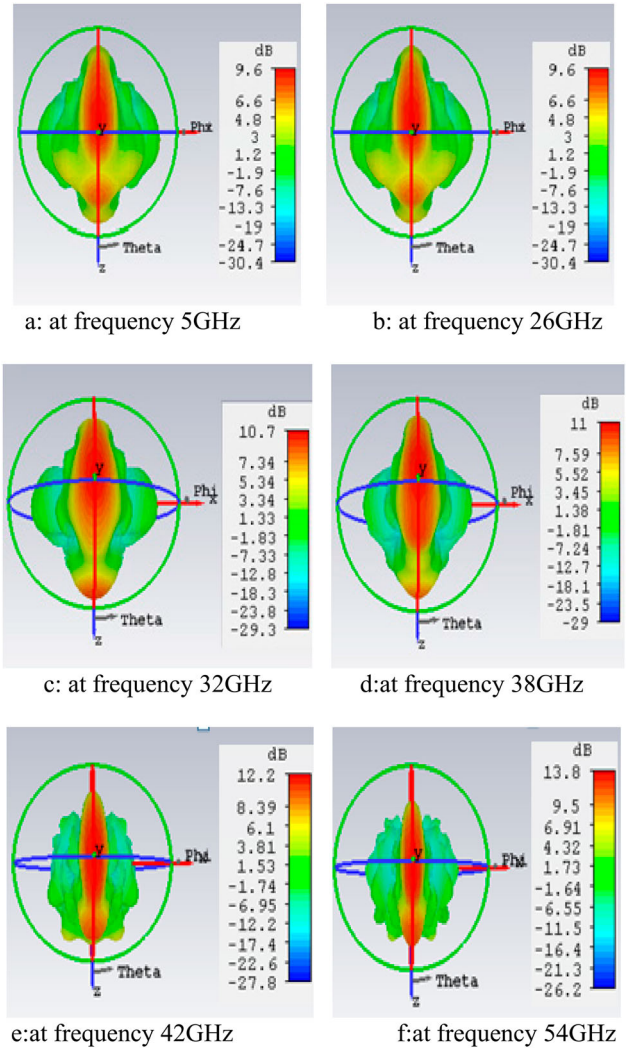


Figure 5: Simulated 3D radiation pattern of proposed antenna #2, at (a) 5 GHz, (b) 26 GHz, (c) 32 GHz, (d) 38 GHz, (e) 42 GHz and (f) 54 GHz

3.2 Surface Current Distribution of the Proposed Antenna

When an antenna is designed with a metallic conductor, an electric current is induced due to the electromagnetic effect. This induced current as surface current distribution of the proposed antenna #2 varies from 66.32 to 95.654A/m. The slots 1 and 2 created at the middle arm of the top patch help enhance the bandwidth of the proposed antenna.

3.3 Radiation Pattern of the Proposed Antenna

The designed antenna #2 shows the different gain values at the different frequencies.Figure 5(a–f) shows that the gain of 4.47, 9.6, 10.7, 11, 12.2 and 13.8 dB over the frequency band of 4–8 GHz and 24–58 GHz. For the 5G communication, the gain value must be greater than 10 dB, which is achieved by the proposed antenna #2.

The maximum gain of 13.8 dB is obtained at 54 GHz due to the added slots and semicircle used at the middle arm of the top patch. Also, the gain of the fabricated antenna is measured on the VNA; the measured gain is high at 45Gha and 56 GHz frequencies. For the other remaining frequency band, the measured and simulated gain is approximately the same, as shown in Figure 6. The measurement of gain of the fabricated antenna is shown in Figure 10(b).

3.4 Radiation Pattern of the Proposed Antenna

The simulated and normalized measured radiation pattern of the proposed antenna #2 is shown in Figure 7.

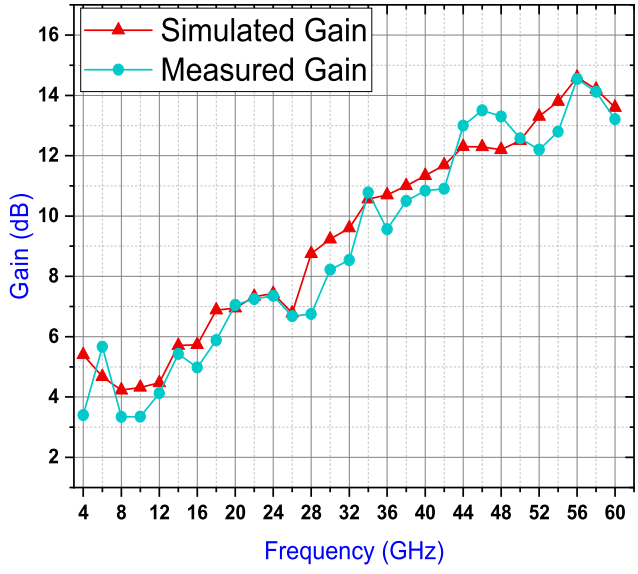


Figure 6: Resonating frequency versus gain plot of proposed antenna #2: — simulated gain and —- measured gain

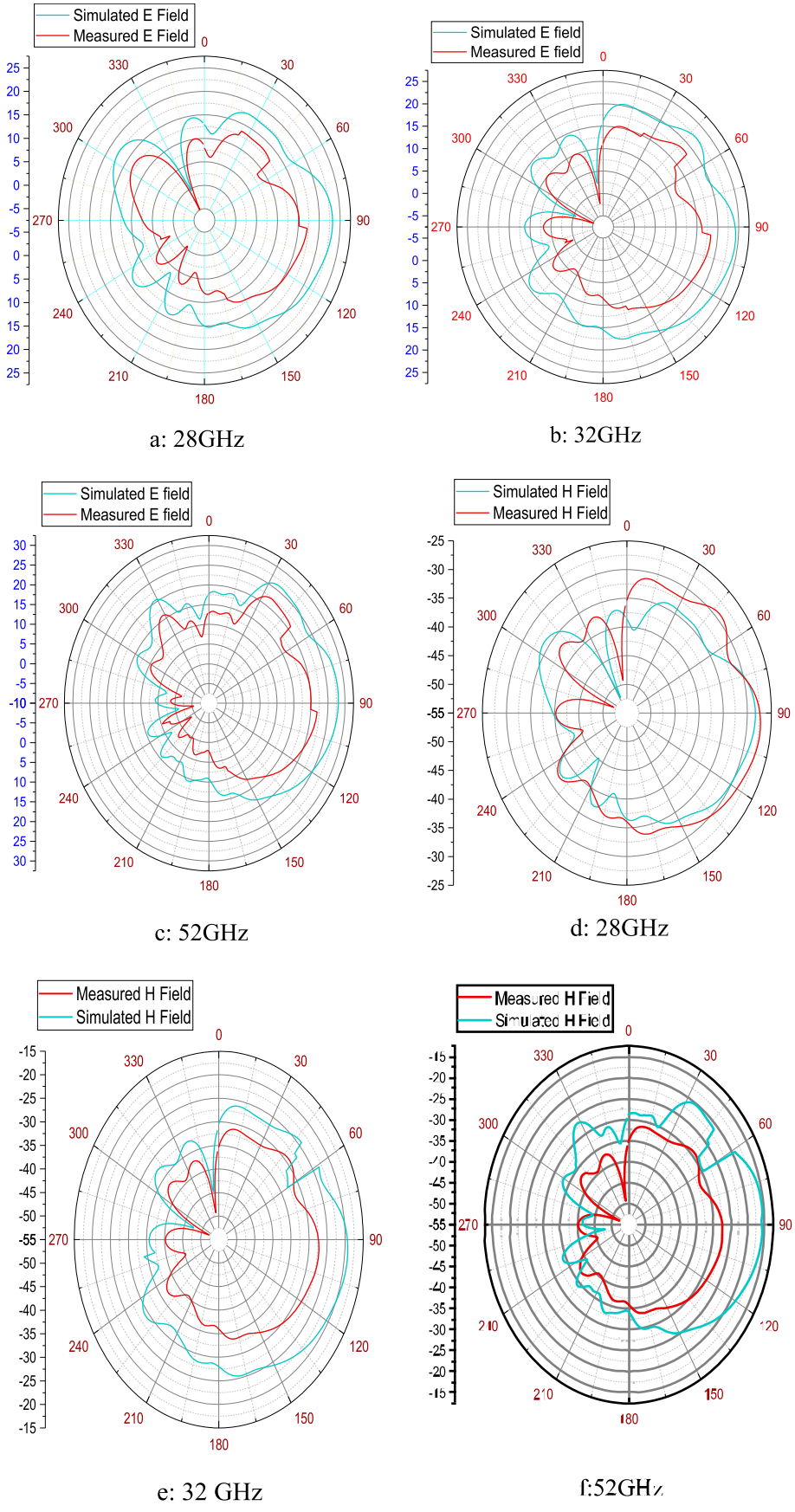


Figure 7: Simulated and measured radiation pattern of proposed antenna #2, (a–c) E field pattern and (d–f) H field pattern

The sample of E field patterns provided the 4–5 major lobes with a magnitude of around 28dBV/m, as shown in Figure 7(a–c), and the H field also provided the one major lobe and two to three minor lobes with an average magnitude of 27.5dBA/m, as shown in Figure 7(d–f).

3.5 VSWR of the Proposed Antenna

From Figure 8, it is observed that the simulated and measured VSWR values of the proposed antenna #2 lie in between 1 and 2 over frequency band 4 GHz to 8 GHz, except at 8–12 GHz and 24-58 GHz. But in the case of the measured values, it is 1–2 for the 24–50 GHz frequency band. So it is concluded that proper impedance matched between the feed line and source applied of 50Ω.

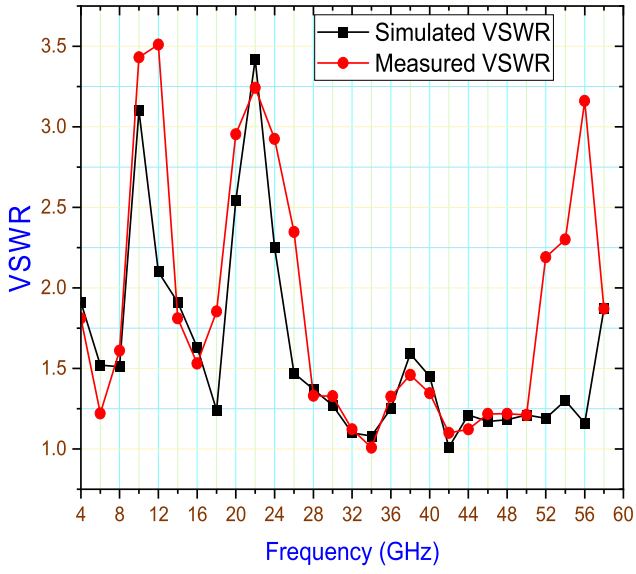


Figure 8: VSWR of the proposed antenna: —- simulated VSWR and —- measured VSWR

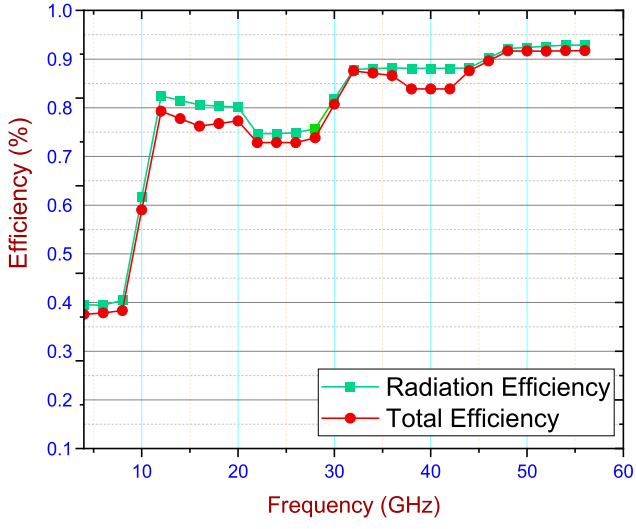
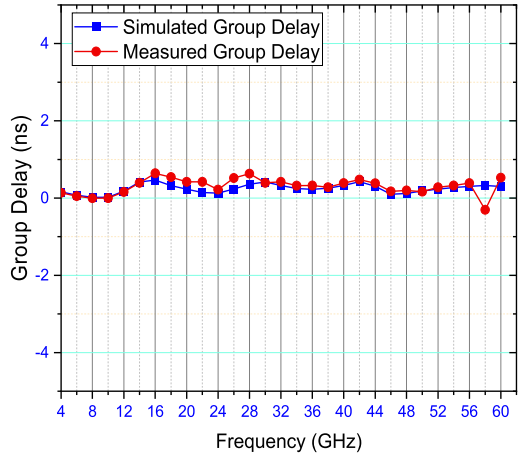


Figure 9: Simulated efficiency versus frequency plot of proposed antenna #2

3.6 Efficiency

For good efficiency, the antenna needs to accept input power given and radiate effectively with minimum losses. The green and the red line show the radiation and total efficiency of the proposed antenna, respectively. The maximum radiation and the total efficiency of the proposed antenna #2 are 94.15% and 91.5% over the frequency band of 4–18 GHz and 24–58 GHz, as shown in Figure 9, and it is improved compared to base paper [1].



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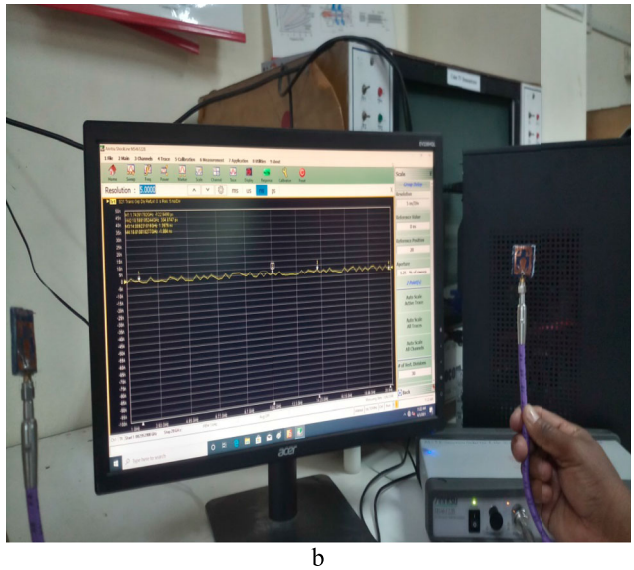

b

Figure 10: Group delay versus frequency plot of proposed antenna #2: (a) simulated and measured graph of group delay and (b) picture of measurement of group delay and gain of the fabricated antenna on VNA

Table 5: Comparison between proposed antenna designs with other literature review

Reference	Technique	Substrate and ε_r	Operating frequency (GHz)	Overall dimensions (mm)	S11 Parameters (dB)	Bandwidth/% Bandwidth	VSWR	Applications mentioned
[1]	Rectangular textile antenna	Jeans $\varepsilon_r = 1.7$	3.2–16.3 GHz	Width length 23.5 × 22 mm	−10 to – 30 dB	13.1 GHz	NA	UWB application
[2]	Circular textile antenna for bending performance	Jeans $\varepsilon_r = 1.7$	2.2–14.5	Radius 15 ground plane 50 × 27	−10 to –55dB	12.3 GHz	NA	UWB application
[3]	Circular UWB antenna	Jeans $\varepsilon_r = 1.7$	2..27–16 GHz	Circular patch 15 mm	−10 to – 36 dB	12.91 GHz	NA	UWB application
[4]	Compact wide band MIMO antenna	Jeans $\varepsilon_r = 1.6$, Loss tangent = 0.02	1.83 GHz–8 GHz	Rectangular patch of size 0.56λ × 0.32λ × 0.008λ	−10 dB to −58 dB	5.16 GHz	NA	UWB wearable applications
[5]	Reconfigurable MIMO	Textile material	Two bands 3.11–5.15 GHz and 4.81–7.39 GHz	2 element MIMO	NA	2.04 GHz and 2.58 GHz	NA	WiMAX/C band & WLAN
[6]	Compact wearable MIMO, improved port isolation with partial ground plane	Jeans $\varepsilon_r = 1.6$, hs = 1.5 mm Loss tangent = 0.02	2.74–12.33 GHz	Ring resonator R1 = 10.5 mm, R2 = 5 mm, Ws = 55 mm and Ls = 35mm	−10 dB to −35 dB	9.59 GHz or 127.27%	NA	UWB applications
[9]	Reconfigurable antenna, back to back snap on button	Foam with air	Dual band 2.45 and 5.8	L1 = 60, W1 = 55	−15 and −18	NA	Between 1 and 2	Wearable textile antenna
[11]	Rectangular patch for different substrates	Cotton 1.60, Polyester 1.90, Lycra 1.90 and Cordura 1.50	2.4	W×L = 46 × 53, 43 × 50, 43 × 50, 48 × 54	−32, −35, −29, −31	97, 40, 50, 48	2.4, 1.0879, 1.0944, 1.0917	NA
[12]	Moon strip shape for Multiband	Jeans $\varepsilon_r = 1.7$	5.44 and 10.15	Moon diameter 26 & substrate 50 × 50	−24 & −23	NA	NA	Satellite application
[14]	Dual-band, rectangular dual L shape	Jeans cloth $\varepsilon_r = 1.7$	Dual-band 3.17 and 5.04	Wp = 25, Lp = 40	−24, −18	100 and 30	1.86 and 1.79	Military
[15]	Wearable textile antenna	Jeans $\varepsilon_r = 1.6$	2.45	Rectangular shape Wp = 54, Lp = 46.6	−32.57	NA	1–2	Wearable application
[18]	Rectangular shape and Inset feed	Jeans $\varepsilon_r = 1.67$	Single band 2.45	W = 45, L = 53, Hs = 2.84 & full ground	−15.76	60 MHz	1.38	Wi-Fi communication
Proposed work	**Rectangular textile antenna #1 and #2**	**Jeans $\varepsilon_r = 1.7$ height 4mm**	**Antenna #2, 4-18 GHz Antenna #2 24-58 Hz**	**Width length 23.5 × 22 mm W4 and L5 variation, Slots at middle arm**	**−10 dB to −42dB**	**7.95-9 GHz UWB and 32 GHz for 5G**	**Between 1 and –2**	**UWB and 5G applications**

3.7 Group Delay

Figure 10(a and b) shows the plots of group delay versus operating frequency of an antenna. The phase distortion analysis has been carried out for antenna #2 over a resonating frequency of 4–60 GHz. The value of simulated group delays for the proposed antenna is constant and it varies from 0.02138 to 0.4251 ns, and the measured values vary from 0.0507 to 0.6425 ns, as shown in Figure 10(b) and compared in Table 4.

The comparison of simulated results of the proposed antenna #2 and base paper [1] is shown in Table 4, and the comparison of the proposed work with previous work carried out is shown in Table 5.

Table 6: Comparison of the simulated result of antenna #2 with base paper

Parameters	Proposed antenna #2	Base paper: Compact and ultra-wideband CPW-fed square slot antenna for wearable applications [1]
Frequency band (GHz)	4–18 GHz and	
24–58 GHz	3.2–16.3 GHz	
S11 parameter (dB)	−10.16 to −45.52	−10 to −32dB
VSWR	1.1–1.9	NA
Gain in dB	4–13.8	NA
Bandwidth in GHz	4 and 34	13.1
Fractional bandwidth %	66.67 and 84.21	135
Group delay (ns)	0.02138 ns to 0.4251 ns	NA
Radiation efficiency (%)	40–94	NA
Total efficiency (%)	38–91	34–45
Application	C, WiMAX and 5G	UWB

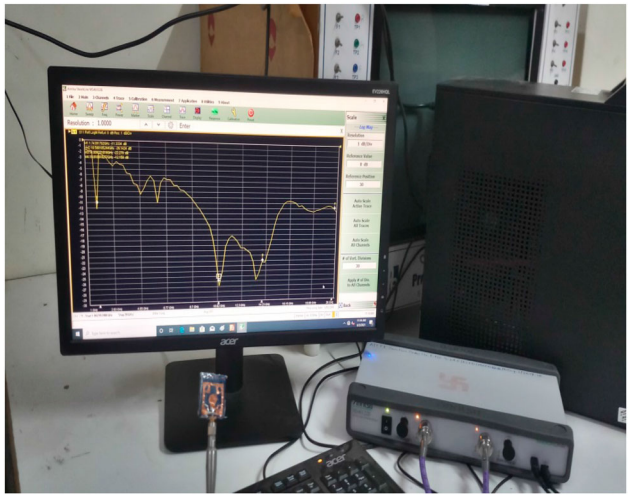

Figure 11: Picture of measurement of S11 parameter of the fabricated antenna on VNA

4. COMPARISON BETWEEN SIMULATED RESULTS OF ANTENNA #2 & ANTENNA #1

The comparison of simulated results of the proposed antenna #2 and base paper [1] is shown in Table 6, and the comparison of the proposed work with previous work is carried out, as shown in Table 5 (Figure 11).

5. CONCLUSION

In this paper, the compact and ultra-wideband textile antenna #2 is designed for future 5G communication using jeans as the dielectric material. The proposed antenna #2 radiates from 4 to 58 GHz due to the novelty added in the design. The simulated and measured S11 parameter is below −10dB and provided the enhanced bandwidth of 34 GHz and maximum gain of 13.8dB. The proposed antenna achieved maximum radiation efficiency of 94.15% and total efficiency of 91.5% [1]. Also, the antenna was investigated for bending the antenna at a radius of 80 mm curvature and 90-degree angle. The value of simulated group delays for the proposed antenna is constant and it varies from 0.02138 to 0.4251 ns, and the measured values vary from 0.0507 to 0.6425 ns.

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DISCLOSURE STATEMENT

No potential conflict of interest was reported by the author(s).

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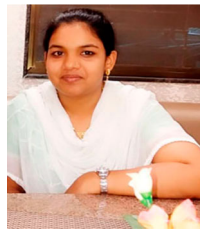

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Design of Circular Microstrip Textile Antenna for UWB Application

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ABSTRACT

The proposed work illustrates the small circular wearable antenna for ultra-wide band (UWB) application. The designed work consists of a circular top patch of 15 mm radius and two square slots of dimensions 6 mm^2 at center and 10 mm^2 at the top of patch are created. The partial ground plane concept is used to get a wide bandwidth with a dimension of 27 mm $\times$ 50 mm. To describe the wearable applications, the light weight jean material is used as a non-conducting dielectric material with the ε_r of 1.7 and the substrate height of 1 mm. The designed antenna is resonating at the frequency range of 2.27 GHz to 15.18 GHz for ultra-wide band (UWB) applications. Also the bending performance of the proposed antenna is investigated at the radius of 80 mm and the angle of 0°. The simulated and measured results of S11 parameter of the proposed antenna are below −10 dB for 2–16 GHz UWB frequency range. The group delay of antenna also is calculated and simulated values of group delay vary from 0.0473 ns to 0.4502 ns and measured 0.1217–0.9852 ns for the wide frequency band. The different antenna parameters are analyzed for this frequency band and the designed antenna is validated on VNA of 20 GHz.

KEYWORDS

Bending performance; circular; group delay; jean fabric; S11 parameter; textile material; WBAN; UWB

1. INTRODUCTION

In the field of wireless application, the emerging technology – wireless body area network (WBAN) plays a vital role. The WBAN communication is performed through different sensors or wearable microstrip antennas attached to the clothes on the body. These wearable microstrip antennas are designed using light weight textile materials such as jeans, cotton, polyester and PDMS. Due to the ease of fabrication of textile antenna, the wireless body area network is most favorably used in biomedical, military and sport applications. Now, the wireless communication needs the multiband antennas for ultra-wide band (UWB) applications. The UWB can be used in the vehicular radar devices for the collision avoidance system, activating the airbag and different road sensors with low power high data rate ($>$ 100 Mbits/s) transmission for a short range communication.

The analyses of different conditions of microstrip textile antenna, such as bending, crumpling and wet, are easier due to the use of textile material. These conditions may change the antenna characteristics, to get best position and the bending angle textile antenna is designed on body. The frequency for UWB application varies from 3.1 GHz to 10.6 GHz as per the norms of American Federal Communication Commission (FCC).

The textile antenna is implemented by using the jeans fabric for UWB communication in the frequency range of 3–12 GHz. The textile antenna is designed using an adhesive copper foil with the height of 35 micron. The gain obtained for textile antenna is 2.8 dB in the frequency range between 6 GHz and 8 GHz and a large gain of 4.1 dB at 10 GHz [1]. The bending performance of textile antenna has been carried out along horizontal vertical convex–concave planes and the bandwidth of 12 GHz was obtained within the frequency range of UWB application. The wearable antennas made with full jeans textile material are tested inside the water, wet condition and dried condition over the frequency range of 2–15 GHz [2]. The compact wearable antenna is designed on the textile jacket made with jeans material over the frequency band of 3.1–10.6 GHz. The circular button-shaped antenna is fabricated by using PTFE material for ultra-wide band application with a gain of 2.6 dBi and 3.4 dBi for UWB frequency range [3]. The proposed UWB MIMO antenna minimizes the mutual coupling as I-shaped isolators are designed on the ground plane.

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The bandwidth achieved for this antenna is of 5.16 GHz over the resonating frequency of 1.83–8 GHz [4]. The antenna has been designed using a 2-element floating resonator for bands of 3.11–5.15 GHz and 4.84–7.39 GHz using partial ground plane and DGS structure [5]. Wearable antenna has been designed on jeans textile material for UWB application over the frequency of 2.74–12.33 GHz. When data are transmitted by the antenna over channel, very small channel capacity loss is achieved [6].

The circular multiband textile antenna radiated at 3.42, 9.73 and 11.17 GHz. The designed antenna has been used for WiFi and WiMAX applications [7]. The textile antenna is designed at 2.45 GHz frequency with S11 parameter of −18 dB and wearable antenna fabricated on clothes and it has resonated at ISM band [8,9]. The circular textile antenna with inverted L notch filter used to reduce the noise in WLAN communication for 5 GHz frequency. The frequency range of 2.88–18.6 GHz is matched for the UWB communication and the 4.88–6.19 GHz frequency band is rejected [10]. The analysis has been carried out for the different textile material, such as Cotton, Polyester, Cordura and Lycra, to design microstrip textile antenna at 2.45 GHz frequency. The comparison of S11 parameter at 2.45 GHz frequency is analyzed [11]. The proposed antenna with moon strip structure is implemented on the jeans fabric of ε_r 1.7 and antenna is resonating over 5.3 GHz–10.15 GHz frequencies. The fractional bandwidth is obtained at these frequencies of 62.78% [12].

The U slot antenna is designed for WiFi communication at the frequency of 2.4 GHz. The dielectric substrates, such as jeans and cotton fabric, were used. The values of S11 parameter are kept below −10 dB for both antennas [13–15]. The different shapes of microstrip antennas are designed for ISM band and the gain obtained of 5.6 dBi at 2.45 GHz operating frequency [16].

The circular patch with thin tapered feed line antenna is studied which provides an enhanced bandwidth. This wide band antenna over the frequency range of 2.8–16 GHz has been used for UWB application [17]. The multiband 5G antenna is implemented for resonating frequencies of 23.9, 35.5 and 70.9 GHz with S11 parameter values of below −10 dB for these frequency bands [18]. The intra body communication antenna is designed at ISM band frequency of 2.45 GHz with the help of biomedical sensors for medical applications [19,20]. The wearable antenna is implemented with ANN & DGS-based ground for radiating at 2.53, 4.9 and 7.6 GHz and the antenna is used in the medical field to test RF signal over the 3–5.7 GHz frequency [21,22]. The textile antenna has been designed using jeans substrates for 2.4508, 5.4005, 6.6503 and 80.0002 GHz. The patch of designed antenna consists of the hybrid structure of Meander and Koch, provided the large bandwidths are at resonating frequencies [23]. The rectangular textile antenna is designed at ISM band for Wi-Fi communication with a gain of 8.05 dB [24].

1.1 Textile Material Selection

The properties of textile material make the microstrip textile antenna flexible and light weight. To fabricate the textile antenna two types of fabrics are used as substrate material – Natural and Man made. Natural textile material is daily used clothes which we use to wear on body such as jeans, cotton and polyester. The second type man made E textile material is formed by the combination of conductive copper and cotton threads. The textile materials provide the large bandwidth, because it has low dielectric constant. In this work, the textile antenna is designed and analyzed by using jeans as substrate material. The jeans material is smooth and flexible, so we can easily wear. The height of jeans substrate selected in such way that, it will minimize the surface wave losses. The measurement of relative permittivity of jeans material has been carried out using dielectric probe over the frequency range of 300 MHz to 20 GHz and relative permittivity (ε_r) is found near about 1.7.

The circular textile antenna is designed with the help of edge line feeding method for ultra-wide band application. In this feeding method, a feed line is connected to the edge of radiating patch.

1.2 Contact Type

The feed line used to excite the microstrip patch of antenna is directly connected to the radiating patch of an antenna. The feed line width will define the characteristic impedance of antenna matched with source impedance. So RF power applied is radiated by the antenna, which will enhance the efficiency of the antenna. Furthermore, this method is classified into – Edge and Inset Line feeding.

The organization of the paper is as follows. Section 2 describes the antenna design and detailed configuration followed by results and discussions in section 3. Section 4 discusses the comparison between simulated and measured results followed by conclusions in section 5.

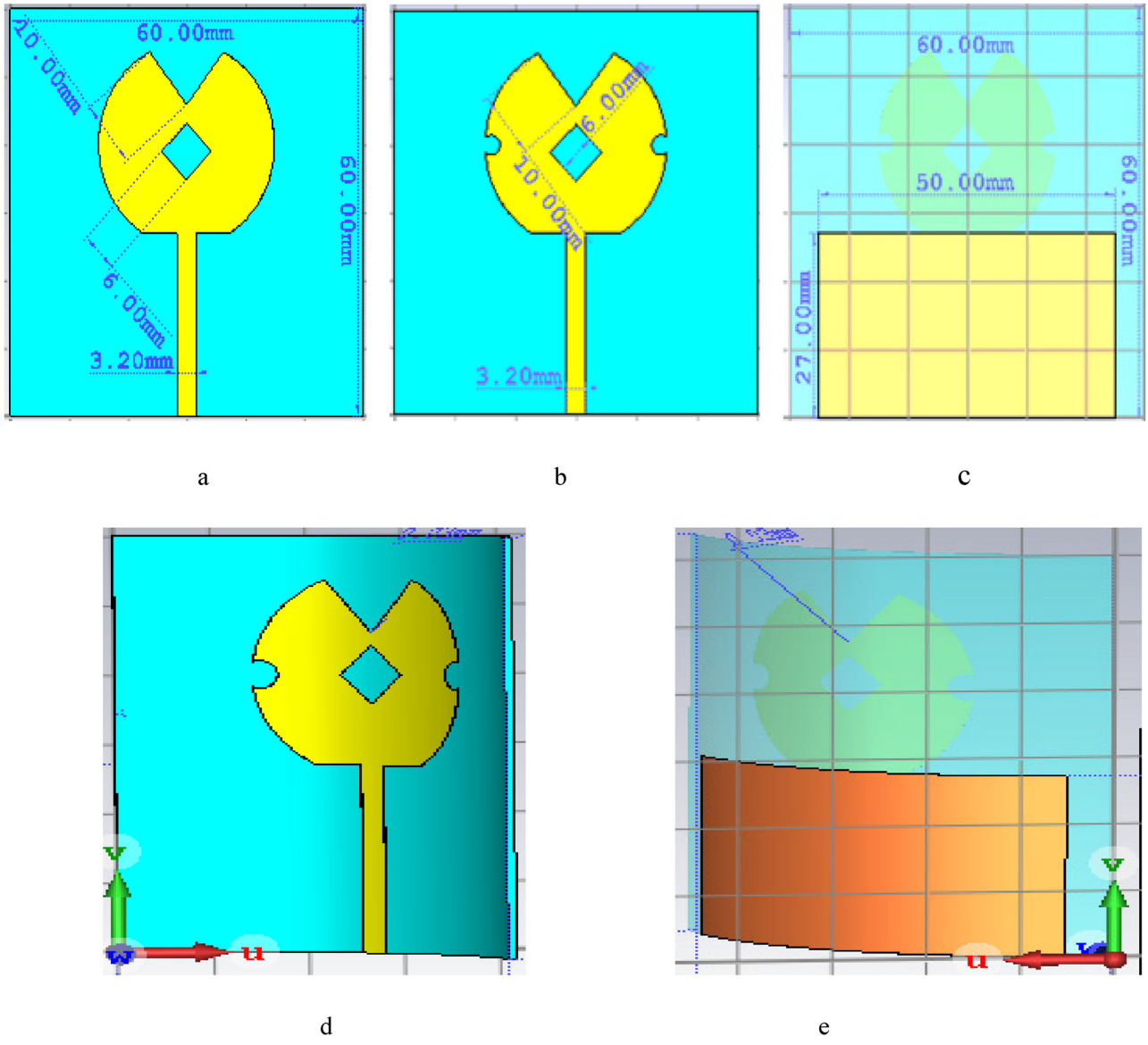


Figure 1: The proposed antenna in CST model. (a) Picture of the top view antenna#1, (b) Picture of the top view antenna #2, (c) Picture of the bottom view, (d) Picture of the top view of bending antenna and (e) Picture of the bending bottom view

2. ANTENNA DESIGN & CONFIGURATION

The proposed design consists of a circular microstrip textile antenna design over the resonating frequency band of 2.27 GHz to 15.18 GHz for ultra-wide band application. The proposed antenna is designed for high gain, large efficiency and wide bandwidth for UWB frequency range. The top patch has a radius of 15 mm determined with the help of equation 1 and 2 square slots of 5 mm^2 and 10 mm^2 dimensions cut on the top patch. The partial ground plane concept is implemented to get a wide and broader bandwidth. The partial ground plane is achieved such that, it will create the capacitive impedance and this will neutralize the inductive behavior of the patch to get purely resistive input impedance by the process of impedance matching. The partial ground plane is obtained by cutting the top portion of ground plane and remaining lower half part of size 50 mm × 27 mm covers the microstrip feed line.

The two half circular slots of radius 1.5 mm are created at the horizontal edge of the top patch; this enhanced bandwidth and large gain is achieved in comparison with base paper considered, as shown in Figure 1(b) [1]. This novelty has been studied analyzed at the radius of 1.5 and 2.0 mm, best results are achieved at the radius of 1.5 mm.

The conducting copper foil of 35 micron is used to design the top circular patch and bottom ground plane of textile antenna. Jeans as a substrate fabric of $\epsilon_r = 1.7$ and the height of substrate material of $h_s = 1$ mm is sandwiched

between these two planes and the substrate dimension of 60 mm × 60 mm [1,2]. Due to the use of textile fabric, fabricated antenna can be easily attached to the clothes and it is made wearable and flexible. The patch is cut of size 2 mm × 4 mm at the lower end to connect feed line. The microstrip line is connected the radiating circular patch and SMA connector at other end. The characteristic impedance of the proposed antenna is calculated 50 ohm for the feed line width of $W_f = 3.2$ mm and the voltage source is applied to provide input to the antenna. All the dimensions are shown in Figure 1(a–c) and Table 2. Also the proposed textile antenna is bent at the radius from 70 to 80 mm which is the size of bicep of human being. The bending performance at the radius of 80 mm at 0 degree rotation of the designed antenna is studied and observed, as shown in Figure 1(d,e).

The dimensions of the proposed antenna are calculated and shown in Table 2. The different parameters of the proposed antenna, such as S11 parameter, surface current distribution, gain, 2D radiation pattern, VSWR, efficiency and group delay, are analyzed using CST Microwave Studio simulation software.

The novelty added in the proposed antenna design consists of the following.

(a) The half circular slots are created on the top patch of radius of 1.5 mm.
(b) The bending performance of the proposed antenna at the radius of 80 mm angle of 0° is investigated.
(c) The group delay of antenna is analyzed for the 2–18 GHz frequency range.

Table 1: Two textile antenna designs with their dimensions

	Radius of patch (mm)	Radius of half circle slot (mm)	Partial ground plane size (mm)	Cut at bottom edge of patch (mm)
Antenna #1	15	–	27 × 60	2 × 4.7
Proposed antenna #2	15	1.5 and 2	27 × 50	2 × 4

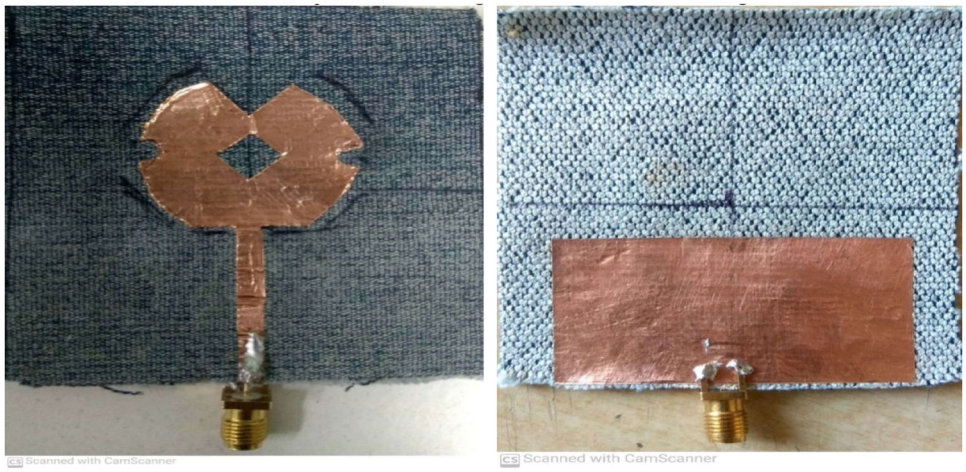
Table 2: Proposed antenna parameters

Antenna parameter	Dimensions
Relative permittivity of jeans ε_r	1.7
Radius of circular patch a	15 mm
Length of slot1 L1	6 mm
Width of slot 1 W1	6 mm
Length of slot2 L2	10 mm
Width of slot 2 W2	10 mm
Radius of half slot	1.5 mm
Length of the bottom plane L_g	27 mm
Width of the bottom plane W_g	50 mm
Width of the feed line W_f	3.2 mm
Substrate thickness h_s	1 mm
Copper foil thickness h_t	0.035 mm

Table 1 shows that the design of two different antennas with variation the partial ground plane size and circular slots on the patch.

The radius of circular patch is determined at the UWB frequency range of 7.85 GHz and $\epsilon_r = 1.7$ with the help of equation (1) [2]. Table 2 shows the design parameter of the circular microstrip antenna. Where f_r = Resonating frequency in GHz, a is the radius of patch and $\epsilon_r = 1.7$ is the relative dielectric constant of jeans material.

$$a = \frac{87.94}{f_r\sqrt{\varepsilon_r}} \tag{1}$$



a b

Figure 2: Picture of the fabricated antenna. (a) Top view and (b) Bottom view

2.1 Textile Antenna Fabrication

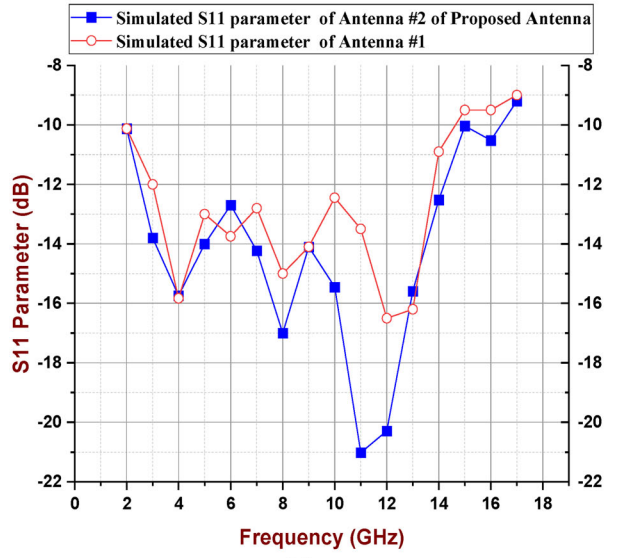
The textile antenna is fabricated on the regular jeans material of size, as mentioned in Table 1. The adhesive copper conducting sheet of 35 micron is used to design top radiating patch on the upper side of jeans fabric and partial ground plane at the bottom side of jeans fabric. The precise size of feed line is connected to the top radiating patch by soldiering with an SMA connector. Figure 2(a) shows the geometry of top fabricated microstrip textile antenna and 2(b) shows ground plane of the fabricated antenna. The fabricated antenna is tested with Anritsu VNA of 20 GHz frequency range, as shown in Figure 11 setup of testing and compared the simulated and measured results of S11 parameter.

3. RESULT & DISCUSSION

To achieve a better analysis, the comparison of simulated and measured S11 parameter, gain, radiation pattern, VSWR, efficiency and group delay of proposed antenna is discussed in this section.

3.1 S11 Parameter

The S11 parameter must be maintained below minimum at −10 dB, to get good radiation. From Figure 3(a) it is stated that, the antenna#1 radiated for the frequency 2.2–14 GHz which is shown in graph by red color and bandwidth has been improved from 2.27 to 15.18 GHz in the case of antenna#2 because two half circle slots are



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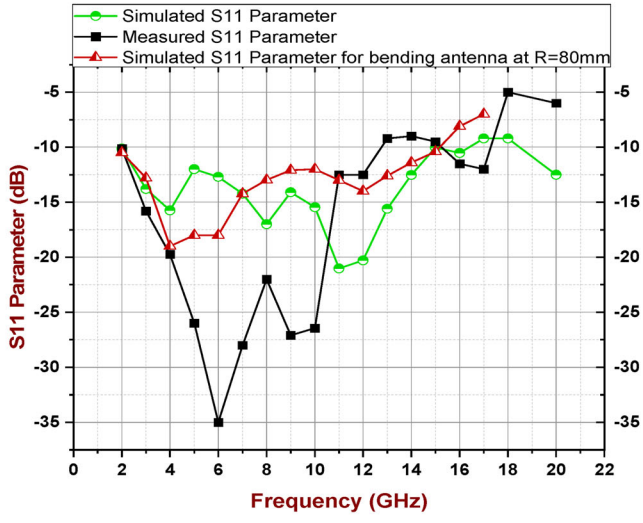

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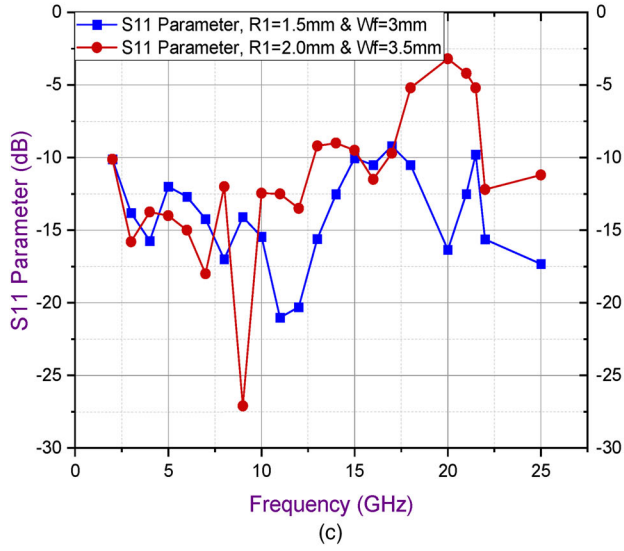


(c)

Figure 3: (a) S11 parameter versus frequency plot of antenna #1 and proposed antenna #2. Simulated S11 parameter of Antenna #2. Simulated S11 parameter of Antenna #1. (b) S11 parameter versus frequency plot of the proposed antenna #2. Simulated S11 parameter. Measured S11 parameter. Simulated S11 parameter for bending analysis. (c): S11 parameter versus frequency plot of the proposed antenna #2. Simulated S11 parameter, at R1 = 1.5 mm and Wf = 3 mm. Simulated S11 parameter, at R1 = 2.0 mm and Wf = 3.5 mm

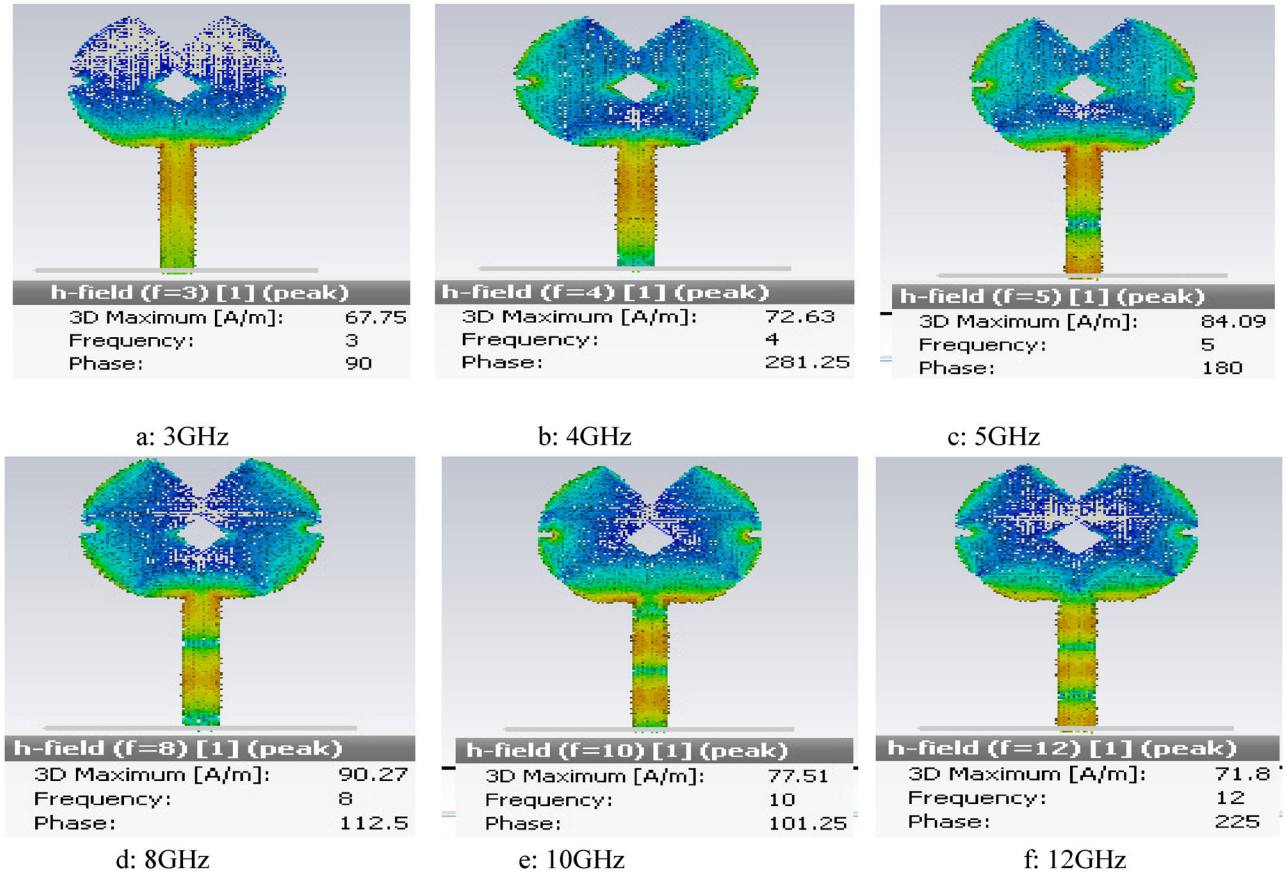


Figure 4: Surface current distribution of the proposed antenna #2

added in the proposed antenna shown by blue color in Figure 3 [1].

From Figure 3(b), it has been observed that simulated and measured S11 parameter versus frequency graph is plotted. It has been seen that, simulated S11 parameter shown by a green color line provided the UWB frequency range of 2.27–15.18 GHz and S11 parameter values varies from −10db to −23 dB. The bending performance of antenna studied at a radius of 80 mm which is nearly about the size of bicep, the S11 parameter of the same is shown by a red color line. Also it is investigated that, simulation results for bending the antenna at 30–60 mm radius along the vertical plane are poor. The bandwidth observed at this frequency range is of 12.98 GHz. Also from simulated and measured graph it is observed that, the antenna is radiating more at the frequencies of 4, 8 and 12 GHz [2].

The fabricated antenna is tested with Anritsu VNA of 20 GHz frequency range and the measurement process is shown in Figure 10. It is observed that, the fabricated antenna is radiating with S11 parameter of −35 dB over the 2–10.56 GHz frequency range, which is shown in Figure 3(b) by a black color line.

Table 3: Comparison of the simulated and measured results of the proposed antenna #2

Parameters	Simulated	Measured
Frequency band (GHz)	2.2–16	2–10.56
Gain (dB)	5.77 at 11 GHZ	7 at 9 GHz
Bandwidth (GHz)	13.8	8.56
Group delay (ns)	0.0473–0.4502	0.1217–0.9852
Fractional bandwidth (%)	197.1	171.2

The novelty added in the proposed antenna #2 is analyzed half circle slots on the patch of radius R1 = 1.5 mm with a feed line width of 3 mm shown by a blue color line and R1 = 2 mm with a feed line width of 3.5 mm shown by a red color line in Figure 3(c). Due to these added half circle slots, the proposed antenna is resonating for from 2.2 to 16 GHz, 16 to 21 GHz and 22 to 25 GHz. The enhanced wide bandwidth of 13.8 GHz and maximum gain of 5.77 dB are achieved for the frequency band 2.2–16 GHz, as shown in Table 3.

3.2 Surface Current Distribution of the Proposed Antenna

The surface current distribution of the proposed antenna#2 is shown in Figure 4, subfigure a to for the

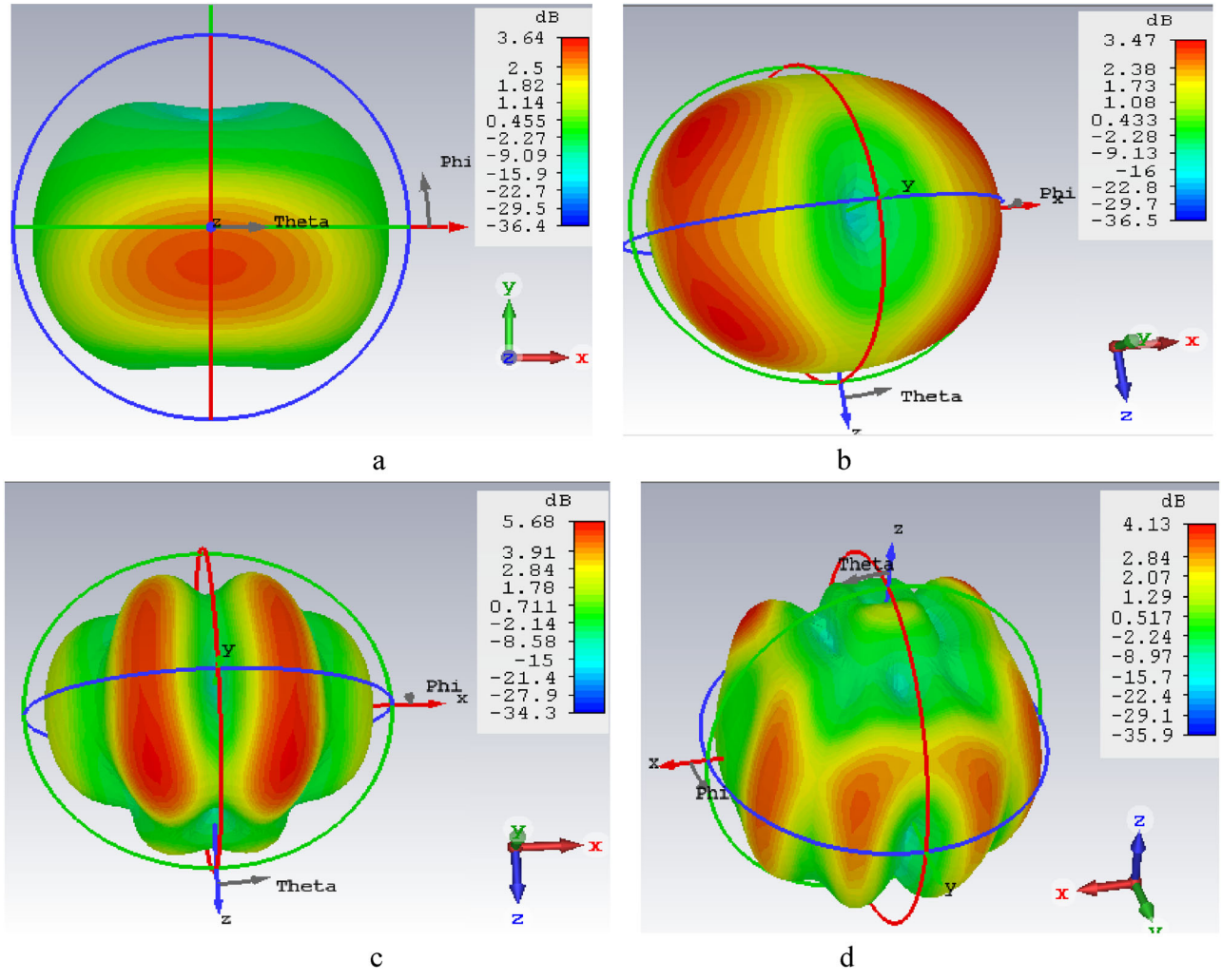


Figure 5: Simulated 3D radiation pattern the proposed antenna #2, (a) at 3 GHz, (b) at 6 GHz, (c) at 10 GHz and (d) at 14 GHz

operating frequencies of 3 GHz to 12 GHz for UWB applications. From the figure it is concluded that, antenna#2 is radiating with the maximum current of 90.27 A/m at 8 GHz frequency and the minimum current of 67.75 A/m at 3 GHz frequency. So the proposed antenna#2 provided the large bandwidth, also the partial ground plane benefited to enhance the bandwidth.

3.3 Radiation Pattern of the Proposed Antenna

3D radiation pattern of the designed antenna for frequencies from 2 to 17 GHz for UWB application is shown in Figure 5(a–d). The designed antenna provided the gain of 3.64, 3.47, 5.68 and 4.13 dB at the frequencies 3, 6, 10 and 14 GHz. The maximum value of gain achieved is of 5.77 dB at 11 GHz frequency due to the use of two circular half slots on the top patch of antenna; these gain values are improved as compared to those of the base paper used [1].

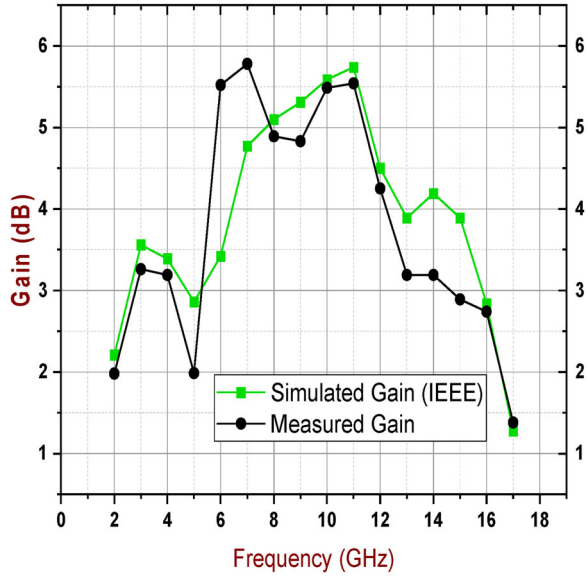


Figure 6: Simulated and measured gain versus frequency plot of th proposed antenna #2

The simulated gain (IEEE) of the proposed antenna and the measured gain of antenna versus resonating frequency are shown in Figure 6. The measured gain is maximum (7 dB) at 6–8 GHz and for the remaining frequency band it is approximately the same of simulated results, as shown in Table 3. The setup for the measurement of gain of antenna is shown in Figure 10(b).

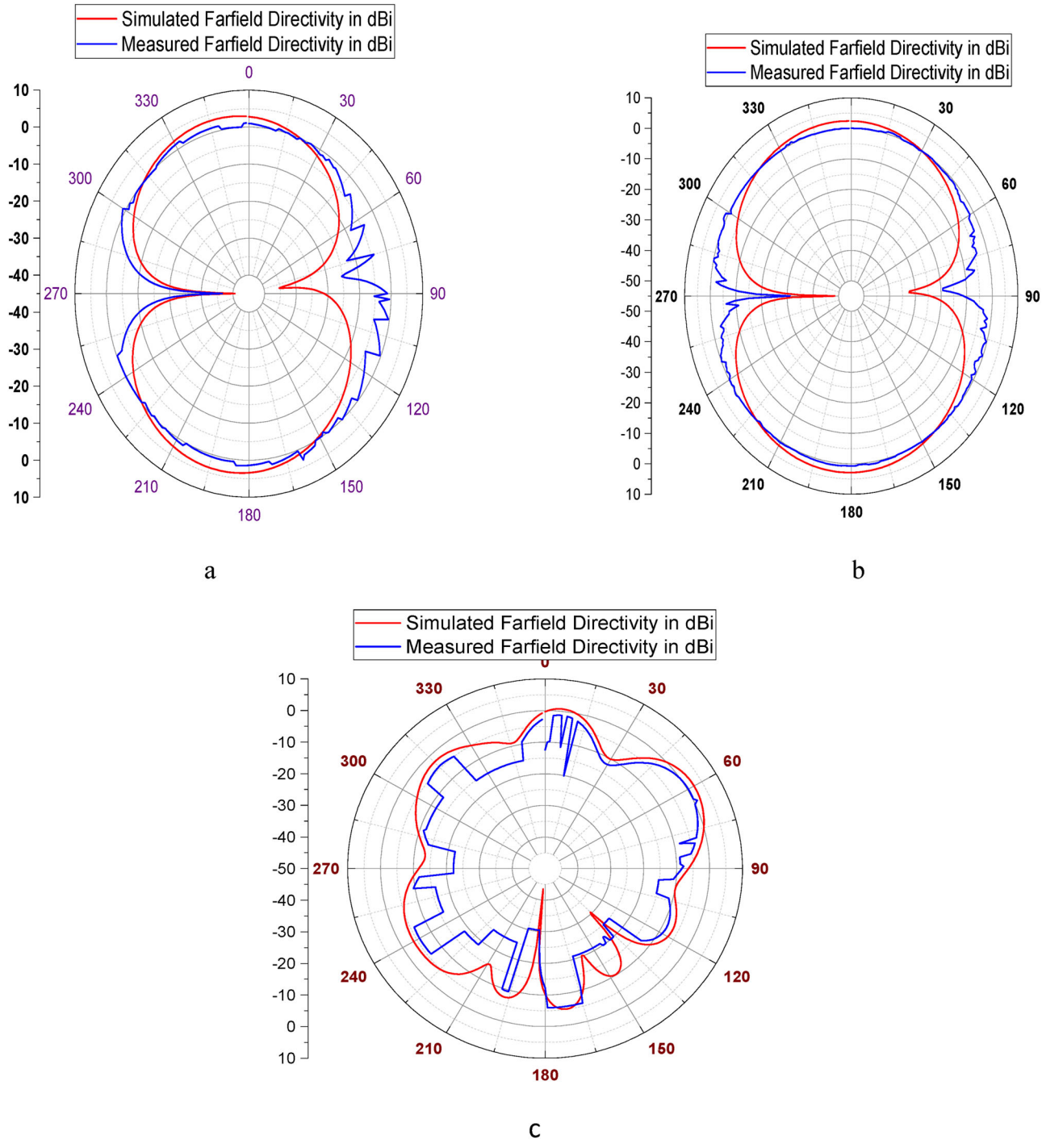


Figure 7: Simulated and measured radiation pattern of the proposed antenna, at (a) 2.5 GHz, (b) 3.5 GHz and (c) at 14 GHz

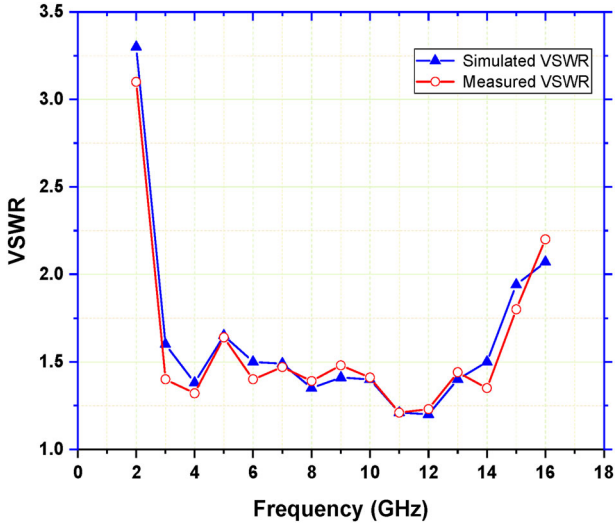


Figure 8: Simulated and measured VSWR values of the proposed antenna #2

3.4 Radiation Pattern of the Proposed Antenna

From Figure 7, it has been shown that the sample of simulated and measured radiation pattern of designed antenna #2 at 2.5 GHz, 3.5 GHz and 14 GHz frequencies is shown in Figure 7(a–c). It has been stated that he main lobe directions of 177˚, 156˚ and 170.0˚ and angular bandwidths of 79.4˚, 72.3˚ and 69.3˚ with magnitudes of 2.92 dBi, 2.26 dBi and 3.75 dBi are achieved.

3.5 VSWR of the proposed antenna

The frequency versus VSWR values, as shown in Figure 8, shows that the simulated and measured VSWR values of antenna lie in between 1 and 2 for UWB frequencies in the range of 2.4 to 16 GHz.

3.6 Efficiency

The radiation and total efficiency versus resonating frequency of the proposed antenna is shown in Figure 9.

The designed antenna radiated over the 2–18 GHz frequency band for UWB application. The radiation efficiencies of designed antenna vary from 94.20% to 99.92% and total efficiencies vary from 89.12% to 97.73% over the 2—17 GHz frequency band. Also it has been concluded that, total efficiency is maximum (98%) for the 10–12 GHz frequency band and it is decreasing from 12 to 17 GHz frequency band (89%).

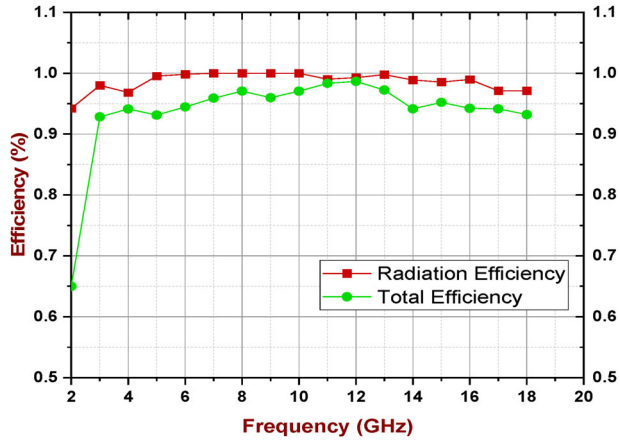
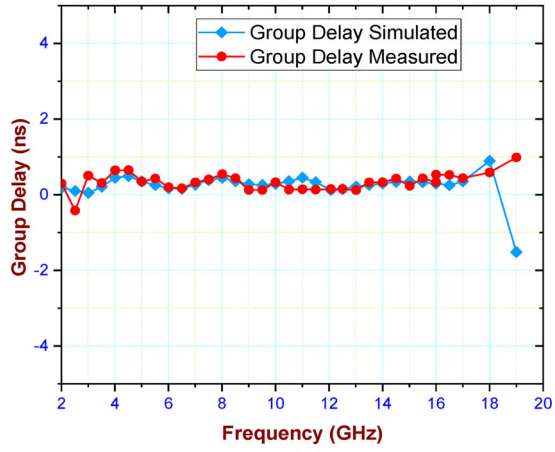


Figure 9: Simulated efficiency versus frequency plot of the proposed antenna #2



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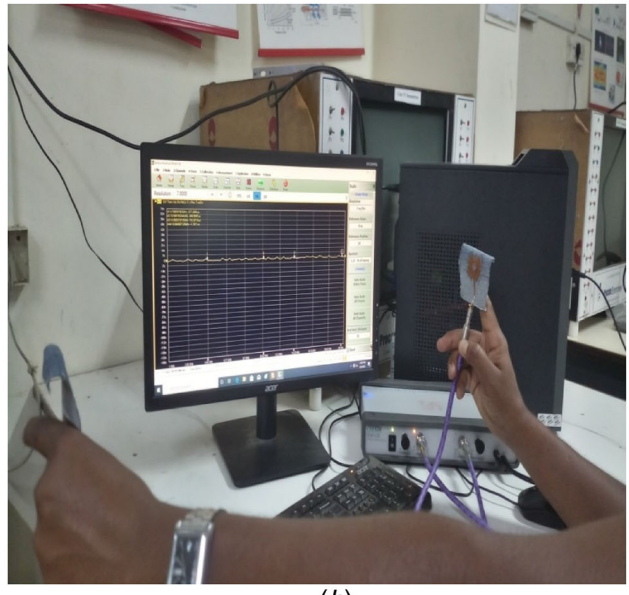

(*b*)

Figure 10: Group delay versus frequency plot of the proposed antenna, (a) Simulated and measured group delay and (b) Picture of measurement setup of group delay and gain of the fabricated antenna on VNA

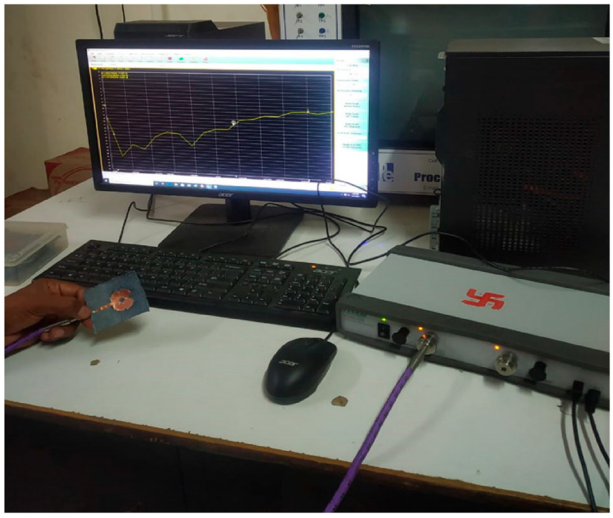

Figure 11: Picture of measurement setup of S11 parameter of the fabricated antenna

3.7 Group Delay

Group delay plays an important role to analyze the amount of phase distortion or noise in the analysis of antenna or microwave filter design. From Figure 10(a), it is observed that, the variation of group delay over the frequency range 2–18 GHz of antenna#2 is constant and approximately near to 0.0473–0.4502 ns. The simulated group delay over the UWB frequency range has achieved high Q or the wide bandwidth of 12.91 GHz for antenna #2, as shown in Figure 10.

The setup for the measured group delay using VNA of 20 GHz is shown in Figure 10(b); the distance between the two antennas (Transmitter and Receiver) is 730 mm (far field) which is calculated using Equation (2), where D = maximum diagonal distance = 85 mm and λ = minimum wavelength = 20 mm for 2 GHz frequency. The measured group delay on VNA varies from 0.1217 ns to 0.9852 ns (Figure 11).

$$\text{Farfield} = \frac{2D^2}{\lambda} \tag{2}$$

4. COMPARISON BETWEEN SIMULATED RESULTS OF ANTENNA #2 & ANTENNA #1

Table 4 shows the comparison of simulated results of the proposed antenna with the base paper considered, Table 5 shows the simulated results of the gain and efficiency of the proposed antenna for 2–20 GHz frequency range and Table 6 shows the comparison of the proposed work carried out and the previous work done.

Table 4: Comparison of the simulated results with base paper

Parameters	Simulated	Design, implementation and performance of the ultra wideband textile antenna [1].
Operating frequency	2.27–15.18 GHz	3–12 GHz
S11 Parameter dB	−10 to −23 dB	−10 to −55dB
VSWR	1–2	1–2
Directivity in dBi	2.92–3.75 dBi	2.6–3.9 dBi
Gain in dB	3.47–5.77 dB	2.6–4.2 dB
Total efficiency (%)	89.12– 97.73%	85–95%
Bandwidth	12.91 GHz	9 GHz
Application	UWB	UWB

Table 5: Simulated results of gain and efficiency of the proposed Antenna #2

Frequency (GHz)	Gain (dB)	Total efficiency (%)
2	2.66	65.25
3	3.64	90.95
4	3.66	93.09
5	3.60	94.51
6	3.47	95.95
7	4.92	96.64
8	4.98	97.05
9	5.31	97.22
10	5.4	97.20
11	5.77	97.83
12	4.53	97.60
13	4.23	95.41
14	4.13	92.95
15	3.85	92.60
16	3.91	85.93
17	3.97	87.43

5. CONCLUSION

In this proposed work, the circular microstrip textile antenna has been designed for UWB wearable application with the jeans as substrate fabric. The proposed antenna has partial ground, to get a broader bandwidth of 12.91 GHz. The S11 parameter of simulated and measured results of the proposed antenna is below −10 dB for the UWB band frequency range, also a high gain of 5.77 dB and a radiation efficiency around 99.92% and total 97.73% have been achieved. The simulated and measured group delay of antenna #2 is nearly zero (0.0473 ns) over the 2–20 GHz frequency band. The bending performance of antenna #2 has been investigated, when antenna has been bent at radius of 80 mm and 0 degree for the UWB frequency range. In addition to this, a stable radiation pattern was obtained over the UWB frequency band.

Table 6: Comparison between proposed antenna designs with other literature reviews

Reference	Technique	Substrate and ε_r	Operating frequency GHz	Overall dimensions mm	S11 parameters dB	Bandwidth/% Bandwidth	VSWR	Applications mentioned
[1]	Circular textile antenna	Jeans $\varepsilon_r = 1.7$	3–12 GHz	Radius 15 ground plane 50×27	−10 to −55 dB	9 GHZ	NA	UWB application
[2]	Circular textile antenna for bending performance	Jeans $\varepsilon_r = 1.7$	2.2–14.5	Radius 15 ground plane 50×27	−10 to −55 dB	12.3 GHZ	NA	UWB application
[3]	Compact UWB antenna	PTFE & Jeans $\varepsilon_r = 1.7$	3.1–10.6 GHz	Circular patch 16 mm	−10 to −17 dB	7.5 GHz	NA	UWB application
[4]	Compact wide band MIMO antenna	Jeans $\varepsilon_r = 1.6$, Loss tangent = 0.02	1.83–8 GHz	Rectangular patch of size $0.56\lambda \times 0.32\lambda \times 0.008\lambda$	−10 dB to −58 dB	5.16 GHz	NA	UWB wearable applications
[5]	Reconfigurable MIMO	Textile material	Two bands 3.11–5.15 GHz and 4.81–7.39 GHz	2 element MIMO	NA	2.04 GHz and 2.58 GHz	NA	WiMAX/C band & WLAN
[6]	Compact wearable MIMO, improved port isolation with partial ground plane	Jeans $\varepsilon_r = 1.6$, $h_s = 1.5$ mm Loss tangent = 0.02	2.74–12.33 GHz	Ring Resonator R1 = 10.5 mm, R2 = 5 mm, $W_s = 55$ mm and $L_s = 35$ mm	−10 dB to −35dB	9.59 GHz or 127.27%	NA	UWB applications
[9]	Reconfigurable antenna, back to back snap on button	Foam with air	Dual band 2.45 & 5.8	L1 = 60, W1 = 55	−15 & −18	NA	Between 1 and 2	Wearable textile antenna
[11]	Rectangular patch for different substrate	Cotton 1.60, Polyester 1.90, Lycra 1.90 and Cordura 1.50	2.4	$W \times L = 46 \times 53$ 43×50, 43×50, 48×54	−32, −35, −29, −31	97, 40, 50, 48	2.4, 1.0879, 1.0944, 1.0917	NA
[12]	Moon strip shape for Multiband	Jeans $\varepsilon_r = 1.7$	5.44 & 10.15	Moon diameter 26 & substrate 50×50	−24 & −23	NA	NA	Satellite application
[14]	Dual band, rectangular dual L shape	Jeans cloth $\varepsilon_r = 1.7$	Dual band 3.17 & 5.04	$W_p = 25$, $L_p = 40$	−24, −18	100 & 30	1.86 & 1.79	Military
[15]	Wearable textile antenna	Jeans $\varepsilon_r = 1.6$	2.45	Rectangular shape $W_p = 54$, $L_p = 46.6$	−32.57	NA	1–2	Wearable application
[23]	Rectangular shape & Inset feed	Jeans $\varepsilon_r = 1.67$	Single band 2.45	$W = 45, L = 53$, $Hs = 2.84$ & full ground	−15.76	60 MHz	1.38	Wi-Fi communication
Proposedwork	Circular patch with 2 half circle slots R1 = 1.5 mm	Jeans $\varepsilon_r = 1.7$, loss tangent = 0.01	UWB band 2.45, 6.47 2.27–15.18 GHz	R = 15, slots of 6×6 & 10×10, 1.5 mm slots & ground plane 50×27	−10 dB to −35 dB	12.91 GHz UWB band	Between 1 and 2	UWB applications

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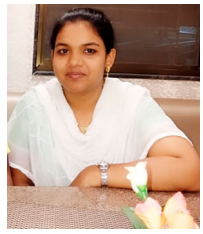

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Flexible MIMO Antennas for 5G Applications

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***Abstract*—5G is emerging as a next-generation technology that enhances capacity, provides very low latency, very high data rates, and good quality of service. For any 5G device to operate successfully, the design and development of an antenna play a very important role. An antenna should be compact in size, cost-effective, and should cover the desired 5G band with enhanced bandwidth, gain, and negligible radiation losses. The shrinking size of the futuristic and next-generation wireless devices will need miniaturized and tightly assembled antennas without affecting the performance. With the number of antennas increased in the MIMO system it will be difficult to meet the space constraint of next-generation devices. Also, with the innovation and ever-increasing demand for flexible electronic devices, there will be a need to design flexible antennas for such devices. Flexible antennas are having tremendous applications in Gateways and Routers, Wireless Access Points, High-speed HD streaming, Handheld Devices, High-capacity MIMO networks for Public Transportation. This review paper explains the concept of flexible antennas and the various types of substrates used for antenna fabrication with its comparison. It also covers the various types of flexible MIMO antennas for 5G applications.**

Keywords— Flexible antenna, substrate, MIMO, 5G, wireless

I. INTRODUCTION

The extensive development in the 5th generation (5G) technology is an unambiguous manifestation of technological insurgency to fulfill the flourishing demand for high-speed communication as well as futuristic wireless applications. 5G is emerging as a next-generation technology that enhances capacity, provides very low latency, very high data rates, and good quality of service. 5G gives a significant advantage in the fields of healthcare, industry, education, and other social regions. For any 5G device to operate successfully, the design and development of an antenna play a very important role. The antenna should be designed in such a way that it should be compact in size, cost-effective, and should cover the desired 5G band with enhanced bandwidth, gain, and negligible radiation losses. So, for 5G devices, it is important to design an antenna by maintaining a balance between the aesthetics and performance characteristics. It is also expected that the existing low band spectrum will be reused for 5G as legacy networks decline in usage and to support future use cases [3]. 5G deployments need several antenna packages for indoor as well as for outdoor use, small cell and macro-coverage, and several different types of terminal equipment [4].

With the number of antennas increased in the MIMO system it will be difficult to meet the space constraint of next-generation devices. Also, with the innovation and ever-increasing demand for flexible electronic devices, there will be a need to design flexible antennas for such devices. The antennas are designed on a flexible substrate which will ensure proper integration and packaging of wireless communication devices and sensor networks. Flexible substrate antennas (FSAs) are in great demand for next-generation wireless devices and can be used in several wireless communication applications where antennas are mounted inside curved electronic surfaces [5]. FSAs have significantly gained popularity for use in multisystem 5G wireless communication devices, radiofrequency identification (RFID) tags, wearable devices, textiles, and upcoming new wireless sensing applications in wireless sensing or the integration in satellite systems.

II. MOTIVATION

Future developing 5G devices require MIMO antenna technology. Antennas should be small in form but with engineering criteria that include greater capacity, greater bandwidth, enhanced profitability, and sensitivity to human users. Moreover, because of the introduction of 5G and the essential qualities such as broad frequency band, shorter wavelength, and propagation properties in snow, fog, and dust, the millimeter waveband received a lot of interest [6–8]. MIMO combines the advantages and features of multiple-input single-output (MISO) and single-input multiple-output (SIMO) [9, 10]. It uses multiple antennas at the transmitter & receiver sides. It increases data capacity & speed [11,12]. Currently, MIMO multi-antenna research is focused on the development of high-performance; low-cost antenna layout concepts [13–15]. The conformal antenna [16] can accomplish this goal. Conformal antennas may be constructed on the device's surface, which avoids damaging the carrier's mechanical structure and saves space [17–19]. The low profile, tiny size, lightweight, and simplicity of integration with other carriers are all benefits of the flexible

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antenna [20-21]. Subsequently, various applications where the flexible antenna can be implemented are Gateways and Routers, Wireless Access Points, High-speed HD streaming, Handheld Devices, High capacity MIMO networks for Public Transportation.

III. MATERIALS FOR FLEXIBLE ANTENNA

In this section materials for the flexible antenna are discussed. To achieve high efficiency of the antenna, the antenna should be developed and manufactured with high conductivity and flexible materials merged with low-cost dielectric materials. The PMC composite materials [22] made of a polymer material such as epoxy resin and reinforcement materials such as carbon fibres and glass fibres, are known as the material for the future, which will be a raw material for the manufacture of various instruments and materials [23-24]. Interior security or transparent communications equipment such as femtocell might be utilized with transparent antennas [25] in the future.

III.I Flexible Substrates

It is essential to pick which substrate is appropriate among several available options. Polyimide (PI), foil, Polyethylene terephthalate (PET), paper, Polydimethylsiloxane (PDMS).Thinner substrates can be utilized for printing flexible antennas, especially for the standard substrates FR4, Teflon, Taconic or Rogers. A slotted wideband CPW fed flexible bow-tie antenna with a size of 60 × 80 mm^2 for WiMAX or WLAN was realized on flexible Rogers RO4003C (0.2-mm-thick) [26]. Authors from the University of Arizona [27-28] developed a second quasi-Yagi-type CPW feed antenna with a range of 0.127 mm Rogers RT5880 thickness that achieved a gain value of 5.76 dBi at a 1.55 GHz resonant frequency. The advanced spiral conical four-brace antenna by cutting, etching, and wrapping of Rogers 0.127-mm thick RT/duroid® 5880, is an example of a 3D antenna of such kind of substrate [29].

A. Kapton polyimide

Fig. 1. Antenna with Flexible Kapton

Many researchers suggested fabricating antennas using this substrate, including the two-frequency CPW fed monopole antennas, with 2.2 and 5.3 GHz resonant frequencies [30] and 2.45GHz and 5.5GHz dual-band [31] antenna. A dual-band antenna, totally isolated from the 0.127 mm thick Kapton polyimide substratum and with a 10- µm thick biocompatible Parylene C film, may be employed in implantable applications employing micro-fabrication technology [32] described by Y. H. Jung et al & for and laptop computer applications[33].

B. Polydimethylsiloxane (PDMS) substrates

Fig. 2. PDMS Material [34]

In several studies, polydimeter siloxane (PDMS) is also recognized as a flexible, elastic, optically transparent, and organically-compatible polymer, In [34], the authors devised ways to stabilize and choose conductive components on the PDMS surface. For sub-retinal prostheses, the PDMS is a flexible, implanted microelectrode for gold plated electrodes [34]. A research group belonging to France, and Rennes used optically transparent leading material fabric tissues in PDMS sub-substrates [35] for the transparent micro-tripped UWB flexible antenna. Another example of flexible structures is the monopoly antenna produced by a micro-strip which is attached to the conductive fibres on the PDMS substrates [36]. The antenna can accommodate a 3.43 GHz – 11.1 GHz frequency band. A PDMS conveyor design by Market inc. [37] and an antenna using conductive NCS95R-CR material, which may be used with two varactors, have been introduced by B. V. Roy et al. as body-centered transmissions, such as the 2.4 and 5.8 GHz dual-band antenna structure. In applications of the wireless body area networks, Z. H. Jiange et al. launched a circular polarised PDMS antenna that uses AgNW ink [38].

C. Textile substrates

Textile substrates antennas or electronic circuitry may be embedded into clothing for wearable and biological usage[39, 40]. Many publications on this subject have been published, among them numerous antennas and electrical components on textiles, which are described in [41-52]. Frequency selective surfaces (FSS) including the gain increase or improved bandwidths may be utilized in on-body communications applications with a periodic structure that uses copper gravure on an electro-textile filter [41], which works as a band cut-off filter spanning from 10 to 12 GHz. In [42] there is another periodic structure with millimetre-wave frequencies. Jingni Zhong et al. [43] suggested a high-strength Kevlar fabric spiral antenna with conductive textile threads. An excellent 0.3 – 3 GHz ribbon width with a circular polarised (CP) gain value of 6.5 dBi over the bandwidth from the 1 - 3 GHz ribbon. A transformer-based patch antenna is also a textile antenna [44-45] and operates within frequency band 2.4–2.4835 GHz. In [46], three Bluetooth rectangular patch antennas supplied by Bluetooth were developed for wear ability applications on various textile materials. This sort of substrate can also use a direct-write method like inkjet printing [47]. For integration in a fire-fighter costume, the screen-printing technology utilized for manufacturing a UHF RFRID antenna with 868 MHz [48] is applied. Figure 4 shows the meander antennas and their example of application on a suit. The method for antenna structures with broken vias was also investigated for the substrate-integrated waveguiding (SIW) [49-52]. For example, the 2.45 GHz ISM band contains a cavity-backed SIW folded rectangular antenna fed through a shielded strip line [50]. It was proposed in [52] for Wi-Fi 2.4/5.2/5.8 GHz for a MIMO two-element textile antenna system based on SIW.

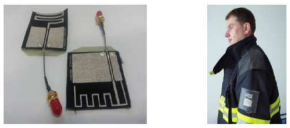

Fig. 3. Textile based antenna [46]

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D. *Plastic materials*

The possible choices for a variety of applications include plastic materials like polyethylenaphthalate (PEN), polyethylene terephthalate (MEP), and plastic isolating sheets. A CPW-fed 2.45 GHz ISM-band Z-shaped antenna fabricated on PET produced by a bureau printer is proposed in [53]. A circularly polarised microstrip patch (7.7 GHz – 8.3 GHz) antenna (4 × 4) created and manufactured on PET by authors of the University of San Diego [54] achieved a gain of over 15 dBi and an efficiency of over 75 percent. The writers in [55-56] study CPW-fed ink jet-printing 20-GHz monopole antennas with two soft substrates namely PET and thick paper. The best antenna performance for a drop of 30 µm was PET's 96 percent radiation performance, with Epson paper being far thicker than PET's 77 percent. UWB tag chip less UWB created and compared UWB-chip less paper tags, made from various ink screens, copper, aluminium and silver [57]. Flexible plastic substrates are cheap cost, smaller loss of antenna substrates (tan amount to less than 0.005) than certain other flexible materials. However, a heat treatment procedure. Therefore, the authors of [57] employed a low-cost self-sintering, printer-friendly, and conducting ink in an Inkjet printer procedure to create an RFID antenna on PET.

E. *Paper materials*

For an ultra-low-cost, flexible electronic substrate that allows better-quality direct writing than polyester and promotes mass manufacturing [58], the paper has turned out to be the viable solution. The interactions between fluids and substrate also include the inertial spread of ink droplets, drying out of a droplet on another, resulting in metallic layers being non-smooth and liquids of ink evaporating [59].

F. *Other substrate materials*

In addition to the substrates above, other substrates may be utilized for flexible electronics, such as LCP, semiconductors [60-62], silicone elastomers [63], printed material natural rubber, and Ninja Flex 3-D [64]. The following can also be employed for use in the production of flexible electroplating.

TABLE I : COMPARISON OF VARIOUS SUBSTRATES

Substrate	Dielectric Constant	Dielectric Loss	Thickness	Cost
Kapton polyimide [30-33]	3.5	0.008	20 µm	high
Polydimethylsiloxane (PDMS)[34-38]	2.65	0.02	200 µm	moderate
Textile substrates [39-52]	1.16	0.02	3.5mm	low
Plastic materials (PET) [53-57]	2	0.008	0.140mm	low
Plastic materials(PEN) [53-57]	2.9	0.025	0.125mm	
Paper materials [58,59]	2.85	0.05	0.254mm	low

Table I shows the comparison between the various substrates mentioned in the literature. Each substrate is used for different applications by considering its advantages & disadvantages. Plastics material (PET, PEN) is the most suitable substrate in flexible antenna design as it is having good electrical, mechanical, and moisture resistant properties.

III.II Flexible 5G Antennas

In this section, the flexible antennas proposed by the researchers for 5G applications are discussed.

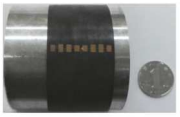

Fig. 4. Conformal Array for 5G MIMO [65]

Four pairs of conformal 35GHz microstrip antennas were designed in this study. The middle frequency of the design is 35GHz, and a relatively dielectric substratum is selected, the µr = 2.2, respectively. Substrate thickness is 0.5 mm. The size of the microstrip patch antenna is 3mm.

An antenna printed on a flexible structure with a low-profile silver ink is shown in figure 5. The polyester fabric-based flexible antenna is supplied via a conventional 50Ω microstrip line connected with a CPS balun (unbalance-to-balance). The antennas work within the range of 23 - 30 GHz that covers the ISM band to 26.5 – 29.5 GHz, as well as LMDs, a range of 24.25 – 27.5 GHz in the k-band. The applications include wearable electronic equipment or medical scanning devices. A 0.35 mm thick polyester with ε_r=2.2.

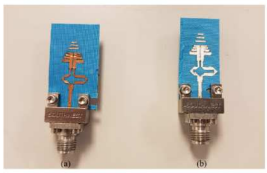

Fig. 5. Flexible Polyester Based Antenna [66]

On the Polyethylene Terephthalate (PET) substrate with a 0.125 mm thickness in 5G applications, a modified patch antenna using microstrip feed is implemented as shown in Figure 6. The 60×75 mm^2 large broadband antenna is manufactured with the use of a new inkjet imprimer as a conductive ink with silver nano-particles. It has 7 - 13 GHz with a radiation pattern in an omnidirectional manner with an average value of gain of 5 dBi. The antenna design achieved good results in the needed specifying requirements in terms of operation, size, flexibility, technology, and materials.

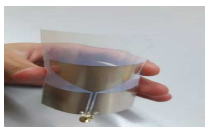

Fig.6. Flexible conductive Ink based antenna [67]

The paper proposes to target Sub 6 GHz 5G band (3.8 - 4.9 GHz) and WLAN applications (5- 5.8 GHz) using PET and AgHT -8 which are a flexible transparent substrates and conductive sheets, respectively as illustrated in Figure 7. HFSS software is used for antenna designing followed by manufacturing and measurement.

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Fig. 7 AgHT and PET- based transparent antenna[68]

A flexible, high gain, wideband transparent radiator manufactured utilizing PET and AgHT-8 is presented where Laser technology ensured the accuracy of conducting layer modeling. The antenna has a 40% bandwidth impedance and average gain value of 3 dBi, the average efficiency for the operating bands is higher than 80 percent.

The Flexible multilayer film antenna shown in Figure 8 provides flexibility and transparency features for usage in laptops. The antenna presented has been manufactured using (IZTO/Ag/IZTO) multilayer film on the substrate made up of polyamide and the conducting antenna material. It provides better bandwidth and a larger user coverage frequency band.

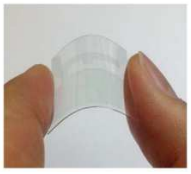

Fig. 8. Flexible multilayer film antenna [69]

III.III Flexible 5G MIMO Antennas

Compact two-port MIMO antenna based on open slot technique for antenna miniaturization [70]. The antenna is designed on a semi-flexible Roger-5880 substrate with a dimension of 28 × 25 × 0.5 mm^3 and operates in the 2.45GHz Industrial Scientific and Medical band (ISM).

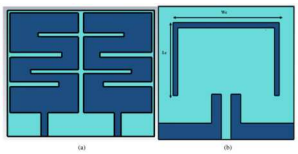

Fig. 9. The geometry of compact open slot two-port MIMO Antenna [70]

CPW fed Inverted F antenna array consisting of two radiating elements separated by a distance of 0.008λ [71]. The substrate used is Kapton polyimide substrate and has a thickness of 25 µm. The antenna operates in the single band at a resonance of 2.5 GHz.

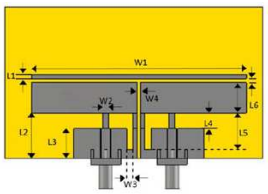

Fig. 10. The geometry of Inverted F antenna [71]

A dipole antenna with integrated balun is illustrated in Figure 11 [72]. The designed antenna consists of a 3D structure and is printed on a flexible paper substrate. The antenna has an overall dimension of 60 × 65 × 41 mm^3 and operates in the 2.4/5GHz band.

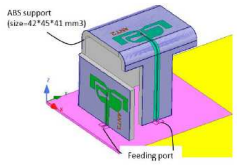

Fig. 11. The geometry of 3D MIMO Antenna [72]

Compact flexible antenna design for UWB application [73]. The antenna is designed using two half elliptical radiating elements and the complete MIMO structure has the dimension of 100 × 33 × 0.05 mm^3. The flexible substrate used is Kapton polyimide substrate having a loss tangent of 0.002 and dielectric constant of 3.4 and the antenna is fed using the CPW technique.

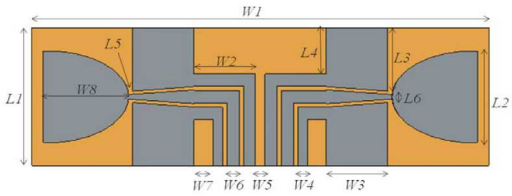

Fig. 12. The geometry of compact two half elliptical radiating element MIMO Antenna [73]

TABLE II : COMPARISON OF VARIOUS FLEXIBLE ANTENNAS

Antenna	Gain	Frequency	Size	Substrate used
Conformal Array[65]	10dbi	35GHz	3mm	RT Duroid 5880
Flexible Polyester Based Antenna [66]	4.3dbi	23 - 30 GHz	25 × 12.7 mm^2	Polyster fabric
Flexible conductive Ink based antenna [67]	5dbi	7 - 13 GHz	60×75 mm^2	PET
AgHT and PET-based transparent antenna[68]	3dbi	3.8 - 4.9 GHz	60×375 mm^2	AgHT and PET
Flexible multilayer film antenna [69]	5.4dbi	5.2GHz	-	Polymide
Compact open slot two-port MIMO Antenna [70]	9.9dbi	2.5GHz	28 × 25 × 0.5 mm^3	Roger-5880

Table II shows a performance comparison of various flexible antennas implemented for 5G applications in terms of gain, frequency, size & substrate.

IV. CONCLUSION

Through the detailed investigation of the existing state of art, it is realized flexible antennas are a good approach for future wireless communication. The existing state of art exhibit limitation like larger dimensions, narrow bandwidth, use of the expensive substrate, low gain and efficiency etc. The plastic substrate is comparatively good as compared to other substrates. The future research work should focus on the design of a low-cost, compact, flexible MIMO antenna with good radiation and electromagnetic properties as well as MIMO diversity performance. The MIMO antenna should cover the entire 5G sub 6GHz band with good reflection and transmission coefficient without using any 3D

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structures and additional components. To ensure the suitability and performance of the flexible MIMO antenna inside a limited space, the antenna should also be tested for different bending conditions. The design of 2×2 & 4×4 MIMO antenna is mostly preferred for 5G applications.

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Multiband Microstrip Textile Antenna for WiFi/WiMAX/5G Communication

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***Abstract*: In the present scenario/trend of communication, the multiband antennas are required for future 5G communications. The geometry of proposed antenna consists of two rectangular patches of dimensions 53mm X 47mm and 25mm X 22mm which are designed at 2.4GHz and 5GHz operating frequencies. The proposed work consist of the multiband textile antenna resonating at the ten different frequency bands of 2.4GHz for Wi-Fi, 7.8GHz for WiMAX, 12GHz for FM receiver for satellite broadcasting, 15GHz for fixed wireless system, 22GHz and 28-37GHz onwards for future 5G communications. The simulation result of return loss shows that antenna is radiating at ten frequency bands rather to radiate at two bands only. These extra frequency bands are obtained due to microstrip connecting feed lines acts as monopole antennas. Also the bending performance of proposed antenna has investigated at angle of 45° and radius of 100mm which size of bicep of human being.**

Keywords: Bending performance, Multiband, Rectangular Microstrip, Wi-Fi, and WiMAX.

I. INTRODUCTION

On body communication can be performed by new trend called wireless body area network (WBAN). The microstrip antennas are made wearable by using textile material such as jeans, polyester and cotton etc. Wi-Fi communication now days are made portable by using textile material. The IEEE standard support for the various frequency bands IEEE802.11/a/b/g/n and good radiation pattern for wide range of communication. Third generation mobile communication is improved due to use Wi-Fi technology. The WiFi frequency band varies from 2.43GHz to 2.485GHz and 5.15 to 5.35GHz, 5.47GHz to 5.72GHz & 5.72 to 5.85GHz. The bandwidths obtained are of 152MHz for Wi-Fi, 235MHz for WiMAX & 4.5GHz for 5G communications [1].The on body performance of wearable microstrip antenna placed on tissue like phantom has been examined at resonating frequency of 2.45GHz. The antenna placed at different locations for transmitting and receiving for line of sight (LOS) and non-line of sight (NLOS) has been analyzed. The patch loss obtained for NLOS is of 3.4dB [2]. A robust snap on button module illustrated the two band reconfigurable wearable microstrip antenna provides the tunable frequency range of 32.8% & 8.8% for two resonating frequencies at 2.45GHz and 5.8GHz. Also designed antenna provided the secure and conformable electronic to textile connections [3]. The basic need of wearable application is to provide the flexible fabric material selection. The different antenna parameters are analyzed for the various textile fabrics such as cotton, polyester, lycra and cordura [4].The fractional bandwidth obtained in the moon strip wearable textile antenna is of 62.78% at 5.3GHz to 10.15GHz for ultra-wide band application [5]. The circularly polarized microstrip textile antenna is radiating at the frequency of 2.4GHz in the ISM band. The enhanced bandwidth and wide axial ratio have been obtained for proposed antenna [6]. The microstrip slot antennas are used to improve the bandwidth of WiMAX for dual frequency bands of 1.97-2.87GHz and 4.87-8GHz. The

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antenna provided the average gain of 3.2dBi and 4dBi at these frequencies [7]. A CPW fed slot antennas has been designed for two operating frequencies in the range of 1.96-4.33GHz and 5.05-7.23GHz for WLAN applications. The antenna provided the boarder bandwidth and S11 below -10dB [8]. The frequency band for the 4G communication varies from 2-8GHz over the bandwidth of 5-20MHz. But by considering the need of advanced 5G communication the bandwidth required has enhanced. For the 5G communication the frequency bands from 28GHz onwards are used with bandwidth of 1-2GHz. The compact size of 0.8λo x 0.75λo, the 4x4 array slot antenna designed for 28/38GHz frequency for5G communication [9]. The 16 element array with aperture coupled feed, millimeter wave antenna has been designed for 60GHz resonating frequency. The gain obtained of 8dBi with single antenna whereas 17dBi for 16 element array. Also the enhanced bandwidth of greater than 10GHzis achieved [10].

The proposed antennas designed for ISM band for the frequency of 2.4GHz with S11 parameter achieved below -10dB [11-12]. The triple band textile antenna operating at 3.42GHz, 9.73GHz & 11.17GHz frequencies with directivities of 3.35dBi, 4.23dBi & 5.19dBi [13]. The compact size textile antenna provided the gain of 5.6dBi for ISM band frequencies [14]. The ultra wide band circular antenna designed for 2.8GHz to 16GHz frequency range [15].

The multiband microstrip antenna is operating at three different frequencies of 23.9GHz, 35.5GHz and 70.9 GHz for 5G application [16].

The analysis has been carried out for the intra body communication antenna for medical application in ISM band [17]. The UWB textile antenna has been developed for 3.2-16.3GHz frequency band. The high efficiency is achieved for on body communication antenna as compared to floating air [18].The wearable fractal antenna has been designed which is resonating at 2.53GHz, 4.9GHz and 7.6GHz for multiband communication [19-20]. The bandwidth achieved for Wi-Fi application with rectangular structure is of 54.2MHz with gain of 8.05dBi and less return loss of -15.76dB [21].

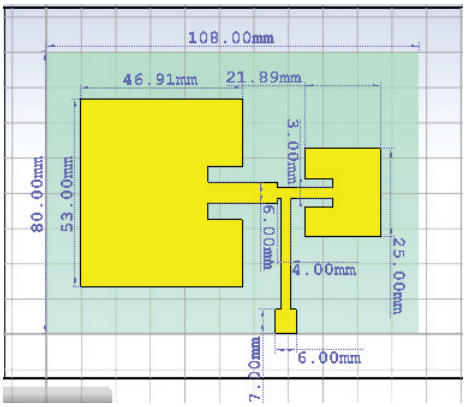
A. Textile Material Selection

The wearable antennas are fabricated by using two textile materials- Natural and manmade. In this work, the textile antenna is designed and analyzed by using jeans as substrate material. The jeans material is smooth and flexible, so it can easily wear on the body. The height of jeans substrate selected in such way that, it will minimize the surface wave losses. The measurement of relative permittivity of jeans material has been carried out using dielectric probe over frequency range of 300MHz to 20GHz and relative permittivity (εr) found near about 1.7.

II. Antenna Design and Configuration

In this proposed work, compact two rectangular microstrip patches are designed at 2.4GHz & 5GHz of sizes 2.35λ x 2.66λ and 2.4λ x 2.72λ with the jean fabric of 1.5mm thickness as dielectric substrate. The overall dimension of ground plane & substrate of proposed antenna is 108mm x 80mm as shown in figure 1(a-c). The top patch and bottom plane are made with adhesive conducting copper foil of thickness 0.035mm. These two patches are excited by the inset feed lines of size (Wf) 4mm, which is proving the impedance of 50Ω to match with source impedance. The patch 1 is connected by line of length 20mm with thickness of 6mm and patch 2 is connected by line of length 16mm with thickness 3mm. These two patches connecting line act as additional monopole antennas, which results to get additional frequency bands of 12-38GHz for 5G communication. The proposed antenna is resonating for ten different multiple frequency bands of 2.4GHz for Wi-Fi, 7.8GHz for WiMAX, 12GHz for FM receiver for satellite broadcasting, 15GHz for fixed wireless system, 22GHz and 28-37GHz onwards for future 5G communications. Top patch of antenna consist of U slot novelty added, which improves the radiation pattern as shown in figure 1b. Also the square slot is designed at the feed point of feed line, which helps to enhance the bandwidth of proposed antenna. So we claim that results are improved as compared to base paper considered in terms of number of frequency bands, bandwidth, gain and efficiency which is stated in result and discussion and comparison table 2. These results are improved due to change of widths of line connecting for two patches. It is also observed that, the bending of antenna at 100mm radius, changes the performance characteristics of proposed antenna as shown in figure 1.

The proposed textile antenna has been simulated in CST microwave studio software for 2-38GHz frequency range and the different antenna parameters have been analyzed.



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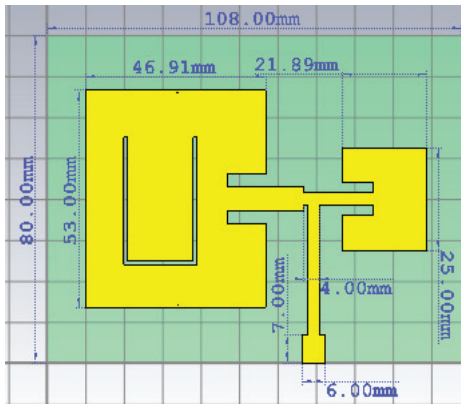

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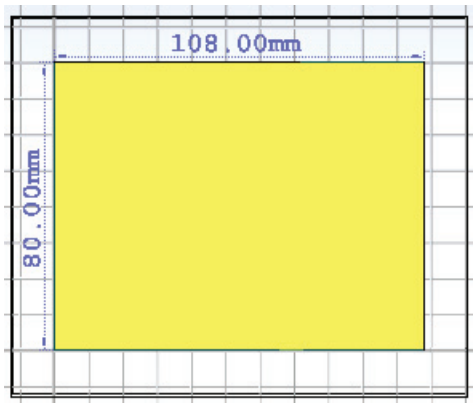

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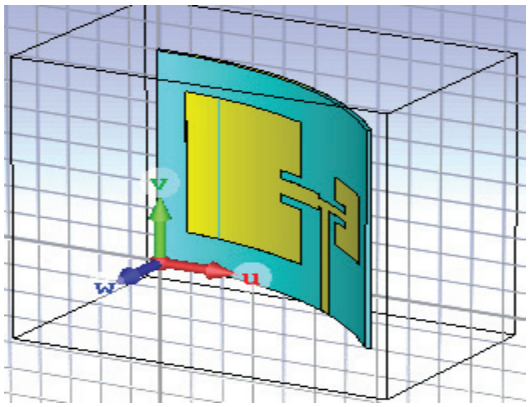

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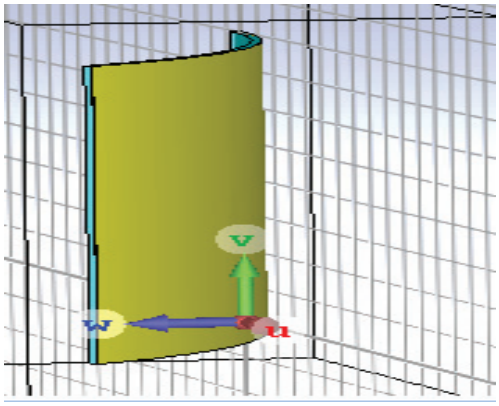
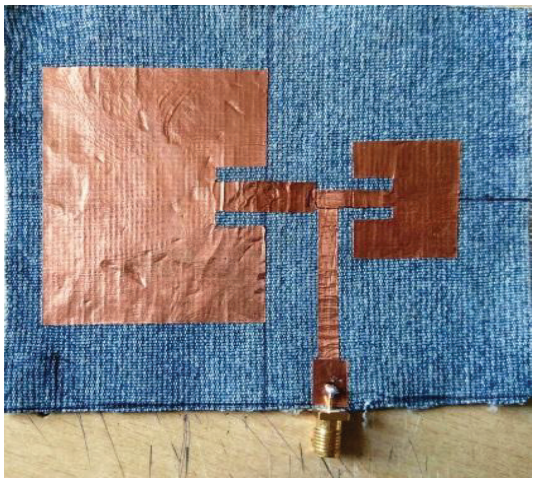


e

Fig. 1. CST Simulation of proposed antenna, a: Top View and b: U slot on top view, c: Bottom View, d: Bending antenna at 100mm radius and e: Bottom view of bending antenna at 100mm radius.

A. Textile Antenna Fabrication

The textile antenna is fabricated on the regular jeans material of mentioned size in table 1. The adhesive copper conducting sheet of 35 micron is used to design top radiating patch on upper plane of jeans fabric and partial ground plane at bottom side of jeans fabric. The precise size of feed line is connected to the top radiating patch by soldiering with SMA connector. The figure 2a shows geometry of top of fabricated microstrip textile antenna and 2b shows bottom view of fabricated antenna. The fabricated antenna is tested with Anritsu VNA of 20GHz frequency range and compared the simulated & measured results.



a

b

Fig. 2. :Picture of fabricated microstrip textile antenna, a: Top View and b: Bottom View

The length and width of proposed antennas are determined at 2.4GHz & 5GHz frequencies with $\in$ r of 1.7, hs=1.5mm as follows [21].

a) Effective Width of patch

$W = \frac{c}{2f\sqrt{(\varepsilon r+1)}}$ => W_1=53.79mm& W_2=25mm

b) Effective Length of patch

$$\in \text{reff} = c + \frac{\in r - 1}{2}\left[1 + 12\frac{h}{W}\right]^{-1/2}$$

$\in$ reff = 1.60

$Le = \frac{c}{2f\sqrt{\varepsilon reff}}$ => Le_1 =48.61mm & Le_2=23.58mm

Due to fringing effect

$$\frac{\nabla L}{h} = 0.412\left[\frac{(\in \text{reff} + 0.3)\left(\frac{W}{h} + 0.264\right)}{(\in \text{reff} - 0.258)\left(\frac{W}{h} + 0.8\right)}\right]$$

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$\Delta L = 0.85mm$

c) Length of patch $L = Le - 2\Delta L \Rightarrow L_1 = 46.91$ mm& L_2=21.89mm

The following table 1 consists of the antenna parameter calculated for proposed antennas.

TABLE I. ANTENNA DIMENSIONS

Antenna Parameter	Value
Dielectric constant εr	1.7
Length of Patch1 L1	46.91mm
Width of patch1 W1	53.79mm
Length of patch2 L2	21.89mm
Width of patch2 W2	25mm
Width of gap for patch1 Gpf1	15mm
Width of gap for patch2 Gpf2	4mm
Length of ground plane Lg	108mm
Width of ground plane Wg	80mm
Width of feed line Wf	4mm
Substrate thickness hs	1.5mm
Copper thickness	0.035mm

III. RESULT & DISCUSSION

In order to get best analysis & validation, the comparison of simulated and the measured return loss, VSWR and bandwidth values of proposed antenna are discussed.

A. Return Loss

To get perfect radiation the return loss value must be kept below -10dB. Figure 3 shows that, the proposed antenna is resonating at multiband frequencies 2.36GHz, 4.27GHz, 5.2GHz, 7.85GHz, 8.53GHz, 12.35GHz, 15.51GHZ, 22.22GHz, 25.81GHZ, 29.32GHZ and 32- 37GHz as shown in figure 3(a-c). Out these frequency bands the large bandwidth is achieved at 12-29GHz and 31-37GHz. These enhanced bandwidths are achieved due to feed line length and square slot designed at feed point of proposed antenna. The bandwidths obtained are 75.5MHz for WiFi, 138MHz for WiMAX, 740MHz at 15.03GHz, 1.558GHz at 22.86GHz, 2.13GHz at 30GHz and 5.2GHz at 31-37GHz band. The frequency bands above 20GHz are used for 5G communication. Also the bending performance of antenna has been investigated at the angle of 45˚ & radius of 100mm and due to bending antenna the one frequency band at 7.8GHz is missed as shown in figure 3(d). This bending antenna at 100mm radius can be implemented on the human bicep and performance is validated.

The results of return loss and fractional bandwidths are shown table 2 of simulated results.

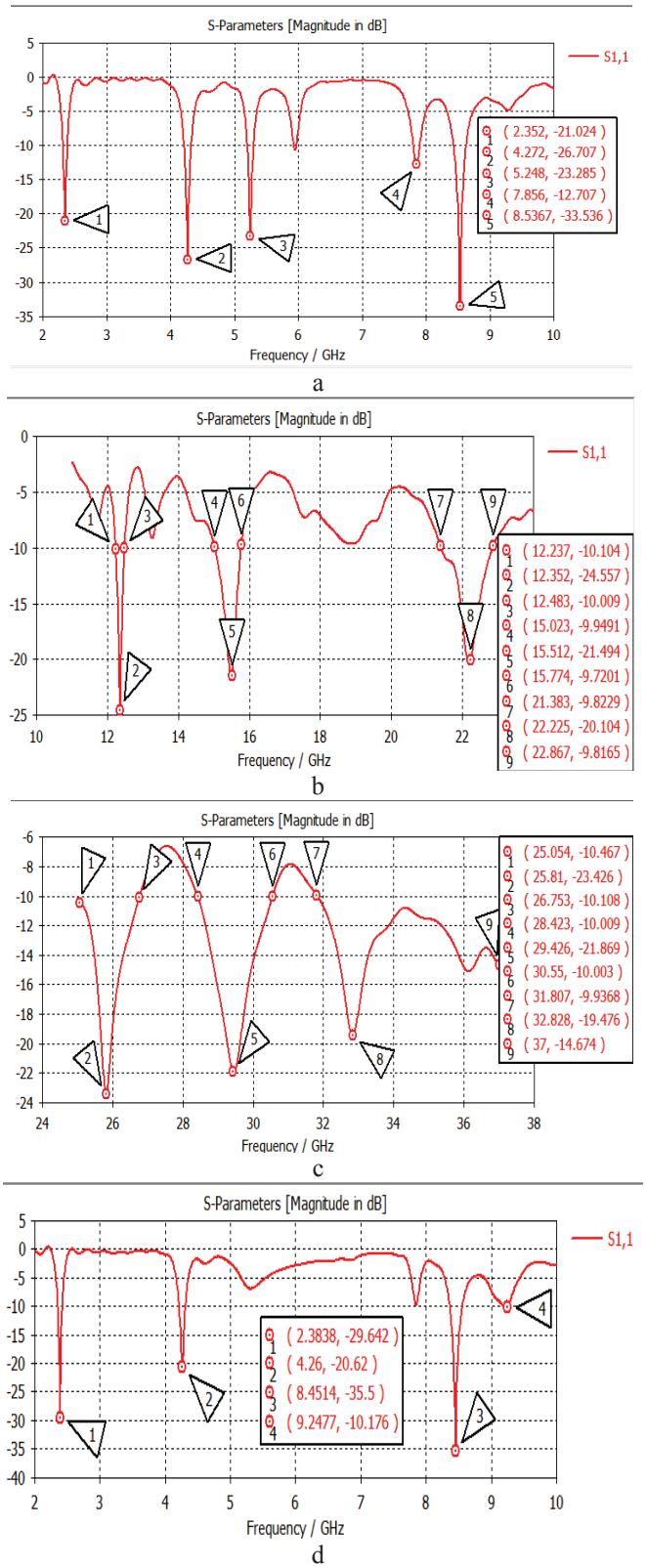

Fig. 3. Return Loss versus frequency plot of proposed antenna in dB a: from 2 -10GHz, b: 10-24GHz, c: 24-38GHz & d: 2-10GHz for bending of antenna at 100mm radius.

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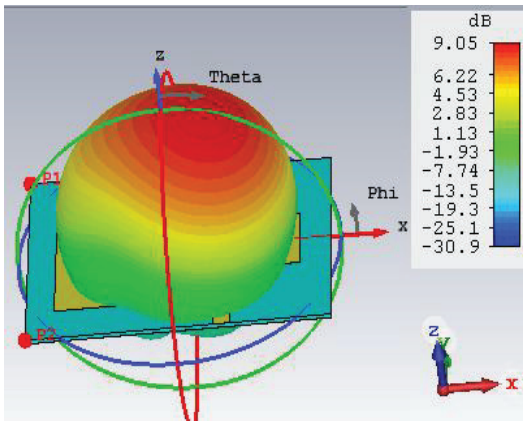
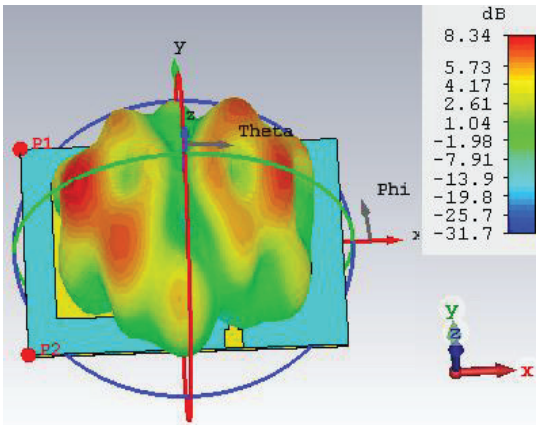
B. 3D radiation pattern of proposed antenna

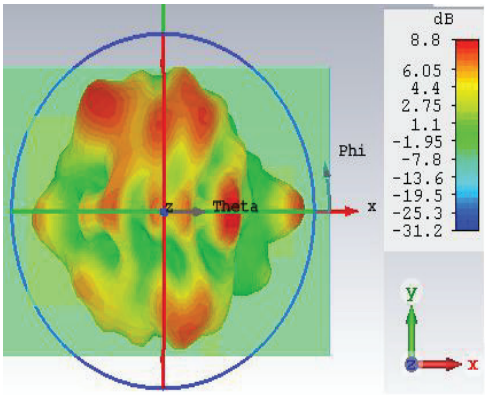
Figure 4(a-f) shows that, the sample of 3D radiation patterns are considered gain plot at the different frequencies of 2.5GHz,7.8GHz,9.2GHZ, 12GHz,22GHz, 28GHz, 30GHz,and 33GHz with the gain of 9.05dB, 8.34dB9.77dB, 8.8dB, 9.81dB, 8.74dB, 9.46dB and 8.41dB.The maximum gain achieved is of 9.81dB at the resonating frequency of 22GHz. At the 2.5GHz frequency, the proposed antenna provided the single major lobe with large gain of 9.05dB used for WiFi communication as shown in figure 4(a). For the WiMAX application the antenna radiated with gain of 8.34dB as shown in figure 4(b) and for 4G application over frequency band 25GHz to 38GHz , antenna radiated with gain of 10dB as shown in figure 4(d-f).



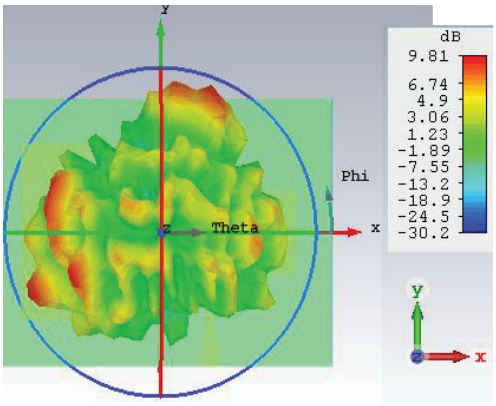
a: 2.5 GHz



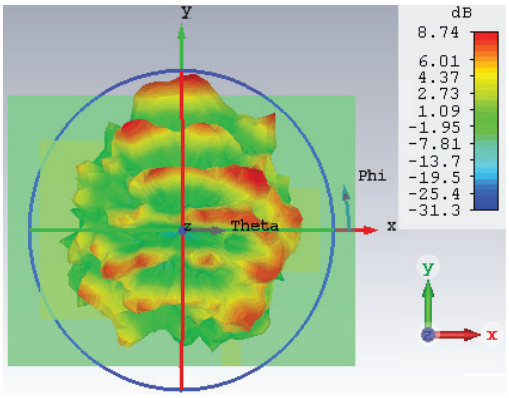
b: 7.8 GHz



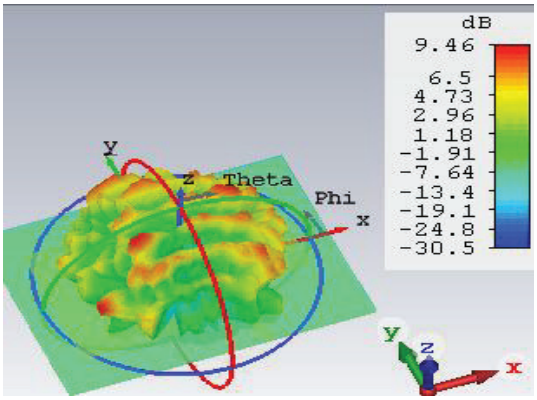
c:9.2GHz



d: 28GHz



e: 30GHz



f: 33GHz

Fig. 4. 3D Radiation pattern of proposed antenna, a-f: Gain of antenna at different frequency bands.

C. 2D radiation pattern of antenna:

From figure 5, it has been seen that the main lobe direction of 2.0˚& angular bandwidth of 74.0˚ with magnitude of 7.55dB at frequency of 2.5GHz for WiFi communication. The main lobe direction of 53˚and angular bandwidth of 41.8˚ with magnitude of 5.85dB at frequency of 7.8GHz for WiMAX communication &side lobe level is of -2.2dB and the main lobe direction of 5.9˚and angular bandwidth of 35.0˚ with magnitude of 9.12dB at frequency of 35GHz for 5G communication with side lobe level is of -2.0dB. The E filed pattern of proposed antenna also analysed with electric field intensity of 17dBV/m, 16.2dBV/m and 23.6dBV/m at 2.5GHz, 7.8GHz and 35GHz frequencies shown in figure 5(d-f).

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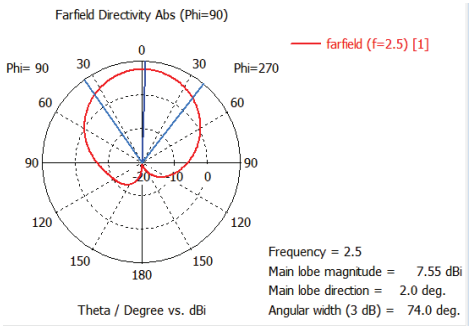
The proposed atnenna is highly directive due to use of U slot, for WiFi, WiMAX and 5G communication which is shown in polar plot figure 5(a-c).



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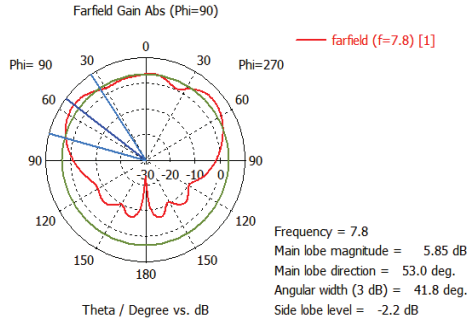

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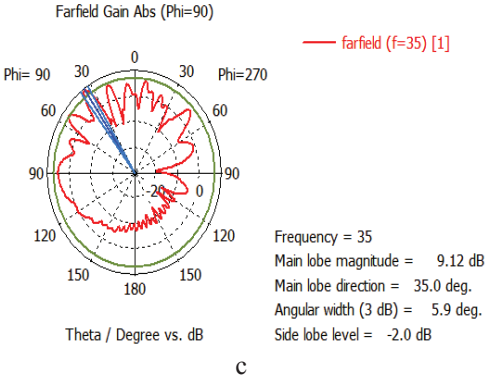

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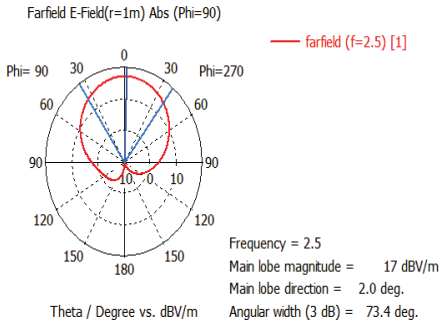

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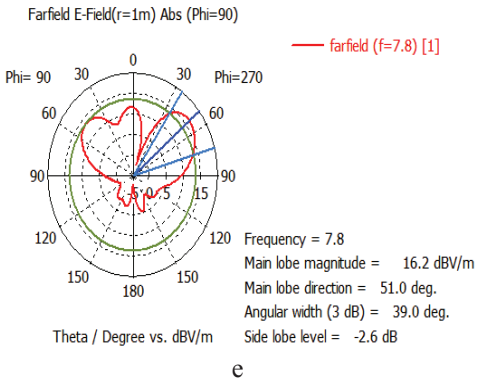

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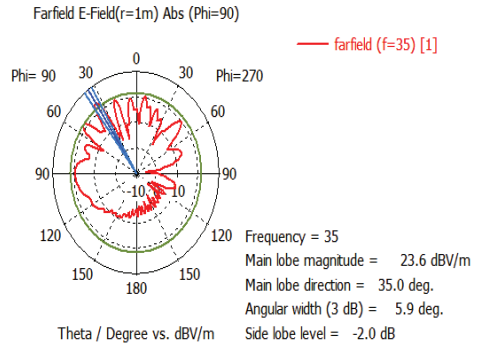
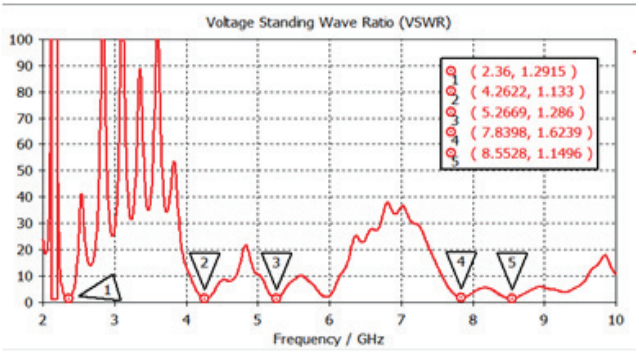


f

Fig. 5. Polar plot of the proposed antenna, at a: 2.5GHz, b: 7.8GHz &c: 35GHz, E field at d: 2.5GHz, e: 7.8GHz &f: 35GHz

D. VSWR of proposed antenna

Figure 6 (a-c) shows that the VSWR plot Versus frewquency for different operating frequencies 2.36GHz , 4.26GHz, 5.2GHz,7.8GHz,12GHz, and 22-37GHz arelies in between 1.12 to 1.62, simulated VSWR values are shown in table 2.



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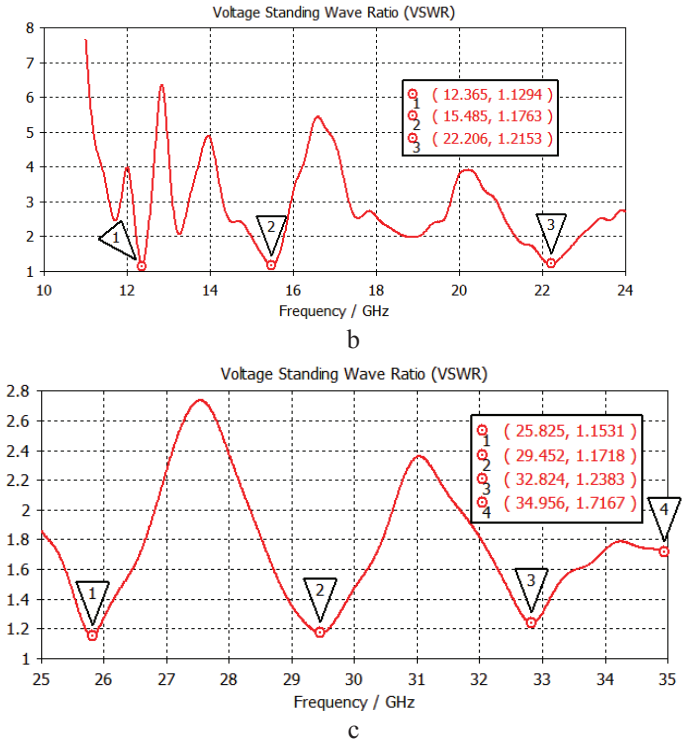
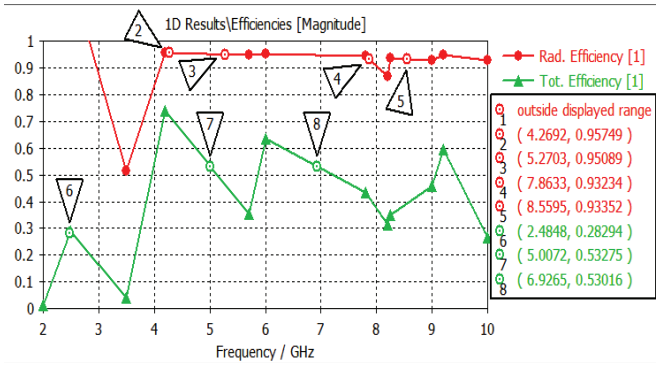


Fig. 6. VSWR of proposed antenna, a:at 2-10GHz, b: at 10-24GHz and c: 25-35GHz frequency bands

E. *Efficiency*

Figure 7 (a-c)shows that the proposed antenna radiated at multiple frequancy bands. The input power and radiated power is high at the frequencies 4.2GHz, 7.8GHz and 31-35GHz, so that radiation effieciency is also high and it is above 93%

The total efficienmcy of antenna is moderate at 2-10GHz lower frequencies, but it is enhanced to above 85% at 15 – 35GHz for 5G communication frequency band.



a

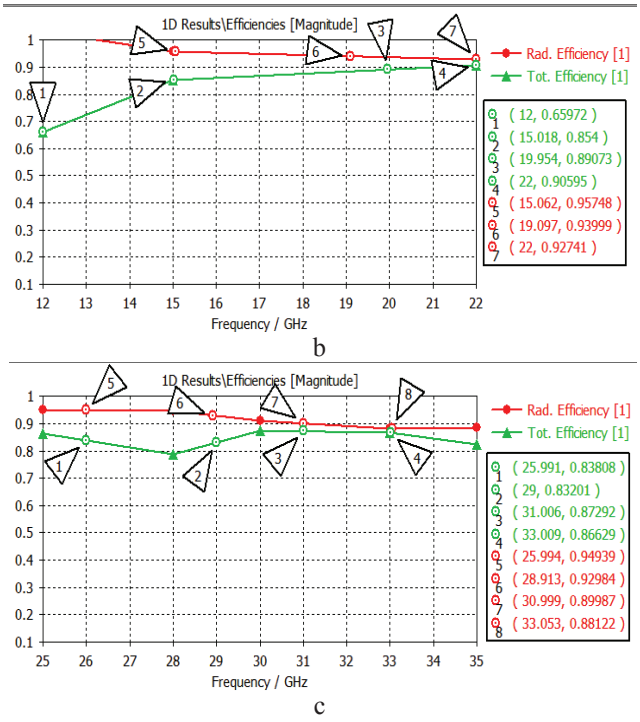
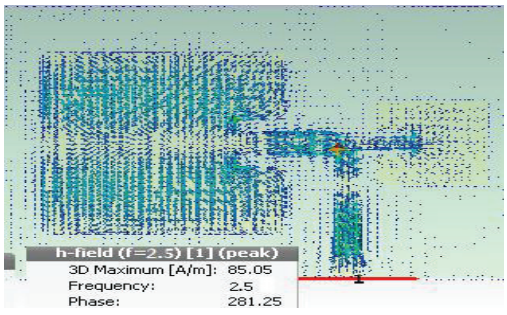


Fig. 7. Radiation & total efficiency of the proposed antenna

F. *Current Distribution:*

When the microstrip antenna is designed with metallic conductor or copper foil, the electric current is induced in the antenna due to electromagnetic field. This induced surface current of proposed antenna is of 85A/m, 136A/m and 114.7A/m at the frequencies 2.5GHz, 7.8GHz and 30-33GHz is shown in figure 9(a-d). The current distributions at 2.5GHz of 85 A/m used for WiFi as shown in figure 8(a), at 7.8GHz of 136.6 A/m used for WiMAX as shown in figure 8(b) and at 30-38GHz of 102-114.7 A/m used for 5G communications as shown in figure 8(c-d)



a

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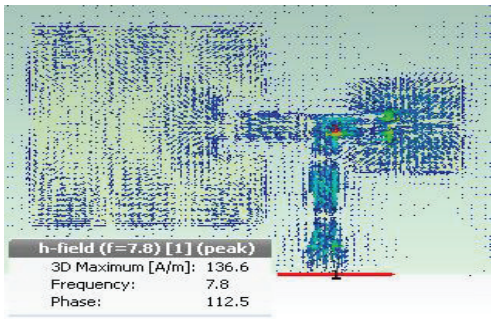

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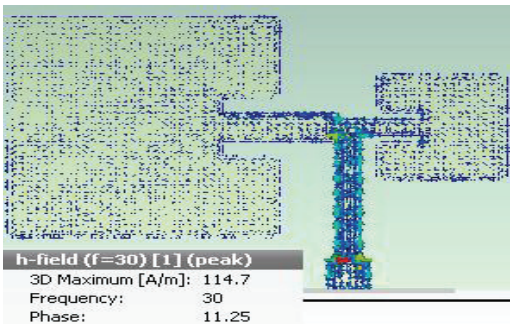

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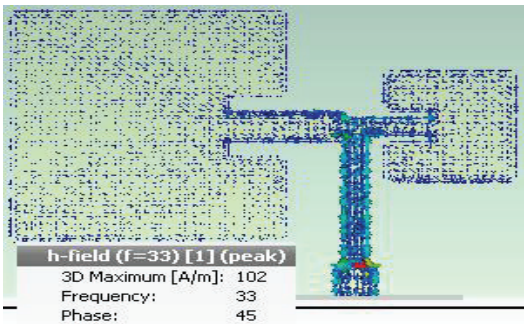

d

Fig. 8. : Surface current distribution of the proposed antenna, at a: 2.5GHz, b: 7.8GHz,c: 30GHz and d: 33GHz

G. Measured result

The return loss of fabricated antenna -23.91dB, -15.97dB, -16.38dB and -15dB at multiple frequencies of 2.5GHz, 5.43GHz, 9.08 and 15GHz which is shown in figure 9. The proposed antenna provides simulated and tested results are nearly same. The fabricated antenna is tested with Anthrusu VNA.

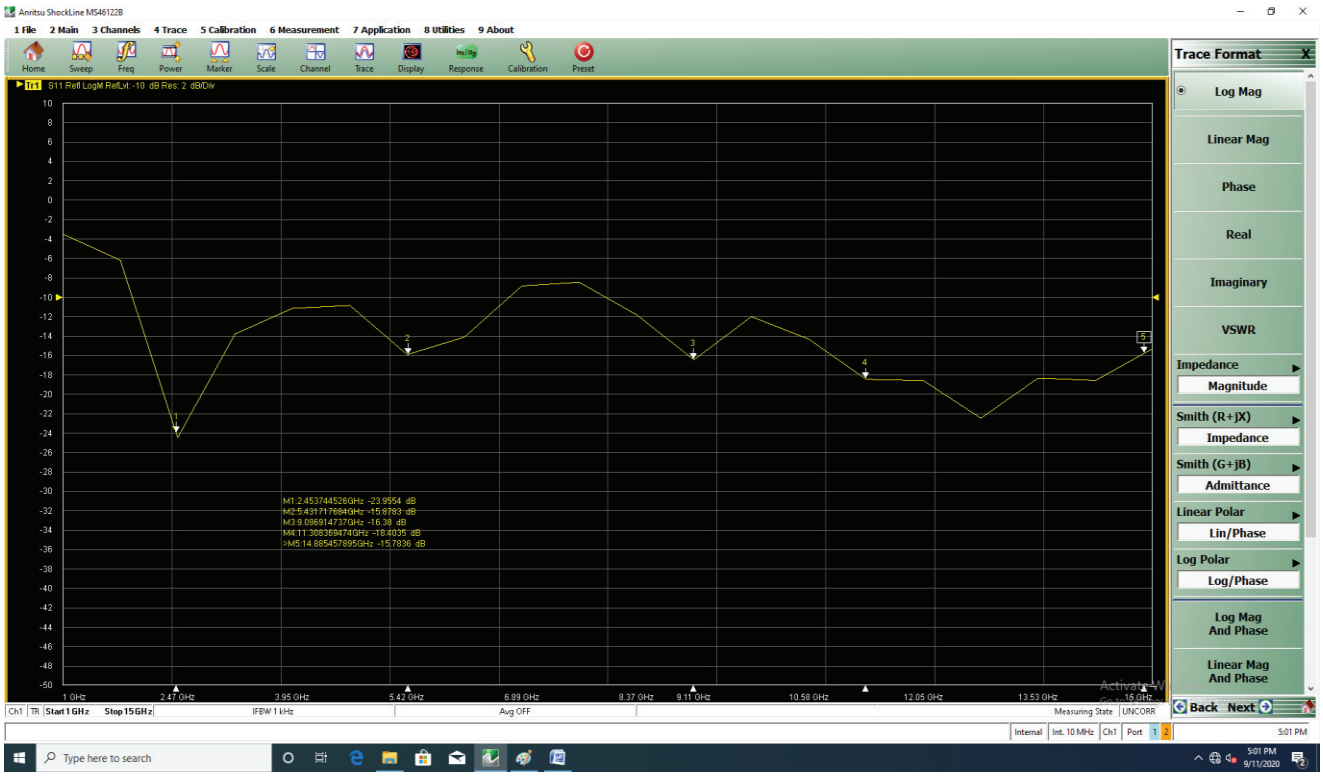

Fig. 9. Measured Return Loss of fabricated antenna

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The different antenna parameters of proposed antenna are analyzed and compared in table 2.

TABLE II. : SIMULATED RESULTS:

Parameters	Resonating Frequency Bands (GHz)									
	2.36	**4.28**	**5.35**	**7.8**	**8.56**	**12.35**	**15.23**	**22.86**	**26-30**	**32-37**
Application	WiFi			WiMAX				5G	5G	5G
Return loss S11 in dB	-21.02	-26.70	-23.28	-12.70	-33.53	-24.55	-21.49	- 20.10	-23.42	-19.47
VSWR	1.29	1.13	1.28	1.62	1.14	1.12	1.17	1.21	1.15	1.23-1.71
Bandwidth in MHz	75.5	103	89	138	234	246	751	1558	2137	5204
Gain in dB	9.05	8.85	7.76	8.34	8.79	8.86	8.93	9.32	9.81	9.46
Radiation Efficiency (%)	98	96	95	93	96	94	93	95	93	88-90
Total Efficiency (%)	29	72	53	46	35	66	85	91	94-90	87

IV. CONCLUSION

Multiband rectangular shaped wearable antennas have been designed for 2.4GHz and 5GHz frequencies. The antenna is radiated at multiple 10 different frequencies out of that 2.4GHz used for WiFi, 7.8GHz used for WiMAX & 28-38GHz used for future 5G communication and the bandwidth obtained at these frequencies are of 75.5MHz, 138MHz and 5.2GHz, when return loss is below -10dB. Also high gain of 9.81dB and enhanced bandwidth of 5.2GHz for 5G communication band is achieved and as compared to base paper [1].

The antenna is radiated with efficiency above 93% and total efficiency above 83% for multiple frequencies. This designed antenna fulfills the needs of WiFi, WiMAX and 5G multiband communications.

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Design and Analysis of Compact 2D MIMO Sub-6 GHz 5G Flexible Antenna

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***Abstract*- The goal of this paper is to present the design and analysis of two dimensional (2D), two port, flexible multiple input multiple output (MIMO) sub-6 GHz 5G antenna for wireless applications. The proposed flexible MIMO antenna consists of two antenna arrays deployed along the X-axis with an inverted-U shaped isolating structure deployed between antenna elements and is blueprinted on 0.2mm thick FR-4 substrate. The complete structure has a size of 52 × 30 mm^2 and is able to generate a wide resonance at 3.35 GHz with impedance bandwidth of 32.18% (3.05-4.22 GHz). Further, the MIMO diversity including gain above 2.8 dBi, efficiency above 78%, envelope correlation coefficient < 0.05 and diversity gain greater than 9.75 dB are achieved. Moreover, to check the flexibility of proposed MIMO antenna, a simulated experiment of bending analysis along X direction is also carried.**

Keywords: Sub 6 GHz 5G, flexible, MIMO and gain

I. INTRODUCTION

With the advancement of fourth generation (4G) wireless communication technology, fifth generation (5G) will evolve into a new generation (NG) of wireless mobile and portable communication devices. These devices demand larger data rate along with latest standards to be incorporated inside them. In order to have a better and uninterrupted communication among these devices, antennas play an essential role. Therefore, MIMO technology which is composed of number of antenna elements is considered to be one of the key technologies in the domain of 5G wireless communications. MIMO technology operates better if antennas applied for forming MIMO utilize less space and is adaptable to fit within restricted space. Moreover, the space constraint can be overcome by designing flexible antennas as they can bend easily as per the needs and can be easily mounted within the space available for mounting antennas inside the devices.

Therefore, several non-flexible and flexible MIMO antennas are reported recently [1-7]. The two port MIMO antenna explained in [1 and 2] are multiband and offers high isolation between antenna elements. However, these MIMO antennas are not flexible though both are printed on FR-4 substrate due to large thickness results in high rigidity and deformity. A dual band reconfigurable flexible MIMO antenna resonating at 2.4 GHz and 5.2 GHz is proposed in [3]. However, this MIMO antenna is expensive as it is built on flexible Rogers RO3003 substrate having thickness of 1.52mm. An ultra-wide band (UWB) MIMO antenna offering advantages like high security, less power consumption and large data rate are reported in [4-5]. The reported flexible UWB MIMO antennas are designed on Kapton polyamide substrate using inkjet printing technique. Three-dimensional (3D) paper-based 3×3 MIMO antenna operating in WLAN bands of 2.4 GHz and 5 GHz is reported in [6]. However, the reported MIMO antenna needs an ABS plastic supporter to offer the required strength to the radiating material. A liquid crystal polymer (LCP) substrate-based MIMO antenna working in 2.4/5 GHz WLAN and 3.5 GHz WiMAX bands for wearable applications is reported in [7].

Though the above literature, it is realized that the reported flexible MIMO antenna have some or other limitations like expensive substrate, need of additional material, fabrication complexity and so on. Therefore, this paper analyzes the two-port flexible MIMO antenna printed on low-cost FR-4 substrate having a thickness, dielectric constant and loss tangent of 0.2 mm, 4.3 and 0.0025, respectively. The proposed flexible MIMO antenna offers a wide impedance bandwidth of 32.18% (3.05-4.22 GHz) with isolation of larger than 15dB throughout the desired band of interest.

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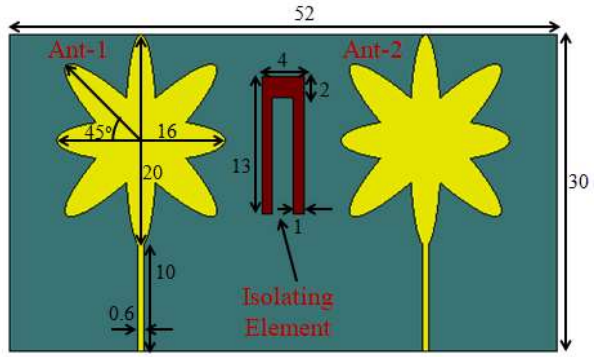
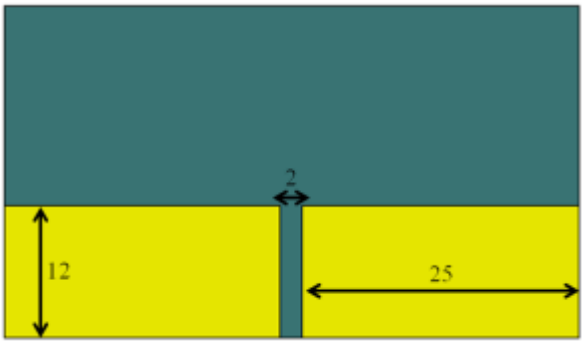
II. Proposed MIMO Antenna Design and Geometry

The geometry and design footprint with optimized values of the proposed flexible MIMO antenna with isolating structure is illustrated in Figure 1.



(a)



(b)

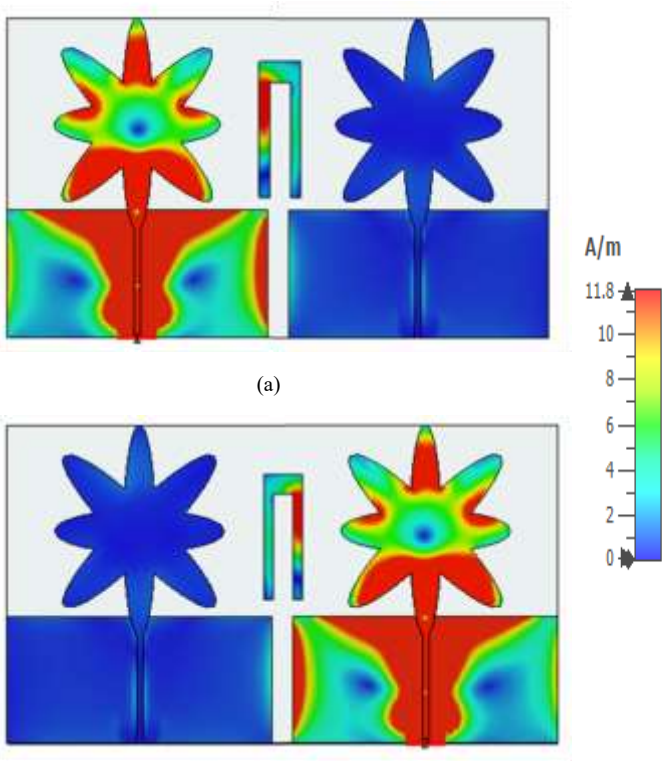
Figure 1 Geometry of proposed flexible MIMO antenna (units are mm) (a) Top view (b) Bottom view

It is noted that twin antenna elements namely Ant-1 and Ant-2 are built along the X-axis on flexible FR-4 substrate of thickness 0.2mm, where each antenna element consist of butterfly shaped radiating structure. This structure is excited by microstrip feed line having dimension of 10 × 0.6 mm^2 and is connected to the abdomen of butterfly structure for maximum power transfer of signal. The oval shaped wings of the butterfly have length of 8 mm from the centre and all the 3 wings at both the sides are at 45-degree angle with each other. The oval shape centre structure of the butterfly has dimension of 20 × 1.5 mm^2. Each antenna element of proposed flexible MIMO antenna has a partial ground plane of size 25 × 12 mm^2 as seen from figure 1b. The disconnected ground plane of the two-antenna element is separated by a distance of 2mm. Therefore, the integration of such structure, contributes in achieving proper impedance matching between feed line and structure. Further, to enhance the isolation between the antenna elements, an inverted-U shaped decoupling structure is embedded between the two antenna elements. The proposed flexible MIMO antenna has an overall size of 52 × 30 mm^2 with thickness of only 0.2mm. This enables the proposed flexible MIMO antenna to bend easily without having much effect on the achieved results. The effect of bending on S-parameters will be verified in Section IV.

III. Results and Discussion of Flexible MIMO Antenna

The proposed flexible antenna is analyzed and simulated using Computer Simulation Technology (CST) software version 2019. The results including electric field (A/m) intensity, reflection coefficient (S_{11}) dB, transmission coefficient (S_{12}) dB, gain (dBi), efficiency (%), envelope correlation coefficient (ECC) and diversity gain (DG) are verified via CST simulation. All the results are achieved under the condition that when Ant-1 is excited, Ant-2 is terminated with 50Ω load impedance and vice versa.

From Figure 2, it is noted that due to decoupling structure the mutual coupling between Ant-1 and Ant-2 is reduced and both the antennas are being protected from electric field of each other while functioning in the desired band of interest. From Figure 2a it can be observed that when port 1 is excited, the field current flows through Ant-1 only and vice-versa is verified from Figure 2b.



(a)

(b)

Figure 2 Electric field current (A/m) of proposed flexible MIMO antenna (units are mm) (a) Port 1 is excited (b) Port 2 excited

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To verify the impedance bandwidth and mutual coupling in terms of S-parameters, Figure 3 plots the S_{11} (dB), and S_{12} (dB) curves of proposed flexible MIMO antenna. As seen from Figure 4, Ant-1 and Ant-2 generate a resonance at 3.35 GHz with impedance bandwidth of 32.18% (3.05-4.22 GHz), whereas S_{12} curve indicates that both the antennas are minimally coupled with each other by exhibiting minimum coupling of -17dB throughout the operating band.

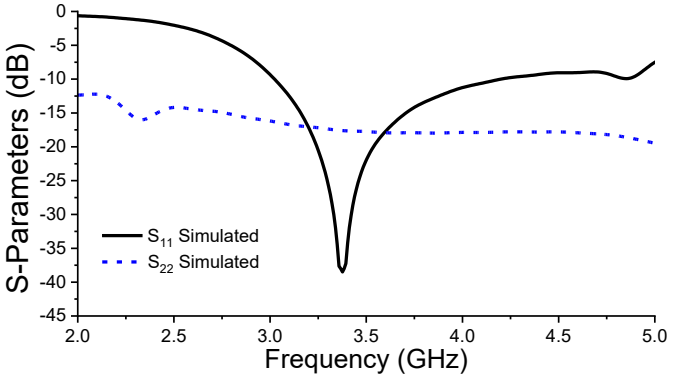

Figure 3 S-Parameters of proposed flexible MIMO antenna

Figure 4 shows the radiation patterns of Ant-1 and Ant-2 at resonating frequency of 3.35GHz in both E-plane and H-plane. It is noted that the radiation patterns of Ant-1 and Ant-2 are mirror image of each other confirming that both the antennas operate independently in the desired band of interest.

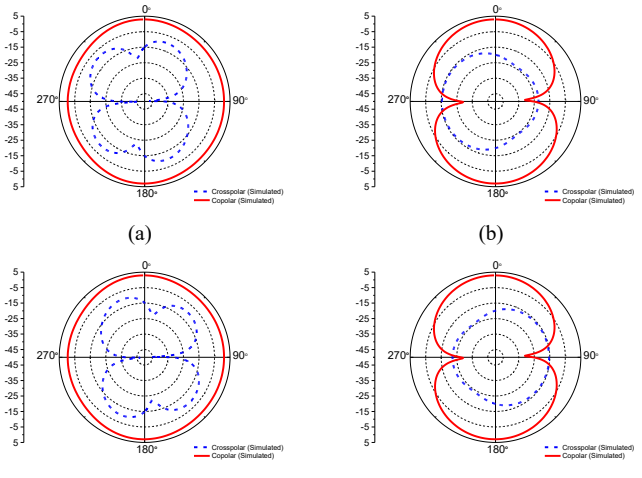

Figure 4 Two-Dimensional Radiation Pattern at 3.5 GHz (a) E-Plane Antenna 1 (b) H-Plane Antenna 1 (c) E-Plane Antenna 2 (d) H-plane Antenna 2

Figure 5 illustrates the 3D radiation patterns of Ant-1 and Ant-2 which validates that similar to two-dimensional radiation patterns, the 3D radiation patterns are actually mirror image of each other.

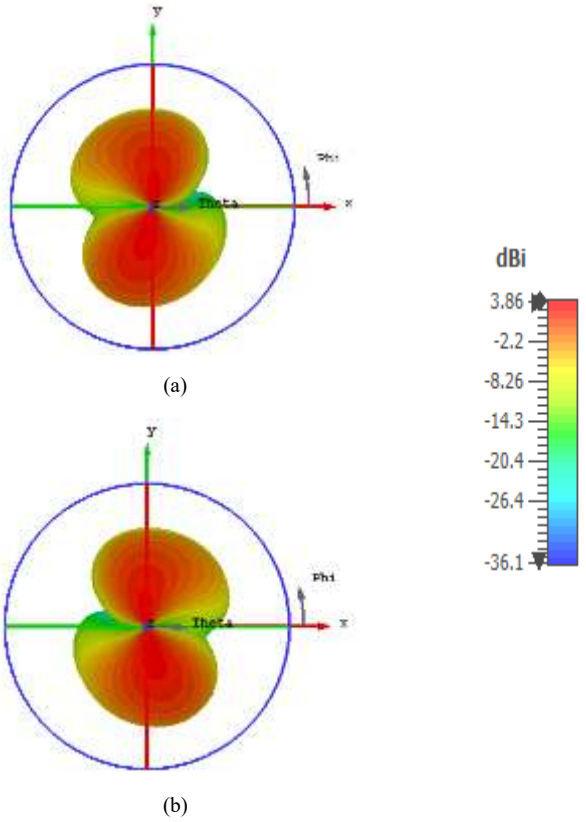

Figure 5 Three-Dimensional Radiation Pattern of flexible MIMO antenna at 3.35 GHz (a) Antenna 1 (b) Antenna 2

Further, to verify the radiation performance gain (dBi) of Ant-1 and Ant-2 is depicted in Figure 4. It is illustrated that both antenna elements produce a stable gain of above 2.8 dBi and efficiency of above 78% throughout the operating frequency band of (3.05-4.22 GHz). Through the investigation of above analysis, it is confirmed that the proposed flexible antenna is a good applicant of sub-6 GHz n77/n78 5G bands applications.

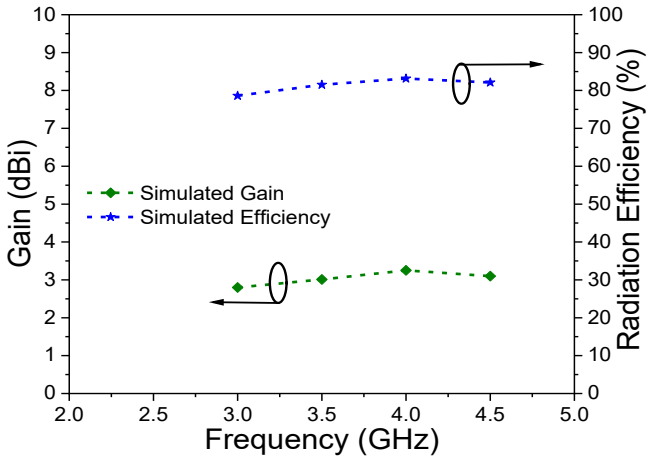

Figure 6 Gain and Efficiency of proposed flexible MIMO antenna

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The MIMO metric like ECC and DG calculated from formula mentioned in [8] are illustrated in Figure 7 and 8 respectively. Figure 7 confirms that ECC is well below 0.05 whereas Figure 8 confirms that the DG values is above 9.75 dB. This validates that both antenna elements applied for MIMO application are highly isolated from each other and do not produce interference in desired operating bands, leading to enhance the capacity of wireless system. Therefore, the proposed flexible MIMO antenna is a potential candidate to integrate inside the compact wireless devices.

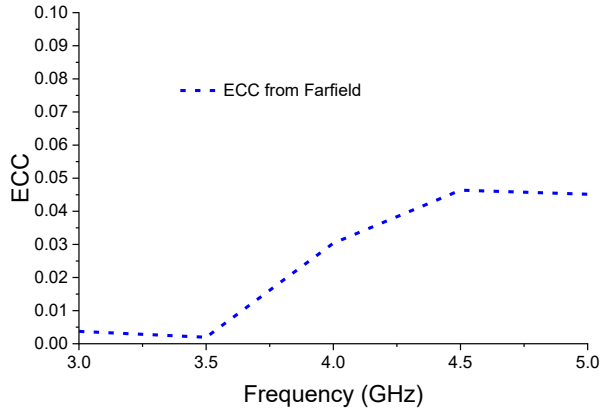

Figure 7 ECC from farfield of proposed flexible MIMO antenna

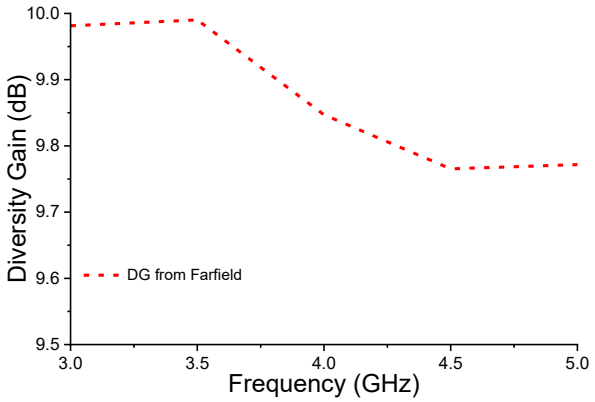

Figure 8 ECC from farfield of proposed flexible MIMO antenna

IV. Bending Analysis of Proposed Flexible MIMO Antenna

In order to verify the flexibility of proposed MIMO antenna, a simulated experimentation of bending using CST software is carried out along the X-direction as shown from Figure 9. Figure 10 shows the effect of bending on impedance bandwidth and mutual coupling of antenna elements. Further, it can be observed that even though there is a slight deviation in both S_{11} and S_{12} results but still the bending of MIMO antenna does not damage the achieved the impedance bandwidth nor effects the coupling between the antenna elements.

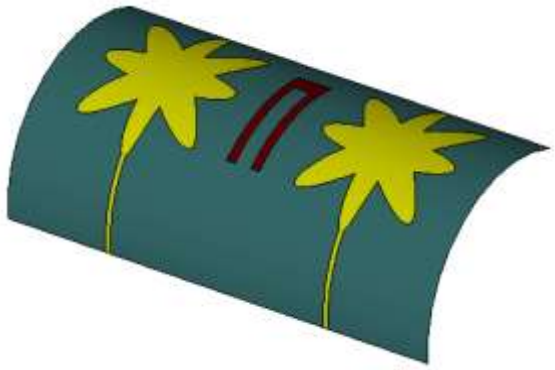

Figure 9 Geometry of antenna bent along X-axis

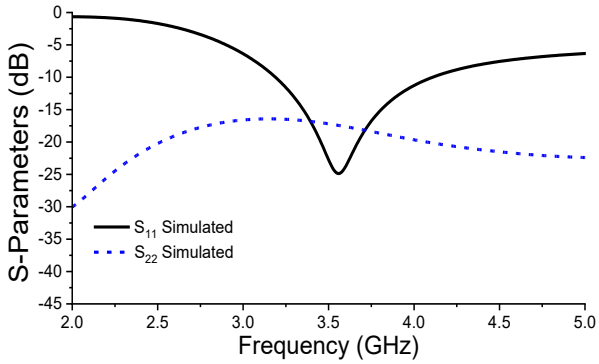

Figure 10 S-parameters of antenna after bending

This validates the proposed MIMO antenna is flexible in nature and it is an easy ease of integration inside the upcoming wireless devices where the board size is restricted.

V. Performance Analysis of Flexible MIMO Antenna

Table 1 gives a sight on performance comparison of proposed flexible MIMO antenna with recently published literature considering size, thickness of substrate, gain, ECC, and type of substrate.

TABLE 1: Performance Analysis of Flexible MIMO Antenna with Recently Published Literature

Ref.	Dimension (mm^2)	Substrate thickness (mm)	Gain (dBi)	ECC	Substrate
[3]	86×56	1.52	-	0.08	Roger RO3003
[5]	33×100	0.055	2	-	Kapton Polyamide
[6]	86×111	41	2.5		Paper
[7]	59×29	0.1	2	0.05	Roger 3850
This Work	52×30	0.2	2.8	0.05	FR-4

From the above table it is analyzed that the proposed MIMO antenna is cost effective unlike [3, 7], does not need additional support unlike [6] and less dimension unlike [3, 5, 6 and 7].

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VI. Conclusion

The design analysis of innovative flexible two-port compact flexible MIMO antenna functioning in sub-6 GHz n77/n78 5G bands for wireless applications is analyzed and discussed. Due to flexible nature, the proposed flexible MIMO antenna is a suitable for wireless devices, where space is limited and can be easily interfaced as per the availability of space.

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A Dual-Band Flexible CPW Fed Interlocked Concentric Rings Antenna

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***Abstract*- A dual band interlocked concentric rings coplanar waveguide (CPW) fed flexible antenna suitable for 2.4/n77/n78/Wi-Fi-6 frequency bands is proposed. The proposed interlocked concentric rings flexible antenna consists of total nine concentric rings and excited by CPW fed technique. The rings are printed on Roggers RT 5880 flexible substrate of 0.2mm thick using cupper conductive material in such way that they are interlocked to achieve maximum signal transfer. The simulation results confirm multiple resonances at 3 GHz and 6.6 GHz generating fractional impedance bandwidth 63.5% (2.2 - 4.25 GHz) and 25.37% (5.85 - 7.55 GHz), respectively. Further simulation analysis shows that the proposed concentric ring flexible antenna exhibits the gain above 2.55dBi and efficiency greater than 91.5% in throughout the operating bands. Moreover, a compressive bending in X-direction is carried out to verify the bending effect on impedance bandwidth of interlocked concentric rings flexible antenna.**

Keywords: Bending, Flexible, Wi-Fi-6, interlocked concentric rings and CPW fed

I. INTRODUCTION

Now a days, research on flexible and compact wireless devices have gained a lot of attention due to their essential properties like easiness to integrate with biomedical applications, vehicular navigation and wearable devices, etc. An antenna is the essential elements in this complete system, and for confirming the device suitability, it should be flexible, compact and stretchable. The non-flexible antennas reported in [1-3] for various applications like smartphone, laptop and wireless devices are application specific and based on use of type of substrate and offer the performance based on surrounding environment. Recently, many flexible antennas are reported in the literature [4-7]

Sana Ahmed et al. [4] reported the design and performance analysis of conformal multiband antenna on Kapton Polyimide substrate using Inkjet printer technique for flexible wireless devices. M. E. de Cos Gomez et.al reported design and fabrication of an ultra-thin flexible antenna for Internet of Things (IoT) applications in [5]. The reported design consists of three flexible substrates operating in 2.7 GHz and 5.8 GHz frequency bands for IoT applications. Liquid Crystal Polymer (LCP) is another preferable flexible substrate reported by Xiao-di Li et.al [6]. The reported compact triple band antenna designed using flexible LCP substrate to operate in WLAN 2.4/5.2/5.8GHz Wireless Local Area Network (WLAN), 3.5/5.5GHz Worldwide Interoperability for Microwave Access (WiMAX) and 5G bands. Md. Amanath Ullah et al. reported the paper based flexible antenna in [7] for wearable telemedicine applications. This reported antenna covers Industrial, Scientific and Medical (ISM) frequency band in the range of (2.33-2.35 GHz).

This research article presents a coplanar waveguide (CPW) fed interlocked concentric rings flexible antenna of size $32 \times 32mm^2$ which is designed on flexible Roggers RT 5880 substrate having the properties like thickness 0.2mm, relative permittivity 2.2 and loss tangent 0.0009. The proposed flexible concentric ring antenna covers the bandwidth requirement of 2.4 GHz WLAN, n77/n78 5G and Wireless Fidelity (Wi-Fi) 6 along with good gain > 2.5dBi and efficiency > 91.5%.

II. DESIGN AND GEOMETRY OF PROPOSED CONCENTRIC RINGS FLEXIBLE ANTENNA

The designed footprint of antenna is illustrated in Figure 1 which is engraved on flexible Roggers RT 5880 substrate possessing the volume of $32\times32\times0.2$ mm^3. As seen from Figure 1, the group of three interlocked concentric rings are deployed in horizontal and vertical directions on flexible substrate in such a manner that they get interlocked forming U shape structure and hence, contribute to downsize the antenna. All rings are identical having inner diameter of 6 mm and outer diameter of 8 mm. The placing and radius of rings are optimized using CST software. These rings are excited by symmetrical CPW fed technique leaving a gap of 0.6 mm between ground plane and feed line. The two CPW grounds has

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size of 15×10 mm^2. A feed line is connected at the bottom of middle concentric ring as visualized in Figure 1.

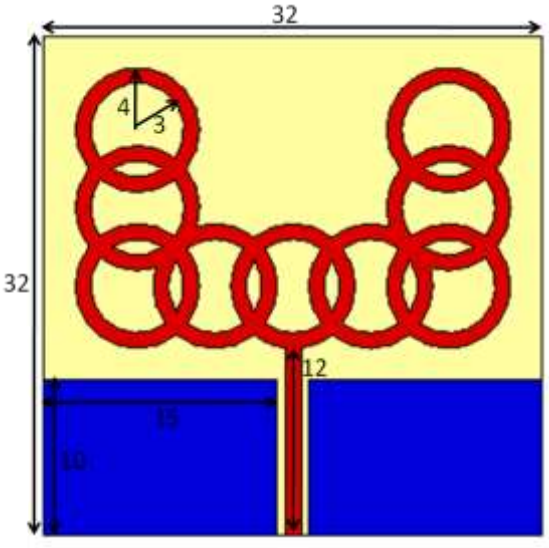
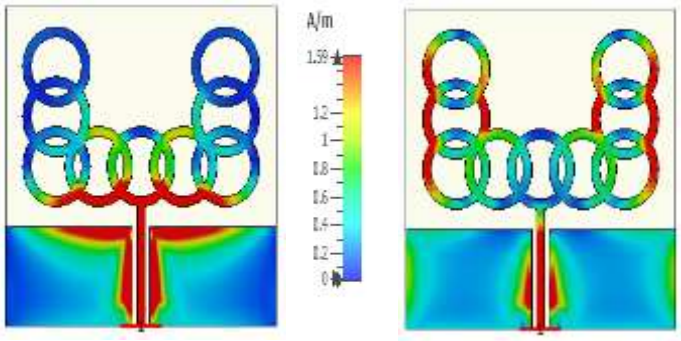


Figure 1 Structural Layout of Proposed Concentric Rings Flexible Antenna

In order to know how the two resonances of proposed flexible concentric ring antenna are generated, a simulated surface current distribution at 3 GHz and 6.6 GHz is shown in Figure 2. From Figure 2a, at 3 GHz, it is noted that the maximum amount of current is flowing through the horizontal rings, while at 6.6 GHz (seen from Figure 2b), maximum portion of current flows through two vertical concentric rings. This validates that the proposed concentric flexible antenna generates two resonances at 3 GHz and 6.6 GHz offering a wide bandwidth in the range of (2.2 - 4.25 GHz) and (5.85 – 7.55 GHz), respectively.



(a) (b)

Figure 2 Surface current distribution (A/m) (a) at 3 GHz (b) at 6.6 GHz

III. Results and Discussion

This section carries out the analysis of reflection coefficient S_{11}(dB) characteristics, radiation patterns in both E and H plane, gain (dBi) and radiation efficiency (%) of proposed flexible concentric ring antenna using CST software.

A. S_{11} (dB) Characteristics:

Figure 3 shows the S_{11} (dB) curve of proposed flexible concentric ring antenna. It is noted that the S_{11} curve has two resonances at 3 GHz and 6.6 GHz spreading in the frequency band of (2.2 - 4.25 GHz) and (5.85 - 7.55 GHz), respectively. Hence, the proposed concentric ring flexible antenna is covering the bandwidth requirement of 2.4 GHz WLAN, n77/n78 5G and Wi-Fi-6 frequency bands. Further, it can be observed that an amplitude of S_{11} at 3 GHz and 6.6 GHz is -18dB and -23dB, respectively.

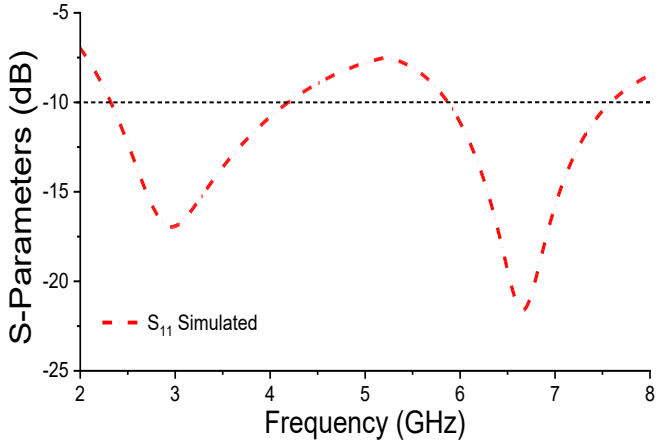
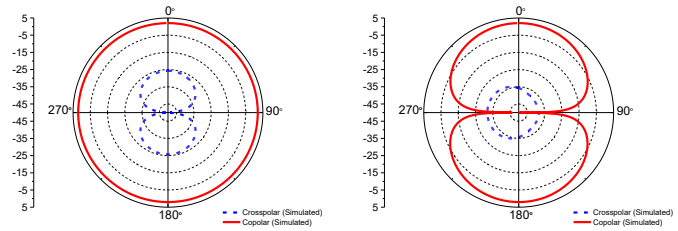


Figure 3 S_{11} of proposed concentric ring flexible antenna

B. Radiation Patterns:

Polar patterns at resonating frequency of 3 GHz and 6.6 GHz in E and H plane are depicted in Figure 4. Figure 4 confirms that the proposed concentric ring flexible antenna has an ability to convert electrical signals into electromagnetic signals by producing balloons without negligible nulls. This ascertains that the proposed concentric flexible ring antenna is a good candidate for the smooth communication inside the flexible wireless devices.



(a) (b)

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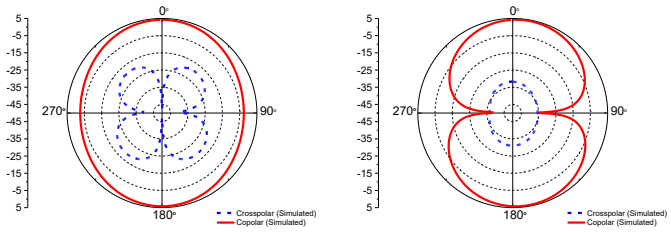

(c) (d)

Figure 4: Radiation Pattern of proposed concentric ring flexible antenna (a) E-plane at 3GHz (b) H-plane at 3GHz (c) E-plane at 6.6 GHz (d) H-plane at 6.6 GHz

C. *Gain and Radiation Efficiency*

The gain and radiation efficiency of proposed flexible concentric ring antenna is depicted in Figure 5. It is visualized that the proposed concentric ring flexible antenna provides a stable gain > 2.5 dBi in 2.4/n77/n78 and greater than 4 dBi in Wi-Fi-6 frequency bands. The constant radiation efficiency of above 91.5% is achieved in operating bands of 2.4/n77/n78/Wi-Fi-6.

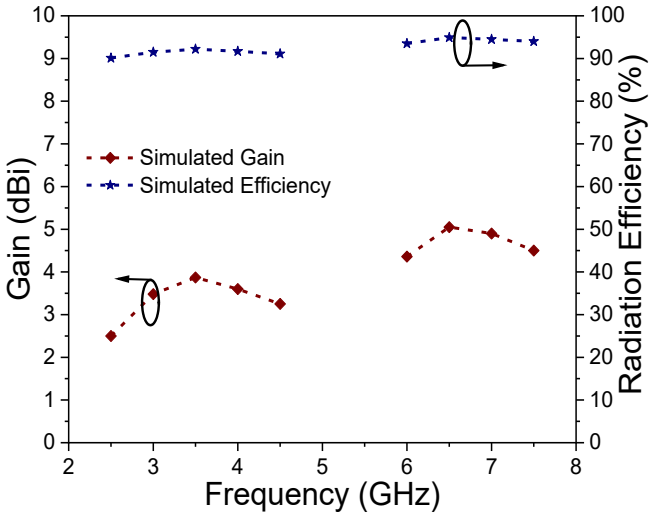

Figure 5 Gain and Radiation Efficiency of proposed concentric ring flexible antenna

IV. Bending Analysis

The flexibility of proposed concentric ring flexible antenna is proved by performing compressive bending analysis along X-axis using CST software. The bending analysis is carried out to verify the impact of bending on the performance of antenna in terms of S_{11} as seen from Figure 6. The antenna is bent by rolling on a cylinder of 20mm radius. From Figure 7, it can be observed that there is a small deviation in the S_{11} results however, the bending does not change the impedance bandwidth of proposed concentric ring flexible antenna. This confirms that the proposed concentric ring flexible antenna is flexible in nature and it can be easily bent as per the requirement of space and can be interfaced without affecting an impedance bandwidth inside the flexible wireless devices.

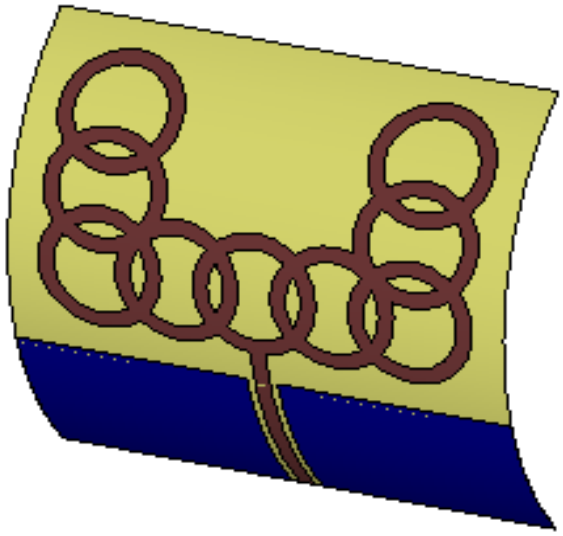

Figure 6 Geometry of proposed concentric ring flexible antenna after bending

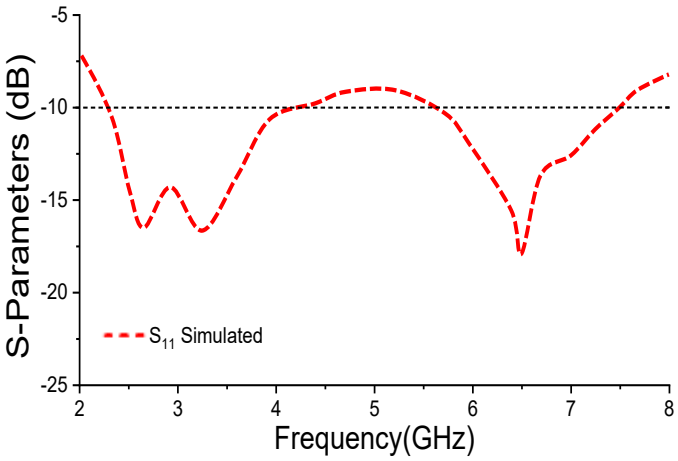

Figure 7 S_{11} of proposed concentric ring flexible antenna after bending

V. Performance Comparison

Table 1 articulates the performance comparison of proposed flexible concentric ring antenna with existing flexible antennas considering overall size, operating bands, gain, efficiency and type of substrate.

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TABLE 1: PERFORMANCE ANALYSIS OF MIMO CDRAA ANTENNA WITH EXISTING ANTENNAS

Ref.	Dimension (mm^2)	Operating Bands	Gain (dBi)	Eff. (%)	Substrate
[4]	70×70	GSM 900 GPS WLAN LTE 2300/2500 WiMAX	2.1	67	Kapton Polyamide
[5]	66×62	2.5/5 WLAN	4.63	91	Polypropylene
[6]	32×20	2.4/5 WLAN N77	0.31	-	liquid crystal polymer
[7]	35×40	2.4 ISM	2	70	Paper
This Work	32×32	2.4 WLAN N77/N78 Sub 6GHz Wi-Fi 6	2.5	91.5	Roger 5880

From the above table it is verified that the proposed concentric ring antenna has smaller dimension than [4, 5 and 7], operates in more band than [5, 6 and 7], has high gain and efficiency as compared to [4, 6 and 7] and uses less complex to fabricate substrate than all the existing state of art. Therefore, the proposed flexible concentric ring antenna is suitable for futuristic and compact wireless devices.

VI. CONCLUSION

The design of dual-band flexible concentric rings antenna functioning 2.4/n77/n78/Wi-Fi 6 frequency bands for futuristic and compact flexible wireless devices is simulated and analyzed. The proposed concentric ring flexible antenna design is simple, easy in manufacturing, low profile and can be mounted effectively inside flexible wireless devices. It also depicts good impedance bandwidth and good radiation patterns which makes it suitable for wireless application. Apart from this, gain above 2.5 dBi and radiation efficiency above 91.5% in the operating frequency bands are also achieved. Finally, from the bending analysis, it is validated that the bending has minimum effect on the bandwidth of the proposed flexible concentric ring antenna which makes it a good and attractive candidate for WLAN, 5G and Wi-Fi-6 band applications.

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A Two-Port Dual Band Microstrip Feed Based Cylindrical Dielectric Resonator Antenna Array for Sub- 6 GHz 5G and Super Extended-C Band Applications

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Abstract- **This research proposes a two-port, dual-band cylindrical dielectric resonator antenna array (cDRAA) operating in sub 6 GHz n77/n78 5G and super-extended C frequency band applications. The cDRAA is designed on FR-4 substrate having a footprint of 65×30mm^2 with a thickness of 0.8mm. The cylindrical dielectric resonator (cDR) is composed of Alumina material possessing the dielectric permittivity (ϵ_r), permeability (μ) and density (ρ) of 9.9, 1, and 3900Kg/m^3, respectively. The cDRA is excited by a 50Ω microstrip strip transmission line with a volume of 13×4×0.8mm^3 to generate dual resonances at 3.6 GHz and 6.7 GHz. The cDRAA is simulated using CST MWS, which exhibits fractional impedance bandwidth (FIB) of 32.30% (3.14-4.35) GHz and 10.44% (6.35-7.05) GHz at resonances 3.6 and 6.7 GHz, respectively. Further, simulation analysis ensures that the isolation between two cDRA is well below -12dB, realized gain above 4dBi, radiation efficiency above 80%, Envelope Correlation Coefficient (ECC) < 0.01, Diversity Gain (DG) ~ 10dB in both operating bands. Therefore, concerning antenna and diversity performances of proposed cDRAA, it is a considerable applicant for sub 6 GHz 5G and super-extended band -C applications.**

Keywords: sub 6 GHz, super-extended frequency-C band, DRA, realized gain, and Alumina

I. INTRODUCTION

The release of sub-6 GHz New Radio (NR) frequency bands and the advancement of 5G modernizations are aiming to offer 100 times high data rate, high bandwidth, and gain using the small size and lack of metal antennas. Though many antennas including monopole, patch, and dipole are proposed by several researchers/designers for various wireless applications operating in different frequency bands, these antennas degrade their radiation efficiency and impedance bandwidth because of the impact of silicon substrate material [1-2]. Therefore, nowadays, the dielectric resonator antennas (DRAs) are becoming very attractive candidate due to their small size, lightweight, ability to generate multi-band/wideband frequency, stable and high radiation efficiency, easy geometry, freedom of feeding technique, lower losses, design flexibility and temperature-independent functioning, etc.

The different types of DRAs like rectangular, cylindrical, hemispherical, and triangular are presented in the latest literature [3-10] as follows. A DRA presented in [3] is excited by aperture coupled technique so that the reported DRA operates in an unlicensed (5.78-5.87) GHz frequency band. However, the mentioned DRA array has a dimension of 60×40mm^2 and functions only in a single band. A reconfigurable and multi polarized DRA including linear, horizontal, and circular polarization is reported in [4]. The reported DRA is consisted of a cylindrical resonator along with PIN diodes for switching purposes and resonates at 3.25 GHz. However, the reported DRA is based on a dual feeding mechanism, which will lead to complex manufacturing. Another polarization diversity DRA operating as circularly polarized in the 5.2 GHz WLAN band is reported in [5]. Circularly polarized (CP) DRA is reported in [6] to operate in GPS, CNSS, WLAN, and WiMAX frequency bands. A triangular multiple-input multiple-output (MIMO) DRA-based probe-fed technique is reported in [7] which has a large footprint of 60×45 mm^2. A hemispherical DRA resonating at 6.2 GHz is presented in [8]. The reported DRA is excited by the microstrip transmission line to achieve desired resonance

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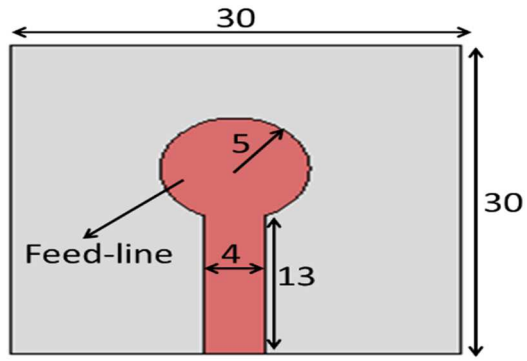
and impedance matching. To achieve high gain and directional beam patterns, a single DRA is not very attractive. Therefore, an array of DRA in [8] is formed to meet the desired requirement for satisfactory wireless applications. However, array formation results in a large size (135×48mm^2). The gain enhancement can be achieved by using dielectric resonators or metamaterial. The cDRA presented in [9] with U-shaped slots contributes to improving gain at the resonating frequencies 3.5GHz, 5GHz, and 6.5GHz. Nevertheless, the reported cDRA has a very narrow bandwidth. A dual-band rectangular DRA having a dimension of 62×25mm^2 printed on FR-4 substrate to operate at 7 and 8 GH is reported in [10].

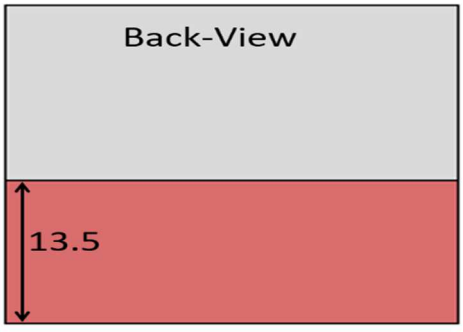
Through the collective innovative state of arts reported in the above literature, it is realized that there is a need to design a DRA that will function in sub-6GHz 5G as well as super-extended frequency band-C, simultaneously. Therefore, this work demonstrates the design and analysis of two-port MIMO cDRAA working in n77 (3.30 - 4.20) GHz, n78 (3.30 - 3.80) GHz of sub 6GHz 5G and super-extended band C with transmitting and receive frequencies (6.42-6.72) GHz and (3.40-3.62) GHz, respectively applications

II. Single Proposed cDRA Design and Geometry

The geometry and layout with parametric values of the antenna without DRA are illustrated in Figure 1.



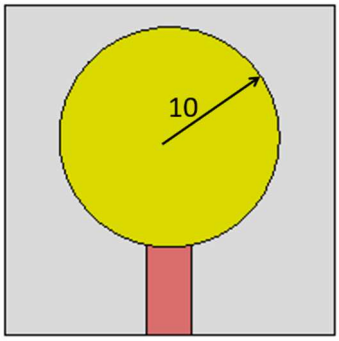
(a) Front View



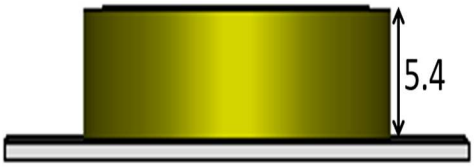
(b) Back View

Figure 1 Geometry of the antenna without DRA (units are mm)

Figure 1a (top view) depicts that a 50Ω transmission line with an area of 13×4mm^2 is embossed on the front end of the substrate. To achieve good performance, FR-4 substrate is chosen of acquiring the properties like dielectric permittivity (ε_r), thickness (h), loss tangent (tanδ) of 4.3, 0.8mm, and 0.0025, respectively. As shown in Figure 1b (back view), to obtain proper impedance matching throughout the desired operating bands, a partial ground occupying an area of 30×13.5 mm^2 is ingrained on the back side of the FR-4 substrate. Further, a microstrip transmission line is ballooned of radius 5mm to get coupled with DR material. Moreover, to develop DRA by using geometry depicted in Figure 1, a cylindrical Alumina material possessing distinguishing characteristics including ε_r, material density (ρ), magnetic permeability (μ), height, and radius are 9.9, 3900Kg/m^3, 1, 5mm, and 5mm, respectively is electromagnetically coupled with radiating ballooned and it is described in Figure 2. Figure 2b presents a side view for better understanding the layout and geometry of the proposed cDRA. The whole structure is electrified by microstrip feeding technique to induce two resonances at 3.6 and 6.7 GHz, so that the proposed cDRA has productivity to work in sub-6 GHz 5G and super-extended band-C with acceptable bandwidth, radiation patterns, gain, and efficiency.



(a) Front View



(b) Side View

Figure 2 Structural layout of the proposed DRA antenna (All units are mm)

III. Two Port-MIMO cDRAA using Proposed Single cDRA

The two-port MIMO cDRAA is constructed using two identical proposed cDRA namely cDRA#1 and cDRA#2 as shown in Figure 3. cDRA#1and cDRA#2 are deployed on FR-4 substrate possessing similar properties as possessed when building a single cDRA. The cDRA#2 is affixed along the x-axis at a distance of 31mm from the edge of cDRA#1. The distance between two cDRAs is attained as 31mm via optimization technique available in CST MWS software. This 31mm distance contributes to retaining the desired impedance bandwidth and attaining port isolation throughout the operating bands of the proposed cDRA. An accomplished measurement of the proposed cDRAA is 65×30mm^2, which is compact and can be effortlessly integrated inside 5G and wireless devices

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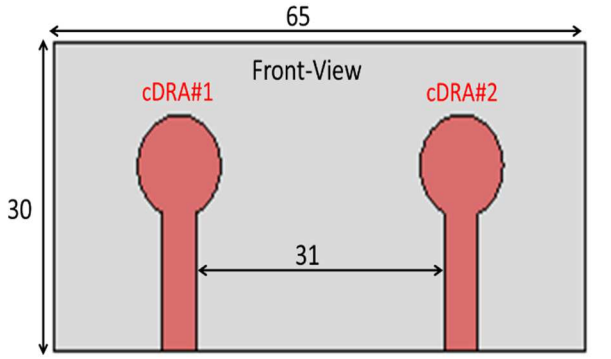
due to the limited height of DR material. The remainder of the manuscript is arranged as follows: Section IV carries results and discussion of MIMO cDRAA. Finally, Section V concludes the work.

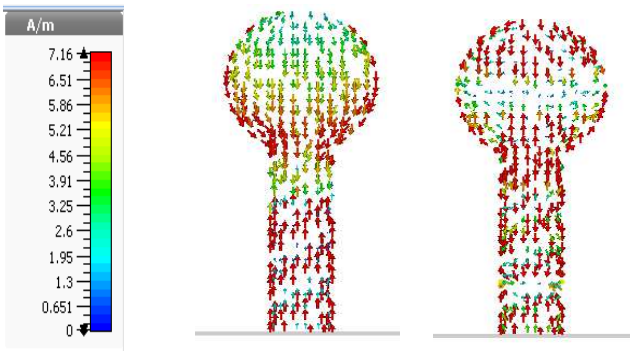


(a) Top View

(b) Back View

Figure 3 Proposed two-port MIMO DRAA (All units are mm)

To verify the radiation characteristics of DR material, a vector current distribution of a single proposed cDRA is analyzed in Figure 4 at 3.6 GHz and 6.7 GHz resonating frequencies. It is seen that at both resonating frequencies, the current is equally distributed on the DR and radiating material confirming that the DR material is well coupled with radiating material at respective resonating frequency. Further, it is also analyzed that metal of height 5.4mm can be replaced by DR material without affecting the performance of the antenna.



(a) 3.6 GHz (b) 6.7 GHz

Figure 4 Vector current distribution

IV. RESULTS AND DISCUSSION OF MIMO DIVERSITY PERFORMANCE PARAMETERS

The MIMO diversity parameters such as reflection coefficient (S_{11}) dB, transmission coefficient (S_{12}) dB, ECC, and DG are simulated and analyzed using CST MWS software.

A. S_{11} (dB) and S_{12} (dB) Characteristics:

S_{11} (dB) and S_{12} (dB) characteristics are described in Figure 5. However, as (S_{11}~S_{22} & S_{12}~S_{21}), for briefness, only S_{11} and S_{12} curves are shown in Figure 5. From the S_{11} curve, it is easily seen that dual resonances centered at 3.6 GHz and 6.7 GHz ascertains that the two-port MIMO CDRAA can easily operate with a frequency range of (3.14-4.35) GHz and (6.35-7.05) GHz, respectively to conform the bandwidth requirement of sub-6 GHz 5G and super-extended band-C applications. The achieved -10dB FIB is 32.30% and 10.44% in sub-6 GHz 5G and super-extended band-C, respectively. It is also observed that the S_{12} curve (shown with dashed red line) signifies that the minimum isolation of -13 dB and -25 dB is achieved in sub-6 GHz 5G and super-extended band-C, respectively. This proves that cDRA#1 and cDRA#2 are well isolated from each other while maintaining compactness and remain prevented from each other's electric field when operating simultaneously.

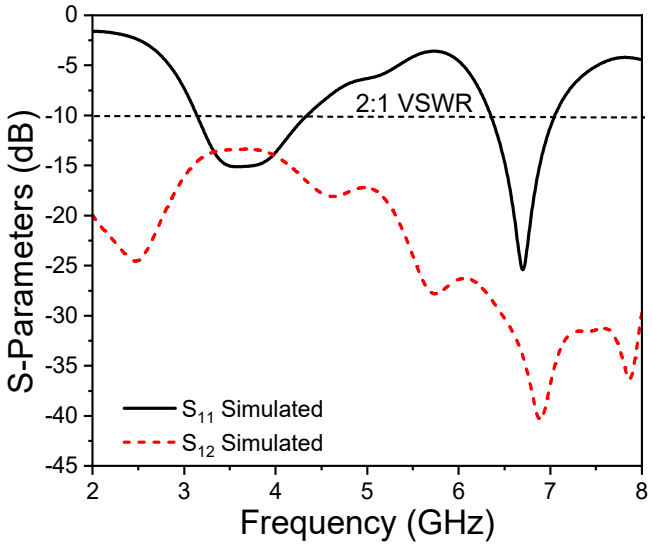


Figure 5 S_{11} and S_{12} characteristics of MIMO cDRAA

B. Far-Field Patterns:

For understanding the capability of the proposed two-port MIMO cDRAA to operate in the real environment, Figure 6 demonstrates the 2-dimensional (2D) radiation field patterns of cDRA#1 and cDRA#2 at a resonating frequency of 3.6 GHz and 6.7 GHz in E-plane and H-plane. From Figure 6, it is visualized that both antenna element showcases nearly equal far-field radiation patterns including the minimum magnitude of cross-polarization of -35 dB all through the functioning bands. This ascertains that the MIMO cDRAA is better contestant for wireless operations in futuristic devices compatible to work in sub-6 GHz 5G and super-extended band-C.

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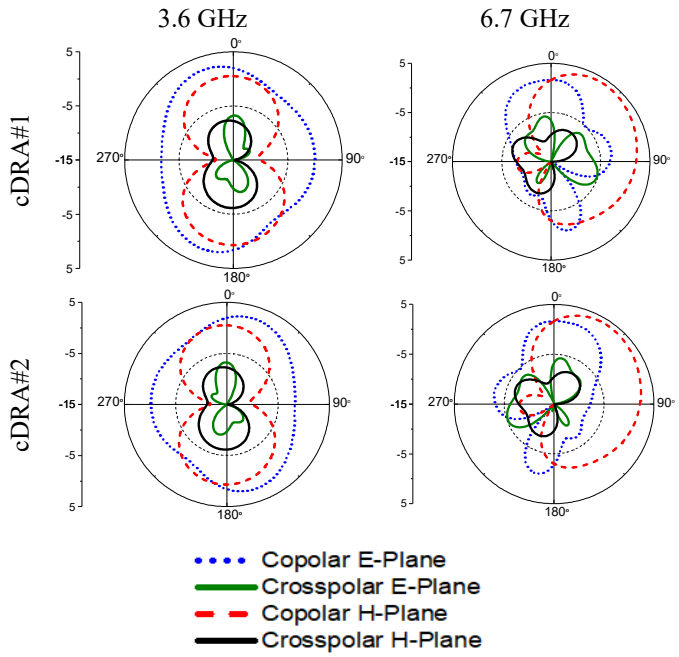

Figure 6 Two-Dimensional Radiation far-field patterns of Proposed MIMO cDRAA

C. Gain and Radiation Efficiency of MIMO cDRAA

The gain and radiation efficiency of the dual-port MIMO CDRAA is portrayed in Figure 7. Concerning Figure 6, as cDRA#1 and cDRA#2 exhibits the same radiation far-field patterns, therefore Figure 7 shows the gain and radiation efficiency of only a single cDRA#1. From Figure 7, it is apparent that the cDRA#1 provides a constant gain of 4 dBi and 5 dBi in sub-6 GHz 5G band and super-extended band-C, respectively, whereas radiation efficiency closer to 85% and 90% in sub-6 GHz 5G and super-extended band-C for wireless applications.

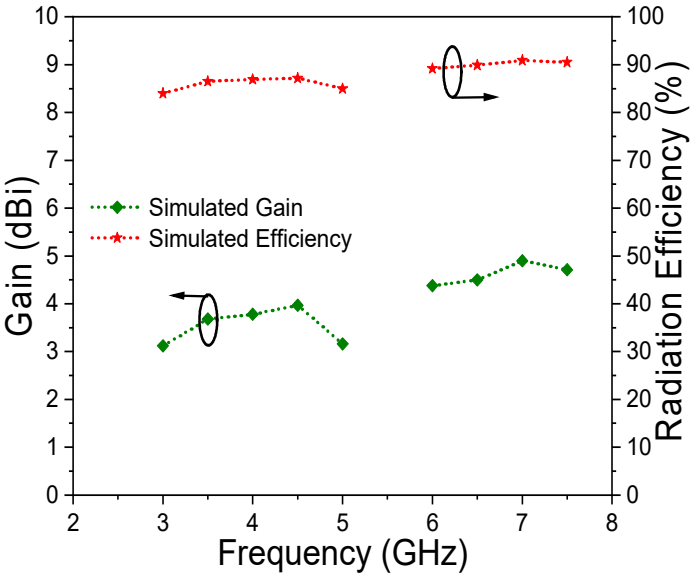

Figure 7 Gain and Radiation Efficiency of MIMO cDRAA

D. Envelope Correlation Coefficiency (ECC):

The ECC parameter is very crucial to justify the diversity performance of MIMO as it illustrates the co-relationship between antenna elements for independent operation in desired frequency bands simultaneously. Figure 8 shows the ECC parameters computed from S-parameters and far-field patterns (using formula mentioned in [11-12]. From Figure 8 is confirmed that ECC values (analyzed from S-parameters and far-field patterns) are well below 0.01 which validates that the proposed MIMO cDRAA produces independent signals for wireless applications and helps in obtaining a high data rate.

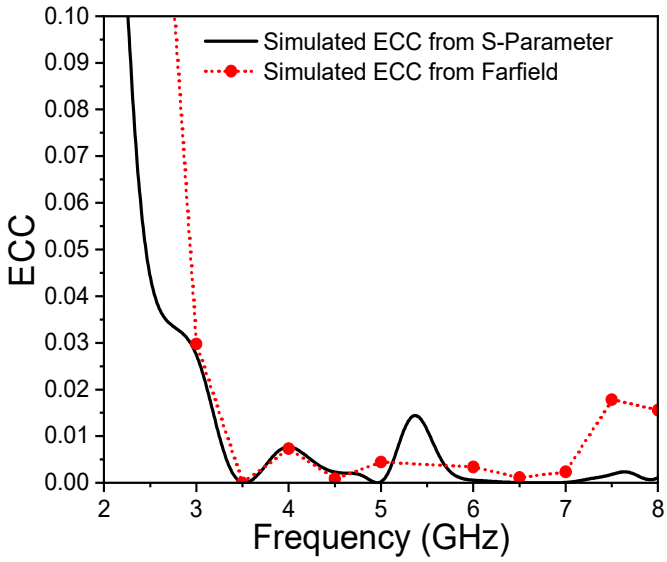

Figure 8 ECC values of Proposed MIMO cDRAA

E. Diversity Gain (DG) dB:

The DG values are calculated by using the below formula [11-12].

$$DG = 10\sqrt{1 - |ECC|^2} \qquad (1)$$

Figure 9 shows the simulated DG (dB) values calculated from S-parameters and far-field patterns of the proposed two-port MIMO cDRAA. It is observed that DG is very closer to 10dB in desired operating bands. To offer better performance in a practical environment and provide a better quality of service, industry standards demand DG values should be around 10dB. Figure 9 illustrates that the MIMO cDRAA is very well attractive to conform to the demand of industry standards.

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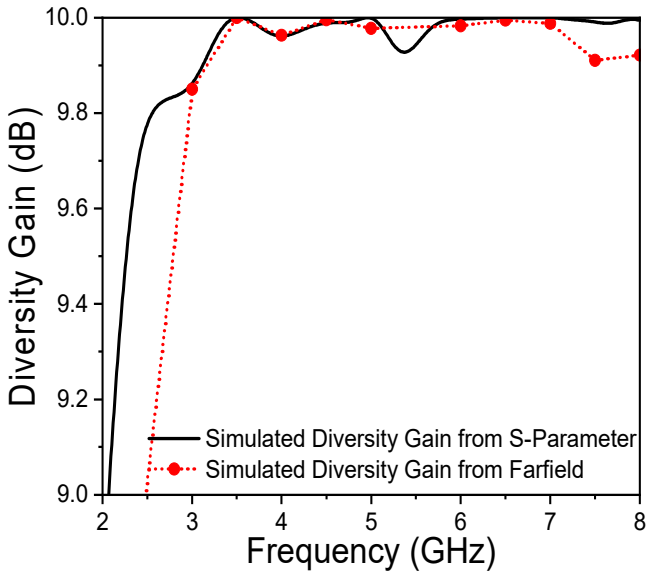

Figure 9 DG values of Proposed MIMO cDRAA

V. Performance Analysis of MIMO cDRAA Antenna with Existing Antennas

Table 1 presents the performance comparison of MIMO cDRAA antenna with existing antennas in terms of dimensions, operating frequency, gain, efficiency and type of substrate.

TABLE 1: Performance Analysis of MIMO cDRAA Antenna with Existing Antennas

Ref.	Dimension (mm^2)	Operating Frequency (GHz)	Gain (dBi)	Eff. (%)	Substrate
[3]	282×60	5.8	14.75	-	F4B
[4]	14×22	3.25	6	-	Roger RO4003C
[5]	105×54	5	10	70	FR-4
[6]	120×120	1.5/2.4	5	-	FR-4
[7]	45×60	5/8	-	-	Roger 5880
[8]	135×48	6.4	5.2		Arlon AD270
This Work	65×30	3/6.5	4	80	FR-4

From the above table it is concluded that the MIMO cDRAA antenna has fewer dimensions than [3,5,6,7 and 8], is cost-effective unlike [4, 7, and 8], operates in the sub-6GHz band as compared to all the antennas and have higher efficiency than [5]. Hence, the MIMO cDRAA antenna is a good contender for futuristic wireless applications.

VI. Conclusion

The design of novel two-port dual-band MIMO cDRAA functioning sub-6 GHz 5G and super-extended band -C for futuristic wireless devices applications is simulated and analyzed successfully. The proposed MIMO cDRAA design is simple, compact, economic, simple in manufacturing, and is easily integrated inside real wireless devices. It demonstrates good FIB and radiation patterns with a less magnitude of cross-polarization proving that the cDRAA is purely polarized. Apart from this, gain above 4 dBi and radiation efficiency above 80% in the operating band are also achieved. It also elucidates diversity performances with ECC below 0.01, DG around 10dB in operating bands of sub-6 GHz 5G and super-extended band-C. Hence, from the analysis, it is recognized that the MIMO cDRAA is a good and attractive candidate for sub-6 GHz 5G and super-extended band - C applications.

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Multiband, Circular Microstrip Patch Antenna for Wireless Applications

Ashish Jadhav, Nagashettappa Biradar, Husain Bhaldar, Mahesh Mathpati, Renuka Wadekar & Manoj Deshmukh

Wireless Personal Communications (2022) | Cite this article

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Abstract

This research article describes the design of a circular-shaped microstrip patch antenna in detail. The circular shaped microstrip antenna is designed to resonate at 10 frequency bands from 3.2 to 19.1 GHz and hence it can be used for advance wireless communication applications. The designed antenna can be used in small handheld devices supporting communication protocols like Bluetooth 2.0, Bluetooth Low Energy, Wireless Fidelity (Wi-Fi), Zigbee IEEE 802.15. 4, 2G/3G/4G/LTE-A, and 5G. The designed antenna can resonate at 10 different frequencies from 3.2 to 19.1 GHz (3.2, 5.3, 7.4, 9.6, 11.7, 13.2, 13.2, 13.7, 15.3, and 19.1 GHz). The bands of frequencies are specifically designed frequencies on which the designed circular-shaped microstrip patch antenna would work and can be modified and redesigned to work for a different dedicated application/protocol operating between the ranges of 3.2–19.10 GHz. At 10 different frequencies specified here, the observed values of S-parameter are lower than – 10 dB. The voltage standing wave ratios of the antenna at above frequencies are in between 1 and 2. As the antenna shows narrow band communication capabilities at these frequencies, the antenna can be used for a definite purpose with a definite frequency with no interference with other wireless communication system.

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The authors declare that all data supporting the findings of this study are available within the article.

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Evaluation of Machinability and Recast Layer Analysis of Ferrous Clay Composite through Electric Discharge Machining Process

Shrikrushna B. Bhosale, Sumit Bhowmik & Amitava Ray

Arabian Journal for Science and Engineering **47**, 8523–8533 (2022)

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Abstract

Recent developments in material science have concentrated not only on the improvement in mechanical properties, but also on the machinability that was difficult for system profiles. The present research explains the machinability assessment of the part of the sintered powder metallurgy using an electric discharge machining. The ferrous clay matrix preparations are constructed from iron–carbon–copper material and bentonite clay. The selected input parameters for the measurement of machinability are wt. % of clay, current (A), pulse on time (μs) and voltage (V), whereas the electrode wear rate, material removal rate and surface roughness (R_a) are considered as performance features. Results show that the performance parameters have been optimized at

three different parametric conditions. Further, to obtain single optimum condition the hybrid GRA-TOPSOS methodology has been implemented for maximum MRR with minimum EWR and low surface roughness. The single optimum condition has been found at 5% clay, current 7 *A*, voltage 49 V and pulse on time 400 µs. The study of micro-structure and chemical composition of machined surfaces has been carried out using scanning electron microscopy with X-ray diffraction and energy-dispersive spectrometry analysis, respectively. The SEM exposes the less recast layer and micro-cracks during electrical discharge machining of ferrous clay composite.

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Experimental Investigation of Flexural Strength of Banana Fiber Reinforced Composites

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EXPERIMENTAL INVESTIGATION OF FLEXURAL STRENGTH OF BANANA FIBER REINFORCED COMPOSITES

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Abstract: The present generation widely makes use of en number of composites in the field of materials technology, with a very high performance and costs appropriate for the applications such as structural and automotives etc. Fiber reinforced composites are those composites that are called as the oldest and frequently used composite materials, in which Banana fibers are the most common ones. Nowadays consciousness and environmental awareness about using natural fibers as a serious alternative has been keep on increasing globally. And also in these present days natural fiber reinforced polymer composites are being widely used in various engineering applications. Natural fibers such as jute, sisal, palm, coir and banana are the most commonly used reinforcements. In vinyl ester resin matrix banana fibers have been used as reinforcement. This work deals with the study of effect of sodium hydroxide (NaOH) on fibers in addition with alumina (Al_2O_3) particulate. It is seen that the flexural strength value of UT, UT+ Al_2O_3, T+ Al_2O_3 has increased with increase in the fiber content.

Keywords: *Composite Fabrication, Vinyl ester, Mechanical properties, Scanning electron microscopy, UT - Untreated, T - Treated*

1. Introduction

In this Paleolithic age all humans are well aware and well known about composites. Clay mixed with finely chopped straw was used in constructing the 300 ft high ziggurat or temple tower in the city center of Babylon [1, 2]. In recent years, many applications such as automotives, sporting goods, marine, electrical, industrial, construction, household appliances, etc makes use of polymeric based composite materials. These types of composites have very high stiffness and strength, light in weight, and high corrosion resistance. An extensive research work has been carried out in the past decades on the natural fiber reinforced composite materials. It was found that natural fibers which are available in abundant can be used to reinforce the polymers in order to obtain light and strong materials from them. The researchers have given results as natural fibers from plants are in the beginning stage to find their way into commercial applications such as automotive industries, household applications, etc.

Lot of investigations has been made on several types of natural fibers to study the effect of these fibers on the mechanical properties of composite materials [4–7]. Mansur and Aziz [6] has studied about bamboo-mesh reinforced cement composites and found that this reinforcing material could enhance the ductility and toughness of the cement matrix, and increase its tensile, flexural, and impact strengths significantly. On the other hand, in order to evaluate the mechanical properties and compare it with wood composites, the jute fabric-reinforced polyester composites were tested [7], and the test came up with good results that the jute fiber composite has better strengths than wood composites. Also there was an investigation made with pulp fiber reinforced thermoplastic composite and it was found to have an increase in stiffness by a factor of 5.2 and increase in strength by a factor of 2.3 relative to the virgin polymer [8]. Information on the usage of banana fibers in reinforcing polymers is limited in the literature.

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In dynamic mechanical analysis, Laly et al. [9] has made an investigation on banana fiber reinforced polyester composites and found that the optimum content of banana fiber is 40%. Mechanical properties of banana–fiber–cement composites were investigated physically and mechanically by Corbiere-Nicollier et al. [10]. It was reported that Kraft pulped banana fiber composite has good flexural strength. In addition, short banana fiber reinforced polyester composite was studied by Pothan et al. [11]; the study concentrated on the effect of fiber length and fiber content. The maximum tensile strength was observed at 30 mm fiber length while maximum impact strength was observed at 40 mm fiber length. Incorporation of 40% untreated fibers Provides a 20% increase in the tensile strength and a 34% increase in impact strength tested with banana fiber and glass fiber with varying fiber length and fiber content as well.

2. Experimental Details

This research work aims in developing the flexural strength of Banana Fiber/Particulate Reinforced Epoxy Hybrid Composites. It was found that only few researches were made using this material and hence to explore the mechanical properties such as flexural strength of the material this work is proposed which may be a platform for the future development.

2.1. Specimen Preparation

The mould should be well cleaned and dried using releasing agent (wax) before laying the vinyl ester resins on the mould. The first layer of the mould is uniformly laid with vinyl ester mixture using a special brush.. The first layer of non-woven fiber mat is placed into the mould. Another layer of Vinyl ester will be applied uniformly on the first layer of non-woven fiber mat. The second layer of non-woven fiber mat is then placed. In order to get the required laminates all these procedures are continuously followed. The mould is then closed and the composite laminates are pressed uniformly for 24 hours to obtain required thickness and curing. Once the composite is completely dried out then it is separated from the mould.
The composite laminates are cut in to specimen size as per ASTM standard for testing.

3. Testing of Flexural Property

A measure of the force that is required to bend a beam under three point loading conditions is known as flexural strength. These datas are often used to select materials for parts that will support loads without flexing. An indication of a material's stiffness when it is flexed is called as flexural modulus. Since the physical properties of many materials (especially thermoplastics) can vary depending on ambient temperature, it is sometimes appropriate to test materials at temperatures that simulate the intended end user environment.

3.1 Flexural Test Procedure:

- Most commonly the specimen will be lying on a support span.
- The load is applied at the center by the loading nose, producing three points which in turn starts bending at a specified rate.
- We have to consider certain parameters such as support span, speed of loading, and the maximum deflection.
- These parameters are based on the test specimen thickness and these are well defined differently by ASTM and ISO. For ASTM D 790, the test is completed when the specimen reaches 5% deflection or the specimen breaks before 5%.
- For ISO 178, the test is completed when the specimen breaks.

- If the specimen does not break, then the test has to be continued as far as it is possible.

Table 1. Various composite samples and its Flexural strength.

Samples	Flexural Strength in Mpa
Sample 1	
UT	4
UT+Al_2O_3	3
T	3
T+Al_2O_3	5
Sample 2	
UT	4
UT+Al_2O_3	5
T	4
T+Al_2O_3	4
Sample 3	
UT	4
UT+Al_2O_3	4
T	3
T+Al_2O_3	4

Figure 1. Shows the loading of the specimen in UTM for Flexural Test.

Figure 2. Specimen before Flexural Test.

Figure 3. Specimen after Flexural Test.

4. Result and Discussion

4.1 Flexural strength

The bending properties of composites were tested by applying 3-point bending method. Sample 1- The flexural strength of T+Al_2O_3 has been increased by 25% when compared with UT. Sample 2 - The flexural strength of composite faring UT+ Al_2O_3 of 5 Mpa, has been increased by 25% when compared with T+ Al_2O_3. Sample 3 – The flexural strength of UT, UT+ Al_2O_3 and T+ Al_2O_3 are same as show in figures 4 (a) & (b), 5 (a) & (b) and 6 (a) & (b).

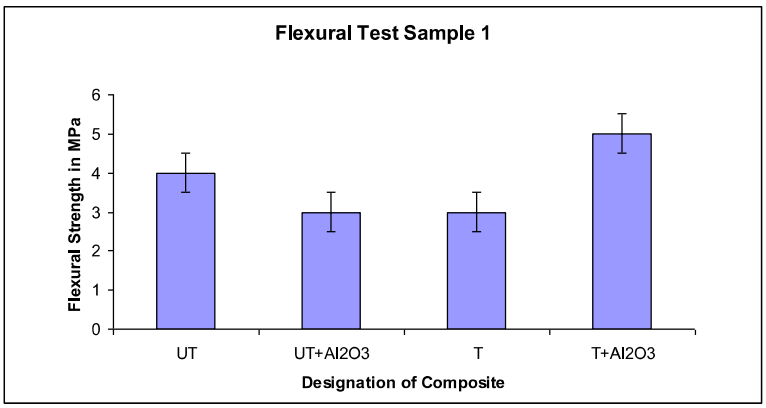

Figure 4 (a). Flexural Test Result of Sample 1

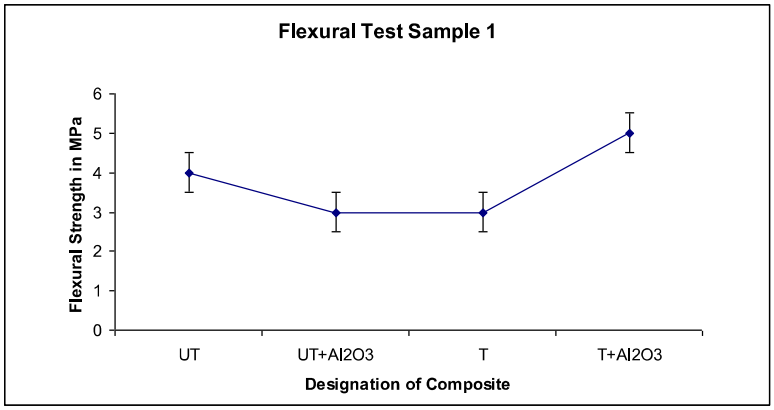

Figure 4 (b). Flexural Test Result of Sample 1

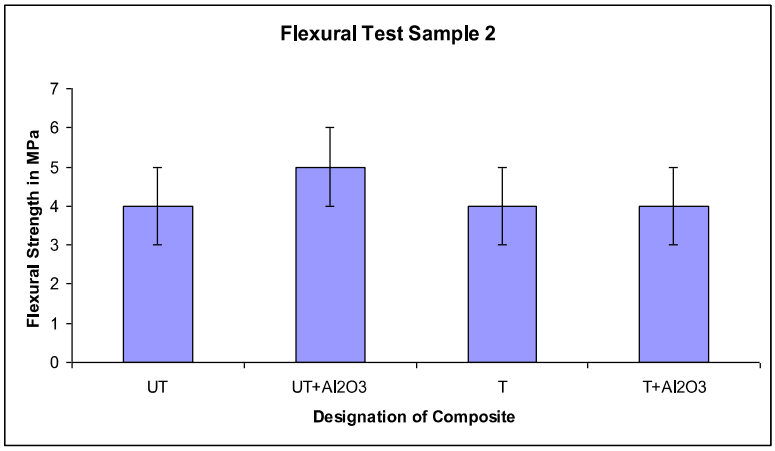

Figure 5 (a). Flexural Test Result of Sample 2

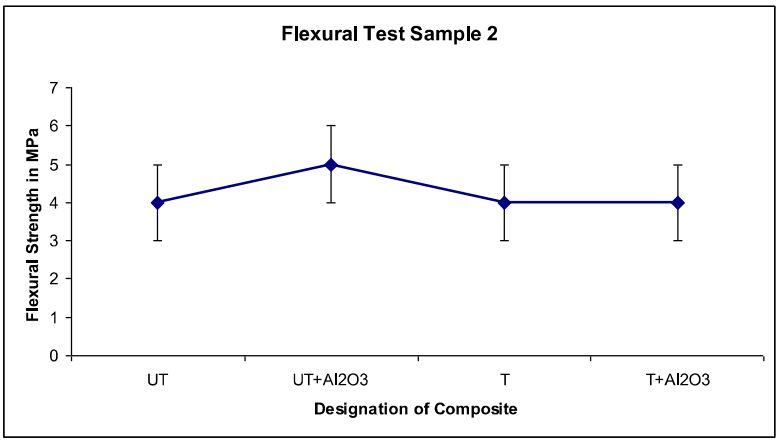

Figure 5 (b). Flexural Test Result of Sample 2

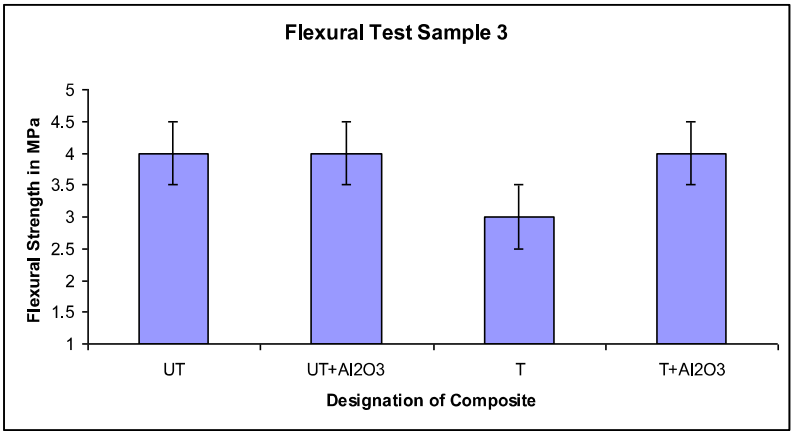

Figure 6 (a). Flexural Test Result of Sample 3

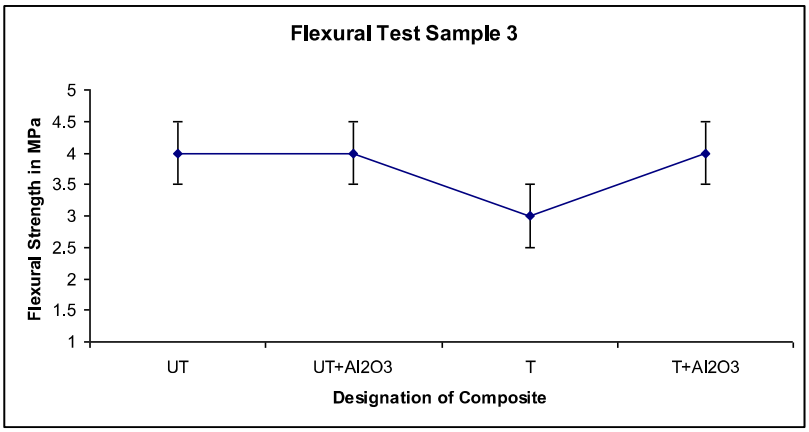

Figure 6 (b). Flexural Test Result of Sample 3

The variations in the flexural strength of samples 1,2 & 3 in single layer composite laminate, and Samples 1,2 & 3 in double layer composite laminate are shown in figures 4 (a) & (b), 5 (a) & (b) and 6 (a) & (b) respectively.

5. Conclusion

In this research work, by adding Al_2O_3 and modifying the surface some of the mechanical properties are experimentally evaluated and the following conclusions have been drawn:

- ✓ Flexural strength has been increased invariably.
- ✓ In addition of Al_2O_3 when it is treated with NaOH it has provided better results in the increase/improvement of flexural strength and other mechanical properties.
- ✓ The flexural strength can be even increased more when these hybrid composites undergoes with surface treatment.
- ✓ Composite materials that are light in weight are made using banana fiber with high specific strength which in turn can be used in making automotive interiors.
- ✓ Hybridized synthetic and natural fiber polymer composites, can be utilized in various fields like structure, marine, consumer articles and in industries also.

Thus it has been concluded that when a systematic and persistent research is carried out it will bring lot of scope and a better future is developed for synthetic and natural fibre – polymer hybrid composites in the upcoming years.

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Fabrication and Testing of Modified Magnetorheological Damper Fitted with External Permanent Magnet Assembly

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***Abstract*—Many vehicle systems and industrial equipment face the issue of vibrations. As such, vibration control devices like classical hydraulic dampers are utilized to minimize vibrations. In this context, magenetorheological fluid is introduced as a damper fluid to improve the damper's vibration reduction capability. This damper is known as the MR damper in which the magnetic field required to activate MR fluid is produced by using an electromagnet over the piston inside the damper cylinder. However, some severe problems are observed due to internal electromagnetic piston configuration in the conventional MR damper. Therefore, modification is suggested in the damper in the form of an external permanent magnet assembly's fitment.The proposed model consists of a damper cylinder filled with MR fluid and an external assembly of permanent magnets positioned near the cylinder. The conventional and modified MR dampers have been tested on a test rig by changing the MR fluid configuration, excitation frequency of exciter, and excitation current. The MR effect on velocity and damping force in conventional and modified dampers has been recorded and compared. The results convincingly indicate that the modified MR damper delivers good performance by generating sufficient damping capacity that can be utilized for necessary applications. Importantly, it resolves the problems associated with conventional MR dampers like electric current unavailability at field, clumping, hard cake formation, remanence phenomenon, and excessive heat formation.**

***Index Terms*—Magnetorheological Damper (MR damper); Magnetorheological Fluid (MR fluid/MRF), force-velocity characteristics, external permanent magnet, excitation current and frequency**

I. Introduction

Vibration control technology has remained a challenging area of study for many engineers and researchers. Civil structures, vehicle systems, industrial equipment, etc., have been facing the problem of excessive vibrations. In the last several years, different kinds of vibration control devices have been developed to minimize vibrations. Magnetorheological dampers (famous as MR dampers) are introduced to reduce the excessive vibrations at various fronts. MR damper is an improved version of a classical hydraulic damper. Smart fluid named Magnetorheological fluid (MR fluid) is used instead of simple damper oil in it. This MR fluid has the right combination of carrier liquid and freely suspended iron particles. MR fluid works as ordinary damper oil when no magnetic field (OFF state condition) is applied [1]. As soon as the electric power is supplied to the electromagnetic piston of the conventional MR damper, it generates a magnetic field. This activity is known as the ON state condition, here freely suspended iron particles form a chain-like structure due to the magnetic field generated. The damping capacity is tremendously improved due to this behavior of MR fluid particles that is illustrated in Fig. 1.

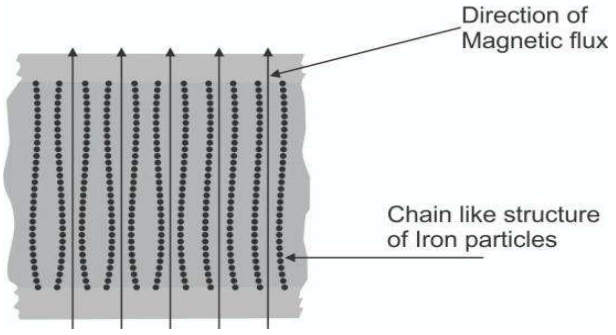

Figure 1. MR Fluid in presence of magnetic field

The Electromagnet contains multiple numbers of copper coil windings. Electric current is circulated through these windings to produce the electromagnetic effect [2]. The existing damping system is mainly classified into three main types, namely active, passive, and semi-active damping systems [3]. The MR damper is an excellent example of a semi-active damper. The MR

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fluid's viscosity changes in few milliseconds after the application of the magnetic field.

The magnetorheological fluid is prepared with a proper combination of the carrier liquid, ferromagnetic particles, and additives [4]. The information about particle size distribution is the main criterion and requirement in comparing MR materials [5]. Sedimentation stability is one of the important factors that need to be taken into consideration. The basic reasons for sedimentation stability are the gravity effect, force's direction, and Brownian motion. The additives operate as anti-settling agents on MR fluids [6]. The sedimentation ratio is affected by the percentage of additives like grease, nanoparticles, and graphene. The sedimentation ratio can be improved from 20 to 81% by adding novel grapheme and is one of the important criteria to decide whether the prepared MR fluid component combination is acceptable or not. MR fluids have great potential for research [7]. The concept of magnetorheology was used to prepare MR fluid (MRF), MR elastomer (MRE), MR grease (MRG), MR polymer gels (MRPG), and MR plastomers (MRPs). MRF has been used worldwide because it is a smart material. It is easy to prepare, very sensitive to change in the magnetic field, and unresponsive to contamination. Due to these properties, MRF is very famous as the smart material used for vibration control. MRF viscosity reduces during long-time operations [8]. This long cyclic process affects the orientation of ferromagnetic particles in MRF. Increment in the damping force was recorded as 44% and 90% in ON state and OFF state conditions than initial force. This was due to the effect of increment in viscosity. MRF has wide applications [9] like in automotive (car and seat suspension), protection to civil structures from seismic action, household appliances, robot fabrication, MR brake, MR clutch, MR beams, heavy vehicles especially defense automotive parts, MR damper bumper to minimize accident effect, etc. Some defects of MRF in working conditions have been found [10]. These defects are hard cake formation, clumping, oxidation of iron particles, and MR fluid particles settlement (known by the name of magnetic saturation). The remedies for such defects are the use of proper additives and the application of an optimal magnetic field. Design and analysis of low force MR damper (where current variation was 0.1 A to 1 A) has been explained [11]. The damper design and geometry calculation process, magnetic circuit design process, and material selection are mentioned in this work. The model design has been analysed with ANSYS software. It has been stated that total damping force is the algebraic sum of damping force due to shear stress and viscous damping force. This conclusion satisfied the low force damper design requirement.

Volume fractions and magnetic induction are also responsible for influence on microstructure evolution of MR fluids [12]. The remanence phenomenon has been observed in the case of conventional MR dampers. The current flows through the coil of the electromagnetic piston results generation of magnetic flux. Due to such magnetic flux acting in the electromagnetic piston, the electromagnetic piston remains considerably magnetized although no current flows through it. The ferromagnetic particles of MR fluid are attracted by electromagnetic piston even in OFF state conditions after the experimentation. It affects the performance of the MR damper. Magnetorheological (MR) gels have been widely utilized as smart material in the vibration reduction of engineering structures [13]. Existing models for MR materials are based on the magnetic dipole theory for MR fluid, but particle size is not taken into consideration in it. This theory cannot be applied to MR gels as MR gels contain a higher volume fraction of particles. So a new micromechanical model was fabricated and it was experimentally verified by using the planar current loop model. The basic performance characteristics of MR gels including magnetization effect and sedimentation stability are carried out in the process. The magnetic energy of particles was calculated by using the magnetic dipole model and the planar current loop model. The results obtained by both methods are compared.MR dampers are also used to reduce the resonance of a structure [14]. The current at which MR fluid regions get saturated is known as the maximum allowable current. The simulation of MR damper has been done by using simulation software like ANSYS, COMSOL, etc., to know the effect of various parameters on the application of magnetic fields. A designer can forecast the range of various parameters, for example, MR fluid gap, magnetic field required to activate MR fluid, damping force range, copper coil stages, shape and size of the piston through it. The MR damper has been used in earthquake vibration mitigation too. The MR dampers with multiple coils are used to improve the damping force and performance in seismic conditions. A three-coil MR damper is the best example of it [15]. The experimentation shows dynamic characteristics and magnetic saturation properties of the three-coil MR damper when different excitation currents and loading conditions. The Bingham model of MR damper with the formula relating the yielding shear stress and the MR damper control current is derived [16]. The formula put before matches with experimental results. To control the semi-active structure, the online real-time control method is suggested. The distortion of structure response can be solved by considering the time-delay problem of semi-active control. In the end, the comparison between controlled and uncontrolled structures is performed by an example of a three-storey reinforced concrete structure. Seismic distortion can be reduced effectively by using this approach. To reduce dynamic responses of a platform under the wide frequency range excitation, a new vibration isolation and reduction device is designed and manufactured [17]. Tests are conducted on such devices to understand the effect of the frequency as well as excitation amplitude on the properties of this device. The dynamic responses of such a platform are calculated under various excitations. It can be noted that such a device helps to reduce dynamic responses significantly.

One of the modified MR damper designs [18] consists of a permanent magnet. This design has been used to

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resolve the fail-safe problem of MR dampers. A permanent magnet and magnetic valve have been utilized [19]. This model is based on electromagnetism theory and the Bingham model. Permanent magnet and self-sensing compact devices have been developed further. A tunable MR damper is another device operated by permanent magnets [20]. There is no use of electromagnetic piston to produce magnetic fields in it. 2 DoF quarter car model with a hybrid magnet MR damper has been developed [21]. This experiment is quite successful for improvement in tire deflection, ride comfort, and suspension control. Magnetic shields (and sandwiched shields) are also used in some cases for twin-tube MR dampers with a single-coil in them [22]. Deviation in the flux lines has been observed due to the effect of such shields.

This study reveals that most of the work reported on MR dampers is with the use of electromagnets located on pistons inside the damper cylinders [23]. But from the application point of view, there may be chances of unavailability of electric current or battery provision on the actual field. Moreover, some of the common defects like hard cake formation, clumping, oxidation, and settlement of MR fluid particles are found in conventional MR dampers. As MR fluid is a good conductor of heat, the heat generated also affects fluid viscosity adversely [24]. So, permanent/hybrid magnets have been tried out in some of the recent designs to find the solutions for existing conventional damper problems. Although an internal permanent/hybrid magnet at piston of MR damper has undoubtedly addressed the heat and short circuit problems, it promotes continuous ON state condition. Moreover, the conventional MR damper has to be dismantled during maintenance that can be quite cumbersome due to internal magnet arrangement. As the result, there will be some limitations of conventional MR damper application due to the need for repair and maintenance on the actual site Such issues open up the scope for modification of conventional MR damper by using an external permanent magnet assembly. There shall be fewer chances of failure in magnetic circuits when one fits such external permanent magnet assembly to the damper cylinder. The modified MR damper becomes more effective as far as the application is concerned.

The present paper is an effort in this direction. The performance of the modified MR damper is investigated and its results are compared and validated vis-à-vis conventional MR damper in the paper.

II. Materials and Methodology

Fig. 2 represents the flowchart of the methodology adopted for the experiments with a modified MR damper. The same methodology has been adopted for conventional MR dampers also.

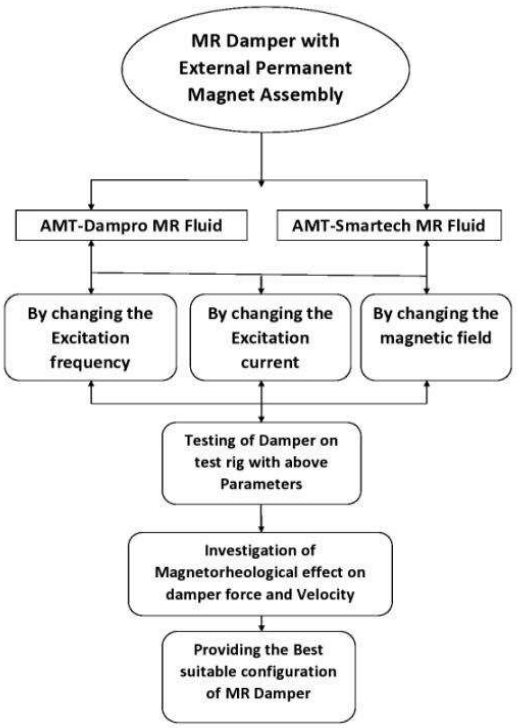

Figure 2. The methodology adopted for experimentation

The modified MR damper is tested. The effect of magnetorheology on velocity and damping force is recorded. The MR fluids can be prepared with 20 to 40 % volume fractions of ferromagnetic particles and are commercially available. They contain different volume fractions of ferromagnetic particles. These volume fractions can affect damper performance. The presented experimental work can be performed with only one type of MR fluid. However, it is better to test modified MR damper performance against more types of MR fluids to understand damper performance when particle fractions of MR fluids are varied. So that, two types of MR fluids AMT-Dampro and AMT-Smartech are used in experimentations. The excitation current is responsible for the change in excitations provided to the damper by the exciter. These excitations provided can be considered as input excitations. The magnetic field (which is externally applied to the modified MR damper) is responsible for the change in the behavior of MR fluid. It effects on output provided by the MR damper. So that, the modified MR damper is tested on a test rig by changing the MR fluid configuration, excitation frequency of exciter, magnetic field, and excitation current. The conventional MR damper is also tested on the same experimental test rig by varying the same parameters for comparison. The best suitable configuration of modified MR damper with used MR fluid and applied magnetic field is suggested from the results obtained from the experimental data.

A. Details of Modified MR Damper Set Up

A Mono-tube MR damper is chosen for experimental work that consists of two cylinders and a piston arrangement. The outer cylinder and piston rod have an

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eye arrangement. The lower and upper eyes are fixed to the piston rod and closed end of the outer cylinder respectively. These eyes are helpful to fix the damper to the test rig or any equipment where the damper is to be used. The lower end is fixed with the hub of the exciter. As discussed earlier, the internal electromagnet arrangement is removed completely in the modified MR damper. The magnetic field in the modified MR damper is varied by changing the distance between the magnets and by adding or removing the magnets in the external magnet assembly. The entire modified MR damper unit can easily be fitted or installed on any structure or equipment just like the normal damper. The actual configuration of conventional and modified MR dampers are presented in Fig. 3 (a) and (b) respectively.

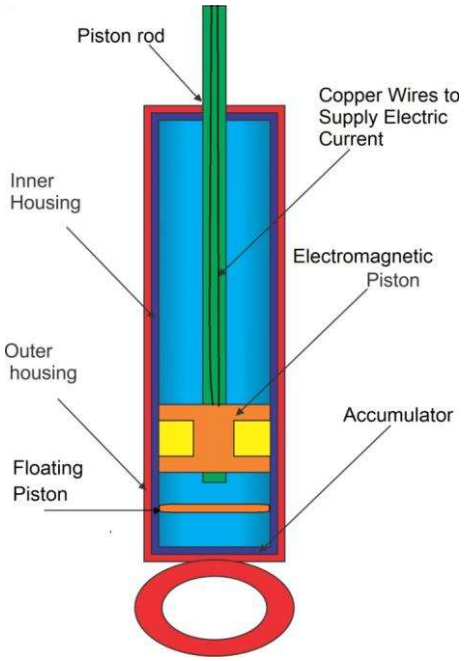

Figure 3 a). The actual configuration of conventional MR damper

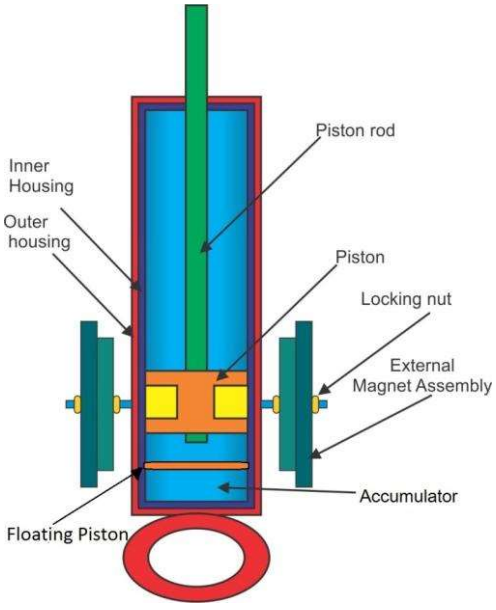

Figure 3 b). The actual configuration of modified MR damper

Two types of magnetorheological fluids, i.e. AMT-Dampro, and AMT-Smartech, are separately used for testing purposes. The properties of MR fluids are consolidated In Table I.

TABLE I. PROPERTIES OF MR FLUID USED

Properties of MR Fluid ↓	AMT-Dampro	AMT-Smartech
Density (gm/cm^3)	2.45	2.90
Zero field Viscosity (Pa s) @ 40°C	0.29	0.37
Response time	<milliseconds	<milliseconds
Flash Point (in °C)	>180	>180
Operating Temperature Range(in °C)	-20 to +150	-20 to +150
Solid Content by weight %	73	81
Yield stress (kPa)	42	69

From the table, it can be seen that a wide range of yield stress is achieved in MR fluids at low intensity of the magnetic field. Excellent quality stabilizing agents have been added to the fluids due to which they have good settling resistant properties. The operating temperature of all fluids can be varied from -20° to +150° C and the fluids have improved properties like optimum viscosity, enhanced lubricity, and wear resistance.

B. Experimental Set-Up and Testing

The experimental setup to obtain force-velocity characteristics is shown in Fig. 4. The exciter from Instrol devices, Bangalore, India has been utilized to provide excitations to the MR damper. The function generator attached to the exciter consists of a power amplifier and an oscillator. This setup generates sinusoidal signals. Load cell and dial gauge indicators are used to measure the parameters like force and displacement. Velocity and excitation frequency is measured with the help of four channels portable FFT analyzer.

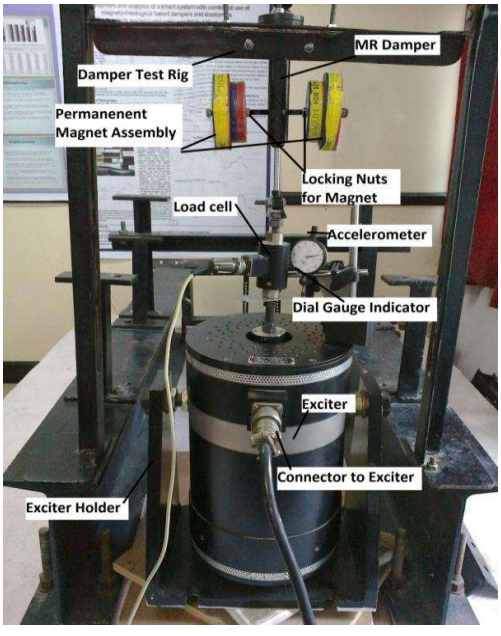

Figure 4. Experimental setup for modified MR damper testing

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The damper is fixed at its lower end on the horizontal middle beam of the test rig. This horizontal beam is movable in a vertical direction to adjust the MR damper's position for its attachment with the exciter. A proper slot is provided on the middle horizontal beam. The external magnet assembly is connected to the modified damper. One can change the magnetic field in a modified MR damper either by adding or removing permanent magnets in it or by varying the distance between magnets and the cylinder of the damper. Permanent magnets are fixed at a certain distance away from the cylinder with a locking nut arrangement. When the assembly of permanent magnets is kept 15 cm away from the damper, it gives a very less magnetic field which is almost null This condition is the OFF state condition. Considerable magnetic field generation starts when permanent magnet assembly is brought near the cylinder. In other words, the magnetic flux density is increased when the distance between permanent magnet assemblies is reduced. This condition is the ON state condition. The specifications of the devices which are part of this setup are provided in Table II.

TABLE II. SPECIFICATIONS OF INSTRUMENTS USED IN THE EXPERIMENTAL SETUP

I. POWER AMPLIFIER	
MAXIMUM POWER OUTPUT	250 VA INTO 1.5 OHM
FREQUENCY RESPONSE	1 HZ-10 KHZ WITHIN +1DB
HARMONIC DISTORTION	LESS THAN 1 %
GAIN AT 1 KHZ	20 DB + 1DB
II. VIBRATION EXCITER MODEL ID-230	
PEAK SINE FORCE	200 N
MAXIMUM DISPLACEMENT	12 MM PEAK TO PEAK
MAXIMUM ALLOWABLE PAYLOAD	3 KG
III. OSCILLATOR	
WAVEFORM	SINUSOIDAL
FREQUENCY RANGE	1 HZ-10 KHZ
FREQUENCY RESPONSE	WITHIN + 1 DB WITH REF. AT 1 KHZ
TOTAL HARMONIC DISTORTION	LESS THAN 1 %
INDICATION ACCURACY	+0.2 % OF THE RANGE OR BETTER
IV. LOAD CELL	
TYPE	STRAIN GAUGE TYPE
RATED CAPACITY	20 KG
RESOLUTION	0.01 KG
ACCURACY	±0.05 % OF THE RATED CAPACITY
V. DIAL GAUGE	
RATED CAPACITY	4 MM
RESOLUTION	0.01 MM
VI. FFT-ANALYZER	
MODULE	OR34
SOFTWARE	NVGATE®

The upper end of the damper is connected to the exciter hub. The range of excitation current is varied from 1.5 A to 6 A with an equal interval of 1.5 A. The excitation frequency of the exciter is set as 2 Hz, 4 Hz, 6 Hz, and 8 Hz. The magnetic flux generated with external permanent magnet assembly is set as 0 Gauss (G), (OFF state condition), 2000 G, 4000 G, and 7000 G.

III. CONFIGURATION OF MODIFIED MR DAMPER

The permanent magnets of 2000 G and 4000 G are initially used one by one in the external assembly of the modified MR damper to generate the magnetic field. However, deviation in the results, Fig. 5 and 6, has been found with these magnetic intensities as compared to conventional MR damper having fixed 7000 G magnetic field. So a combination of two magnets (3000 G and 4000 G) is used to generate 7000 G magnetic field. Modified MR damper gives results very near to conventional MR damper at 7000 G magnetic field. The optimum distance of magnets in the external assembly from the damper cylinder is found. Magnets are positioned at various distances from the outer cylinder and tested. The external permanent magnet assembly is connected to the outer housing and does not move with the piston. But the external magnet assembly can be moved and its position can be varied according to the piston stroke. Importantly due to the large size of the external permanent magnet, the magnet generates a sufficient magnetic field around it to activate MR fluid irrespective of any piston position. In the experiment, the recorded output was found to be stable like conventional/traditional MR damper. There are very small percentage differences in Force-Velocity characteristics of conventional and modified MR Damper. The average percentage difference in force and velocity characteristics of modified and conventional MR dampers is recorded in Table III. This table helps to decide the optimum distance between the outer cylinder of the modified MR damper and permanent magnets. From the results, a distance of 5 mm is desirable where the average percentage difference is minimum for both types of used MR fluids.

TABLE III. EFFECT OF DISTANCE BETWEEN OUTER CYLINDER AND MAGNETS

Distance between Magnets and Cylinder in mm	Average Velocity difference in %	Average Force difference in %	MR Fluid Used
5	4.51	5.85	AMT-Dampro
	4.85	6.11	AMT-Smartech
10	6.88	7.04	AMT-Dampro
	6.83	7.83	AMT-Smartech
20	8.65	8.34	AMT-Dampro
	8.09	8.89	AMT-Smartech
30	10.65	8.95	AMT-Dampro
	9.61	10.34	AMT-Smartech
40	11.35	11.4	AMT-Dampro
	11.17	10.71	AMT-Smartech
50	12.88	10.7	AMT-Dampro
	12.75	12.21	AMT-Smartech

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It is therefore deduced that modified MR damper requires magnets of 7000 G that need to be arranged at a distance of 5 mm away from the outer cylinder. This configuration is selected for further experimental work.

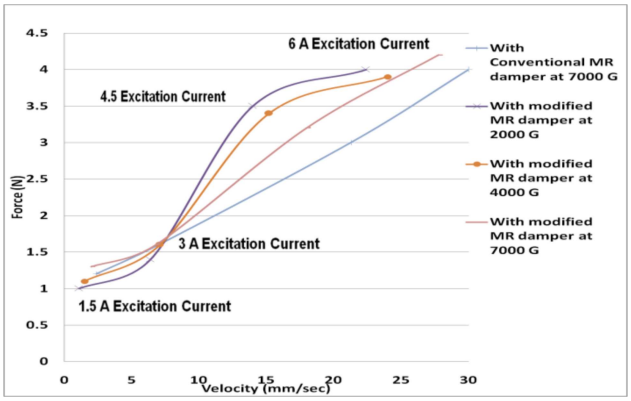


Figure 5. Force-velocity characteristics of MR damper with AMT-Dampro MR fluid

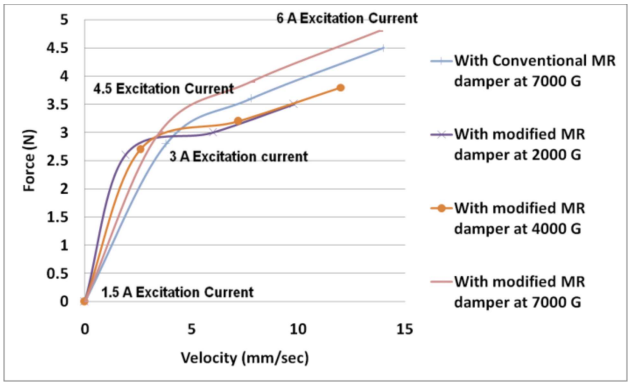


Figure 6. Force-velocity Characteristics of MR damper with AMT-Smartech MR fluid

IV. Results and Discussion

The exact velocity amplitude is recorded at various excitation frequencies by the FFT analyzer (with module OR34 and NVGate®Software). An accelerometer of FFT analyzer is useful to record the parameter like velocity. An integrated metallic plate connected to the damper on which an accelerometer with a magnetic base was mounted. For analysis, the velocity values obtained at a particular excitation frequency were recorded. There are two windows present; one is a recorder that records the reading as Time Vs Acceleration. After recording the reading, the second Analysis window is generated which can be Frequency Vs Acceleration, Frequency Vs Velocity, and Frequency Vs Displacement. The frequency Vs Velocity option is chosen out of these options here.

The force amplitude is recorded with the help of a digital strain gauge type load cell. The velocity amplitude *vs* excitation frequency plots of conventional and modified MR dampers at 7000 G are given in Figs. 7 to 9.

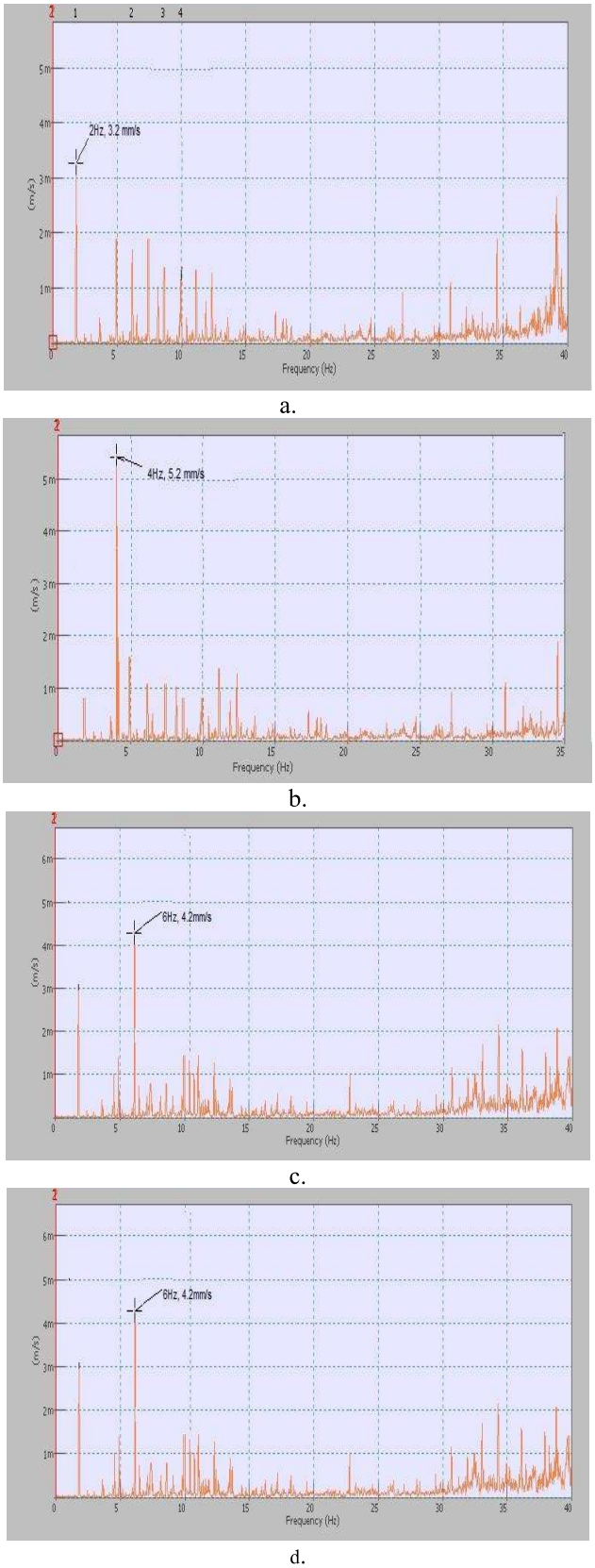
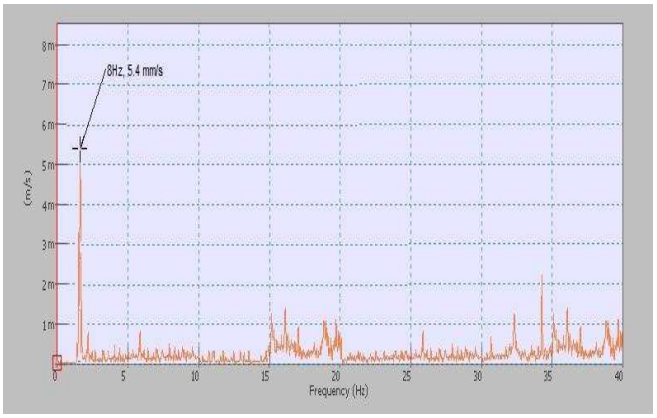


Figure 7. Velocity *vs* Excitation frequency graphs of modified MR damper with AMT- Dampro MR fluid



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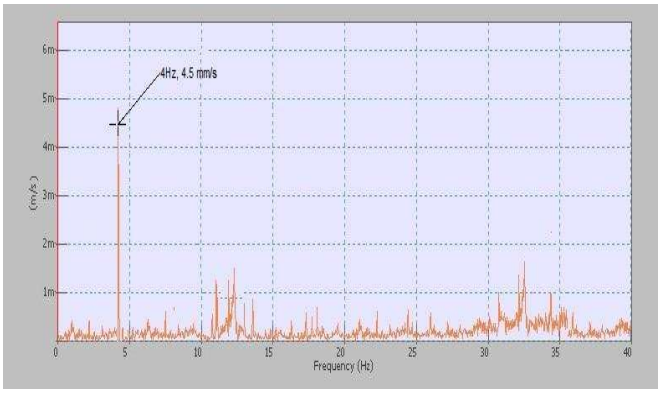

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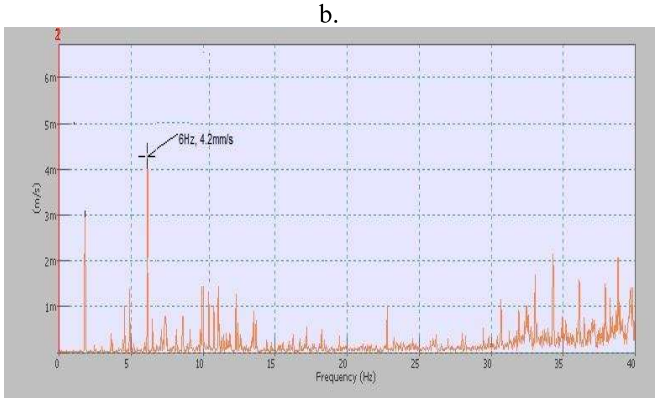

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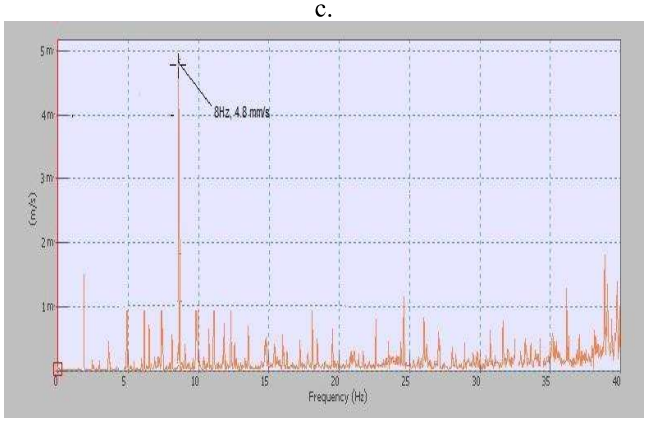

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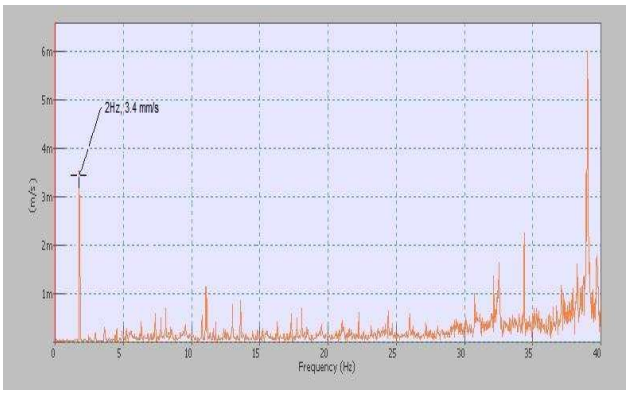
Figure 8. Velocity *vs* Excitation frequency graphs of modified MR damper with AMT- Smartech MR fluid



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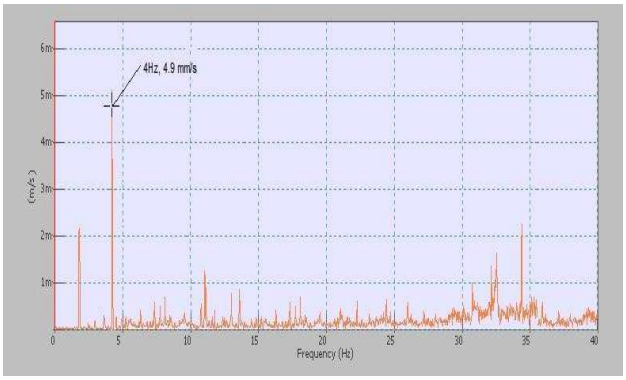

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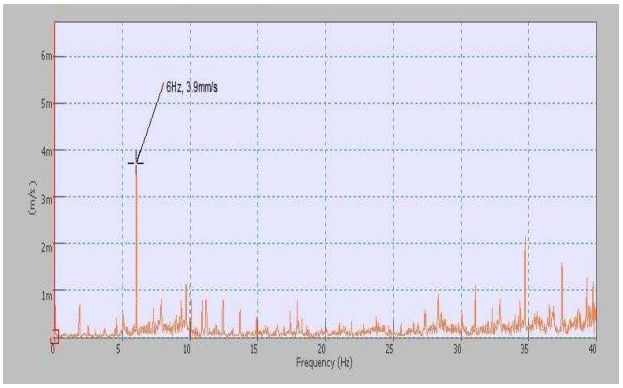

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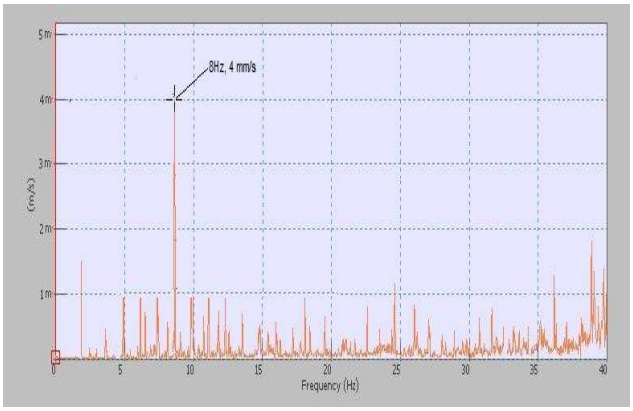

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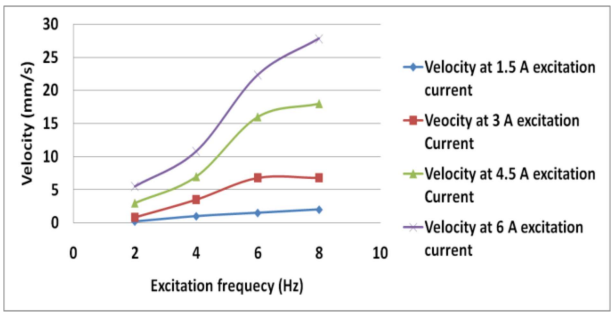
Figure 9. Velocity vs Excitation frequency graphs of Conventional MR damper

The motivation to use an FFT analyzer is to note exact velocity amplitude. In Figs. 7 to 9, some additional velocity curves can be seen. These additional velocity plots existed due to seismic vibration. It is considered noise. Its magnitude is very less as compared to recorded exact velocity at certain excitation frequencies. Hence, these are neglected. The velocity amplitude at various frequencies recorded as indicated in Figs. 7 to 9 is used to study the effect of excitation frequency on velocity amplitude. The graph plotted in Figure 10 is showing it for modified MR damper with AMT- Dampro and AMT-Smartech MR fluid at 7000 G magnetic field. It can be seen that, as excitation current at certain frequency increases, the velocity amplitude also increases. It means the excitation current is directly proportional to the velocity. The maximum difference in velocity occurs at 8 Hz excitation frequency and excitation current of 6 A. The velocity range is reduced when AMT-Smartech fluid is used with a modified MR damper. It means the used MR fluid, provided the magnetic field with external permanent magnet assembly and modified MR damper are responsible for velocity reduction. The generated magnetic field and AMT-Smartech MR fluid (which contains more nos. of iron particles) make velocity fall from 27.8 mm/s to 13.8 mm/s. It proves that damper performance is affected by external magnet assembly and nos. of iron particles. The sedimentation effect is responsible for 0 velocities at 1.5 A excitation current for all excitation frequencies. It can be seen in Fig. 10 (b).



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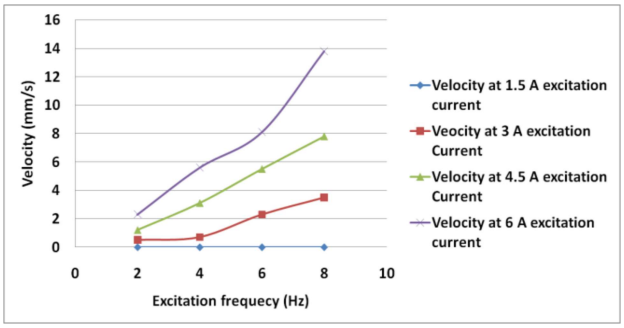
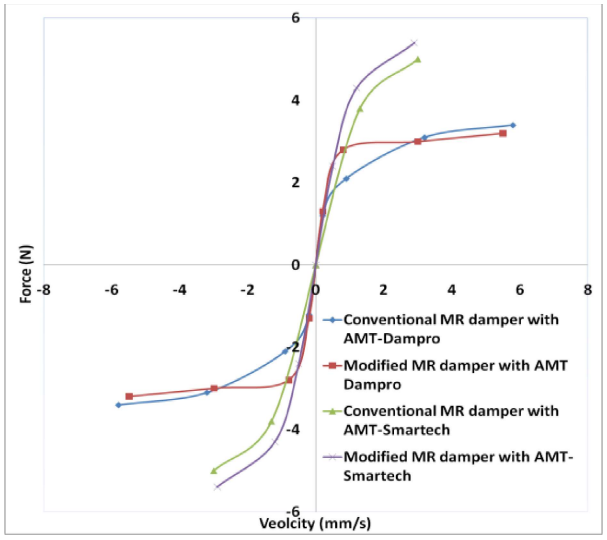


b.

Figure10. Velocity Vs Excitation frequency graphs of Modified MR damper when a) AMT-Dampro MR fluid is used b) AMT- Smartech MR fluid is used at 7000 G



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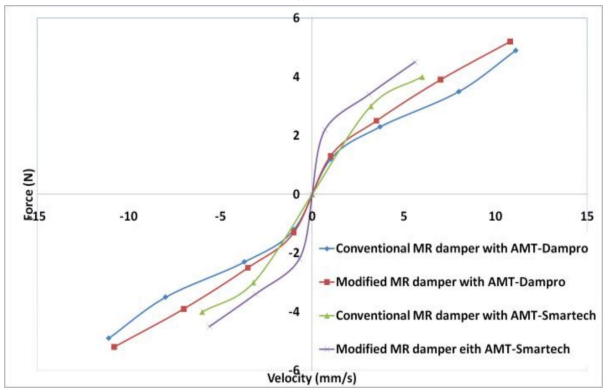

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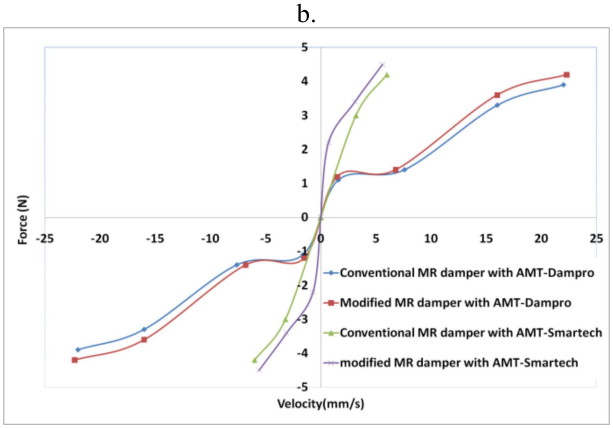

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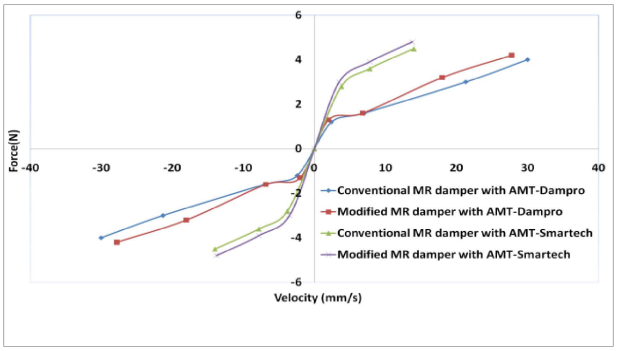
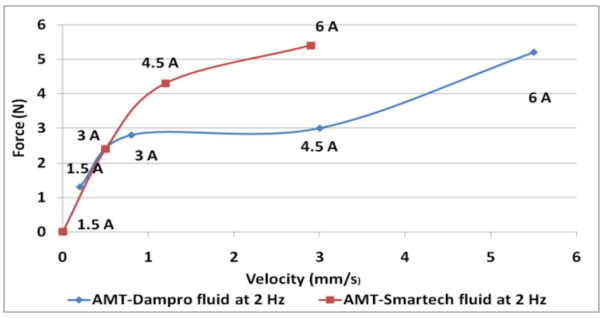


d.

Figure 11. Force-velocity characteristics at a) 2 Hz b) 4Hz c) 6 Hz and d) 8 Hz and 7000 G

Fig. 11 shows the Force-velocity characteristics of conventional and modified MR dampers The AMT-Dampro and AMT- Smartech have been used as MR fluids. When AMT-Dampro MR fluid is used in testing, it is observed that there is an increment in force as velocity increases in both dampers. However, these graphs are non-linear hysteresis curves. MR dampers are well known to have such curves in force-velocity characteristics presentation. A very small difference in the force amplitude is observed in modified MR damper at the same velocity as compared to conventional MR damper. This effect has been recorded for all values of excitation current viz. 1.5 A, 3 A, 4.5 A, and 6 A at all excitation frequencies, especially at 7000 G magnetic field density. There are considerable variations in force-velocity characteristics at excitation frequencies of 6 Hz and 8 Hz. The Force and Velocity vary from 1.2 N - 4.9 N and 0.2 mm/s to 30 mm/s for conventional MR dampers. For modified MR damper, these values vary from 1.2 N - 5.2 N and 0.2 mm/s to 27.8 mm/s. So it can be stated that a modified MR damper controls the velocity and produces more force than the conventional MR damper. The performance of conventional and modified MR dampers improves when AMT-Smartech MR fluid is used in it. The highest force difference has been recorded in graphs at 7000 G magnetic field applied in both the dampers. The highest value of the force is noted at 6 A excitation current, 2 Hz excitation frequency, and magnetic field 7000 G viz 5.4 N for modified MR damper. The same parameter recorded for the conventional MR damper is at 6 A excitation current, 2 Hz excitation frequency, and magnetic field 7000 G viz. 5 N (highest). The magnetic saturation starts occurring at 4 Hz, 6 Hz, and 8Hz at 1.5 A excitation current.



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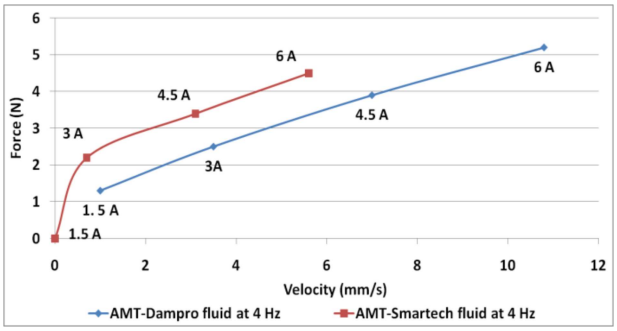

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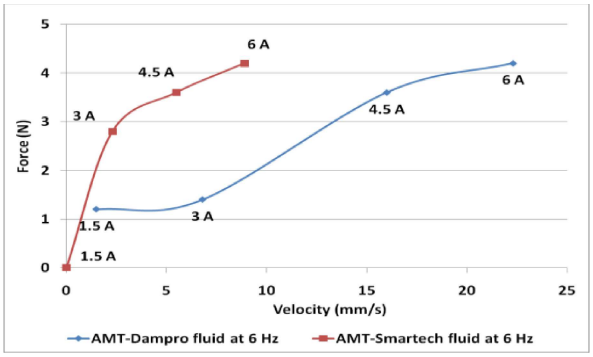

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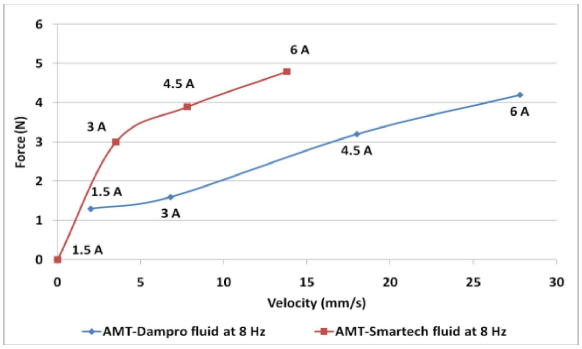

d.

Figure 12. Force-velocity characteristics of modified MR Damper for different excitation currents at a) 2 Hz b) 4 Hz c) 6 Hz and d) 8 Hz and 7000 G

The excitation current effect of modified MR damper on the Force-Velocity characteristics has been part of this study too. The optimization for excitation current is performed by using recorded data. Fig. 12 shows the Force-velocity characteristics of AMT-Dampro and AMT-Smartech MR fluid for different excitation currents at different excitation frequencies viz. 2 Hz, 4 Hz, 6 Hz, and 8 Hz. The force-velocity curve indicated at different excitation currents has only one curve because the force-velocity data at 7000 G have been considered to plot it. The data from different currents at a single excitation frequency under 7000 G magnetic field clubbed together to plot these graphs.

The observations indicate that the velocity at 1.5 A at 2 Hz and 4 Hz are almost very close at all applied magnetic fields when AMT-Dampro MR fluid is used. But a considerable difference has been observed in force-velocity characteristics at different excitation currents in all excitation frequencies. When AMT-Dampro MR fluid has been selected in testing, it gives better results at high excitation current (4.5 A and 6 A) and high excitation frequency (6Hz and 8Hz). Force-velocity characteristics of AMT-Smartech fluid are also indicated in same graphs. The excellent range of variations in the force-velocity characteristics has been recorded here at every frequency and each excitation current as compared to AMT-Dampro MR fluid. Further, it has been observed that the magnitude of force decreases and the magnitude of velocity increases as the excitation current goes on increasing from 3 A to 6 A. The highest force recorded is 5.4 N at 2 Hz excitation frequency, 6 A, excitation current, and 7000 Gauss magnetic field. The optimization

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can be done after studying these plots. This optimization will be helpful to decide the combination of excitation current, excitation frequency, magnetic field, and MR fluid for the required application. This will provide the force-velocity range at different excitation frequencies also.

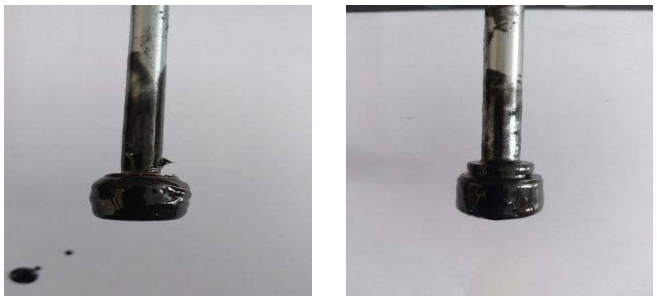
V. Performance Validation of Modified MR Damper

It is necessary to validate the performance of the modified MR damper. The recorded force-velocity readings of modified MR dampers have been used for comparison with those from conventional MR dampers. The percentage difference for conventional and modified MR dampers is calculated and presented in Table IV.

TABLE IV. Percentage Difference in Force-velocity Characteristics of Conventional and Modified MR Damper

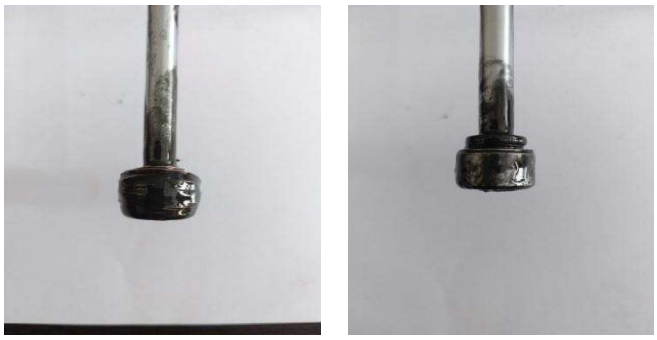
Excitation Frequency	Velocity Difference in %	Force Difference in %	MR Fluid Used
2 Hz	3.17	5.34	AMT-Dampro
4 Hz	3.76	6.61	
6 Hz	4.74	6.09	
8 Hz	6.38	5.39	
2 Hz	6.33	5.27	AMT-Smartech
4 Hz	4.39	5.98	
6 Hz	5.90	6.63	
8 Hz	2.42	6.56	

The minimum percentage of velocity difference for AMT-Dampro MR fluid has been recorded as 3.17 % at 2 Hz excitation frequency while the maximum percentage difference in velocity for the same fluid has been recorded as 6.38 % at 8 Hz. The force percentage differences have been recorded as 5.34 % minimum and 6.61 % maximum. Likewise, the minimum percentage of velocity difference for AMT-Smartech MR fluid has been recorded as 2.42% at 8 Hz excitation frequency while the maximum percentage difference in velocity for the same fluid has been recorded as 6.33% at 2 Hz. The force percentage differences have been recorded as 5.27 % minimum and 6.63 % maximum. From the percentage differences, it is clear that the difference in force and velocity of modified MR damper and conventional MR damper is small that supports the use of modified MR damper.



a. b.

Figure 13. The remanence phenomenon at Piston when AMT -Smartech MR fluid is used a. Conventional MR damper and b. modified MR damper



a. b.

Figure 14. The remanence phenomenon at Piston when AMT-Dampro MR fluid is used a. Conventional MR damper and b. modified MR damper

The effect of the remanence phenomenon at the piston of conventional and modified MR dampers just after the experiment is shown in Fig. 13 and 14. This effect has been observed to be more in conventional MR dampers due to the effect of an electromagnet. The magnetism effect remains in the electromagnetic piston for a certain time even after the deactivation of current. Iron particles from MR fluid are attracted to the electromagnetic piston and get saturated inside the cylinder. In short, more no's of iron particles from the MR fluid are attracted by conventional MR damper piston. However, in a modified MR damper, once the magnets from the assembly are removed, there is very less magnetism effect on the piston as compared to that on a conventional MR damper piston.

a. b.

Figure 15. Clumping effect on AMT-Dampro MR fluid when it is used it with a. Conventional MR damper and b. modified MR damper

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a. b.

Figure 16 Clumping effect on AMT-Smartech MR fluid when it is used with a. Conventional MR damper and b. modified MR damper

The clumping effect (white patches) in MR fluids AMT-Dampro and AMT-Smartech is shown in Fig. 15 and 16. The clumping effect is generated as a result of the long-time operation of the MR damper at a very high direct magnetic field. This effect is responsible for the grouping of iron particle chains which leads to hard cake formation. A significant difference in the clumping effect is observed between conventional and modified MR dampers. Iron particles grouped due to clumping in the case of conventional MR damper can be seen in Fig. 15 'a' and 16 'a'. Reduced white patches in modified MR damper fluid are confirmed from Fig. 15 'b' and 16 'b'.

VI. Conclusions

A conventional MR damper has an internal electromagnet inside it as a damper piston. In a modified MR damper, such an internal electromagnetic piston is removed. The external assembly of the permanent magnet is used in a modified MR damper to generate the magnetic field. The conventional and modified MR damper are tested on the same experimental rig. The force-velocity characteristics of both the dampers are compared. The performance of modified MR damper is found to be at par with that of conventional MR damper. Importantly modified MR damper gives additional benefits of reduced remanence phenomenon and clumping. Other conclusions drawn from the work reported in the paper are as follows:

1) It is observed that force-velocity characteristics improve with nos. of ferromagnetic particles. MR fluid - AMT-Smartech gives better performance in the case of both conventional and modified MR dampers. However, at a low excitation current where the velocity of excitations is low (like 1.5 A), ferromagnetic particle saturation is observed. In the case of AMT-Dampro, considerable changes are observed in force-velocity characteristics at excitation frequency 4 Hz to 8 Hz. The graphs plotted (Fig. 12) help to decide force-velocity characteristics range at different excitation currents. 3 A, 4.5 A, and 6 A excitation currents give a better range of damping force for both kinds of MR fluids.

2) The best suitable combination for force-velocity characteristics is noted with modified MR damper at 8 Hz excitation frequency and 4.5 excitation current at 7000 G magnetic field with AMT-Smartech MR fluid (Fig. 11).

3) In table IV, the percentage difference in force and velocity recorded for conventional and modified MR dampers has been obtained for every excitation frequency. The table shows that minimum differences have been observed in the case of both MR fluids. The minimum percentage difference in the force and velocity readings supports the viability of experimentation too. Results convincingly show that the modified MR damper delivers good performance by generating effective variation in force-velocity characteristics as compared to conventional MR damper.

4) The modified MR damper resolves the problems like hard cake formation-clumping, remanence phenomenon, and excessive heat formation. The new and simple external assembly arrangement makes the modified MR damper handy and convenient for installation and application to the system at the actual site. There will be fewer chances of failure in magnetic circuits when external permanent magnet assembly is connected to the damper.

5) The results reported in the paper shall provide basic data for further study using external permanent magnet assembly to magnetorheological instruments in the field of vibration control.

Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Author Contributions

All authors contributed to the study conception and the actual experimentation. Mr. Yashpal M. Khedkar performed material preparation, data collection, and analysis. He wrote the first draft of the manuscript. This work is performed under the guidance of Dr. Sunil Bhat. Dr. Sunil Bhat and Dr. H. Adarsha reviewed and edited the manuscript. All authors commented on the previous version of the document. All authors read and approved the final manuscript. All Authors agree to be accountable in every aspect of the work to ensure that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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DEVELOPMENT OF AUTO FEEDER MECHANISM FOR CRICKET BALL THROWING MACHINE"

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ABSTRACT
Cricket is one of the most popular games in India. We have developed an automatic feed mechanism for cricket ball throwing machine to help young and passionate players improve their cricket skills. The mechanism consists of a DC geared motor with ribs connected to a shaft. The motor rotates at a specific interval desired by the user. The rotating fins push the ball into the ball-throwing machine. The rotation of the DC motor is detected by an induction sensor and sends a signal to the PLC. This program is designed to control the time interval at which ball is delivered to a throwing machine. This eliminates the external effort required to feed the balls in turn to the cricket-throwing machine
Keywords: DC geared motors, PLC, cricket, machine, External Efforts etc.

I.INTRODUCTION

In today's highly competitive world, every job requires maximum practice to achieve the required skills. In cricket, a bowling machine is a device that repeats the throwing of a ball of a certain length,line, and speed so that the batter can practice (usually on the net) and hone certain skills. In the context of unprecedented pandemics and the uncertainty of the physical crowd, the need for these machines for batters becomes more acute. 4,444 professional cricketers train for an average of about4-6 hours each day over 5 days a week. This includes network training and various forms of trainingsuch as flexibility, strength and conditioning, stamina building, gym and reflexes, fighting, bowlingand playing on the pitch. Even beginners need a fair amount of ball play practice. Usually bowling

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alleys exist to throw the ball to the batter, but if you continue bowling with the same energy, your body gets tired. This is why you need a cricket ball throw that can run continuously at a certain length and speed. Also, the for this ball throwing machine there is need of certain external human efforts to feed ballsinto the machine which is very hectic job for human being to do it for long period of time.

During this pandemic times it becomes necessity maintain the COVID protocol and avoid unwantedgathering of people.

II.METHODOLOGY

1. Conceptual design:

In Auto feeding Mechanism We have used a storage rack to store the balls. The Capacity ofthis Rack is calculated to be 36 Balls. This Mechanism is feasible and easy to use.

Figure 1.CAD Model of mechanism

The storage medium was made of acrylonitrile butadiene styrene (ABS). It is mounted on the ball launcher at an angle of 7°.

This mechanism consists of a 12 V dc gear motor with fins mounted to the shaft. Fins Help put the ball in turn into the Ball throwing machine. An inductive sensor is used to sense a rotation of a DC motor and send a signal to a programmable logic control called a PLC. Power for the PLC is providedby a switched-mode power supply with an output of 8.8A. Three switches are used. When the first switch is turned on, it sends a signal to the PLC and the PLC sends an output according to the programbeing downloaded. A program has been developed in three time periods, i.e., 20 seconds, 30 seconds, 40 seconds. The beep will always sound for 2 seconds at the end of each time cycle. When the time is up, the motor starts to spin and the ball is put into the Ball throwing machine. When the motor finishes one revolution, the induction sensor sends a signal to the PLC and stops the motor and startstiming for the next cycle. If, in the case of a user turning on one or more switches at the same time,an arrangement shall be made so that

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the beeps sound continuously until the single switch or noneremains ON.

2.Closure:

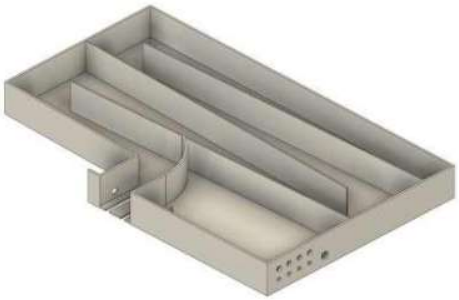
Above chapter briefs us about construction and working of Auto feeding mechanism for ballthrowing machine

III.List of Components –

1.Metal Componant

A. Storage Rack:

Storage Rack is manufactured from acrylonitrile butadiene styrene (ABS). The part is manufactured by using 3D printing process. The reason behind using this material is that this material offers high strength and toughness and also this material comes with glossy and finished look. The dimensions of storage rack are 900*550*90 mm.



B. Motor:

Motor is used to rotate the fins which in turn pushes the ball into the ball throwing machine.Motor specifications:

Type:	DC motor
Max Torque:	4 Kg-cm
Speed:	10 rpm
Voltage:	12 V
Current:	450mA
Weight:	150 gm

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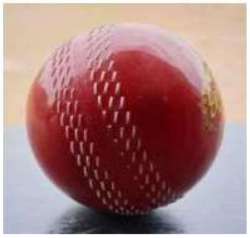
C. Synthetic cricket ball:

The balls which we have used for the designing the Auto feeding Mechanism is SyntheticCricket Ball .



Ball specifications

Diameter: 63 mm

Weight: 70 g

D. Supporting stand:

To support entire storage rack stand is required. The storage rack is made of Mild steel

E. Fin:

For applying motor torque on ball, we have attached Fin on shaft of motor. With the help of thisfin ball is push forward.

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2.Electrical components

A. Programmable Logic Control (PLC)

switched-mode power supply supplies power to the PLC. The negative voltage from SMPS is given to S0.X0 is connected to main ON/OFF switch. X1 is connected to one end of Inductive sensor. While X2, X3, X4 are connected to the three switches. Positive voltage from SMPS is given to the C0. While Y1, Y2 are connected to positive ends of Relay

B. Switched-Mode Power Supply

Specifications: Current: 8.8AmpVoltage:24V

C. Inductive Sensor

It is used to sense one revolution of shaft of DC motor. When DC motor completes onerevolution it is sensed by inductive which in turn sends signals to the PLC.

D. DC to DC convertor

As the output coming from SMPS is 24V and our motor and Beep requires 12V supply we haveuse DC to DC convertor. After converting the voltage, the output of DC convertor is given to motor and beep

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E. Beep

A beep is used to alert the batsman that ball will be delivered in short time

F. Switches

Switches are provided so that user can select any one of the time interval which he/she wants.

G. LED

16 mm LED is being used which indicated which switch is ON/OFF

IV. Calculations

For the proposed Auto feeding Ball throwing Machine we need a dc motor. For pushing the ball into the machine, we need to calculate the required torque.

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a) Torque Calculation

Mass of the Ball (m)=150gm=0.15 kgCoefficient of Friction(μ)=0.4 Diameter of Ball(d)=70mm

Force due to weight= m*g

=0.15*9.81

= 1.4715 N

Normal Force = Force due to weight

=1.4715 N

Force due to Friction = μ* Normal Force

=0.4*1.4715

=0.5866 N

Total Force = Force due to weight + force due to friction

= 1.4715+0.5866

=2.0601 N

Perpendicular Distance=76.75 mm

Perpendicular distance * total force

= 76.75*2.0601

=158.11 N-mm

=0.15811 N-m

The torque required to push the ball into the machine is 0.15811 N-m

We have used Storage rack made up of acrylonitrile butadiene styrene (ABS). Its is required tocalculate quantity of balls that can be stored into the storage rack

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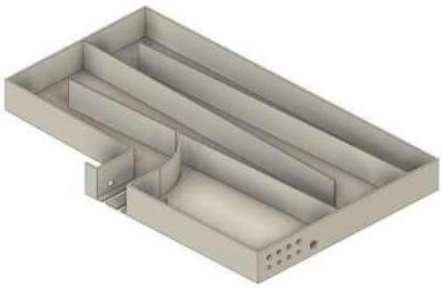
b) Closure:

This chapter briefs about the torque calculation

V.FIGURES AND TABLES

V.1 CAD Model of mechanism



V.2 Storage Rack

V.3 Final Modules

CONCLUSION

➢ Cost of ball throwing machine around 2.7 lack which is too expensive because it developed byforeign manufacturers, but there has no existing machine that has Auto feeder mechanism installed. So that is not affordable to local Academy and institute

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level practice purpose.

- It becomes a hectic job for a person to feed balls one by one into the ball throwing machine. For this purpose, there is a need to affordable Auto feeder Mechanism for Cricket Ball throwing machine

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DESIGN OF MULTI-POWERED SOLAR BOAT

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ABSTRACT

Backwater Tourism is the prime attraction. Diesel engine driven boats are conventionally employed for water transport. The fumes emitted into the water results in water pollution. Incorporation of renewable energy in an electric boat can promote sustainable tourism. The goal of this paper is to design a Multi-Powered Boat for tourist transportation along the coast, rivers, and lakes. Our plan is to develop project guidelines for the construction of a zero-impact boat. Switched Reluctance Motor (SRM) due to rugged construction as well as high performance can be used in electric boats. Solar energy available in plenty can act as the driving source for this motor. Battery bank can supplement the surplus power required depending on the load requirement. So, this hybrid boat is not going to create any environmental pollution objects. As, we are using solar energy which is freely available in nature.

Introduction

Using solar energy to your own advantage is a very old concept and goes back millions of years. All life on earth depends on the sun in some way. Using sun energy to create electricity is also not such a new concept. Research on it began as early as 1839 when Alexandre

Edmond Becquerel observed a photoelectric effect when an electrode in a solution of conductive liquid became charged when in sunlight. In this project I am going to explore the possibility of making a boat that is powered solely from the sun. I will then design and make a working model. It is generally thought that solar power is limited to sunny locations. However, contrary to what most people think, solar panels still can get energy if the sky is overcast but they do not absorb as much energy. Therefore, designing a solar powered boat for the use in The Netherlands is not that farfetched. Currently, there is huge amount of research going into solar power and many new technologies are being discovered. Over the past few years new flexible and light solar panels have been invented and because of those it will be much easier to make a solar powered boat. I have absolutely no previous knowledge of solar power however I do know a fair bit about model boats. Therefore, I am hoping to build on my knowledge of model boats and learn more about using solar energy. Furthermore, by presenting my work I am also hoping to raise awareness in the school about possible alternative energies and the great potential that solar energy has.

Literature Review

These days for fishing and tourist boats, traditional boats are used. Traditional boats are either driven by manually or by using I.C.Engine. For this small purpose ships 2-stroke diesel engine is used. These engines can develop sufficient power to run the engine at heavy load. For the tourists who want to enjoy boat riding for them some paddle boats are available there. But these paddle boats required more power to drive it and not convenient for long distance.
Also, Tourists' transport along the coast, in the rivers, in the lakes, can be performed on route well-defined and carried out with boats that sail at low speed. In these days, boats are available in many shapes and sizes and are multifunctioning. But the main problem with this boat is they are operated on engines and therefore leads to the pollution of air, water and more danger to the water species and ultimately it contributes to the global warming and water pollution [1-5]. So, the solar boats are going to be the best replacement for these boats.

Problem Statement

This project is intended because of following points:

1. The increasing impact of fuel price in the global market is one of the factors that motivate people to find new alternative energy to substitute usefulness of fuel.

2. As we know, the solar panels cannot be used at night because there is no sunlight to produce it; however, this problem can be solved using rechargeable batteries that can supply current to the electric motor of solar boat at night.
3. The selection of electric motor must be exact and applicable to the boat.

Objectives

1. The project is related to store and use the freely available solar energy.
2. To reduce stress on the use of fuel by using solar energy/ any renewable energy.
3. To make sea-shore tourism more comfortable and profitable.
4. To deduct the impact of increasing fuel price on the shore tourism, lake tourism, and other water tourism businesses as well as on the businesses related to the water resources.

Methodology

- To design the solar boat, we first collected the data of boats which are in use currently like their shape size, etc.
- After taking suitable measures we designed a prototype model on CATIA software.
- Later, we analysed the model and calculated actual dimensions.
- After deciding dimensions, we started manufacturing an outer body of a ship.
- We have used the metal sheets to create an outer side of a ship body and used arc welding to join the metal angles.
- After designing an outer body, we started working on solar plates and battery arrangement and other shaft assembly.
- Later, the main problem was leakage of water in the boat, and we solved that problem by filling silicon in the boat where the water was leaking.
- Assembly of the propeller and the battery.
- Installation of steering arrangement.
- Final testing of the boat in actual water.

Performance Analysis

1. Motor- 1.5 HP (As we are using 4 panels means 900 watts & 1 HP=750 watts; so, 1.5 HP motor is sufficient)

2. Drive- Chain and Sprocket assembly (a chain and sprocket drive is a way of conveying power to the wheels of vehicle.)
3. Battery- 4 batteries of 12 volt each and 28 Ah. (As sufficient for the load
4. Charging- 1. Electric 48 v (direct charging and charge SMPS is available in market)
   2. Solar Panel 100 watts NCB solar panel
5. Max speed of boat – 20km/hr(approx.)
6. Lifetime – Min. 5 years duration
7. 4 Solar Panel used – 100 watts 12 Volt

Calculation

We know that, 1HP=750watts

Formula of *I*=w/v

*I=440*3850/440*

I=8.75A ……(v = 440 fixed v)

W=8.75*440

1.5HP=900w

Motor=1.5HP

Wattage=900watt

900w = 48v

RPM : 1.5hp=2800rmp

2800rmp to convert 900rpm

900*1/3=300rpm……..(appx.)

Amps = Watts / Volts

A=900/12v

Amps=28A

Panel measures
6.5 x 3.2=20.8
Area=20.8s.f
Power formula
P=total area*solar irradiance*conversion efficiency
$E_{panel}(kWh) = P_{panel}(kW)*Time(hour)$
P=900w
Total Capacity of Boat
T=Total weight of boat+Panel weight+external weight
T= 250+25+400
T=675kg……..(approx.)

Note: Area all requirement of small scale power plant 1kw 12sq.

Designing Work

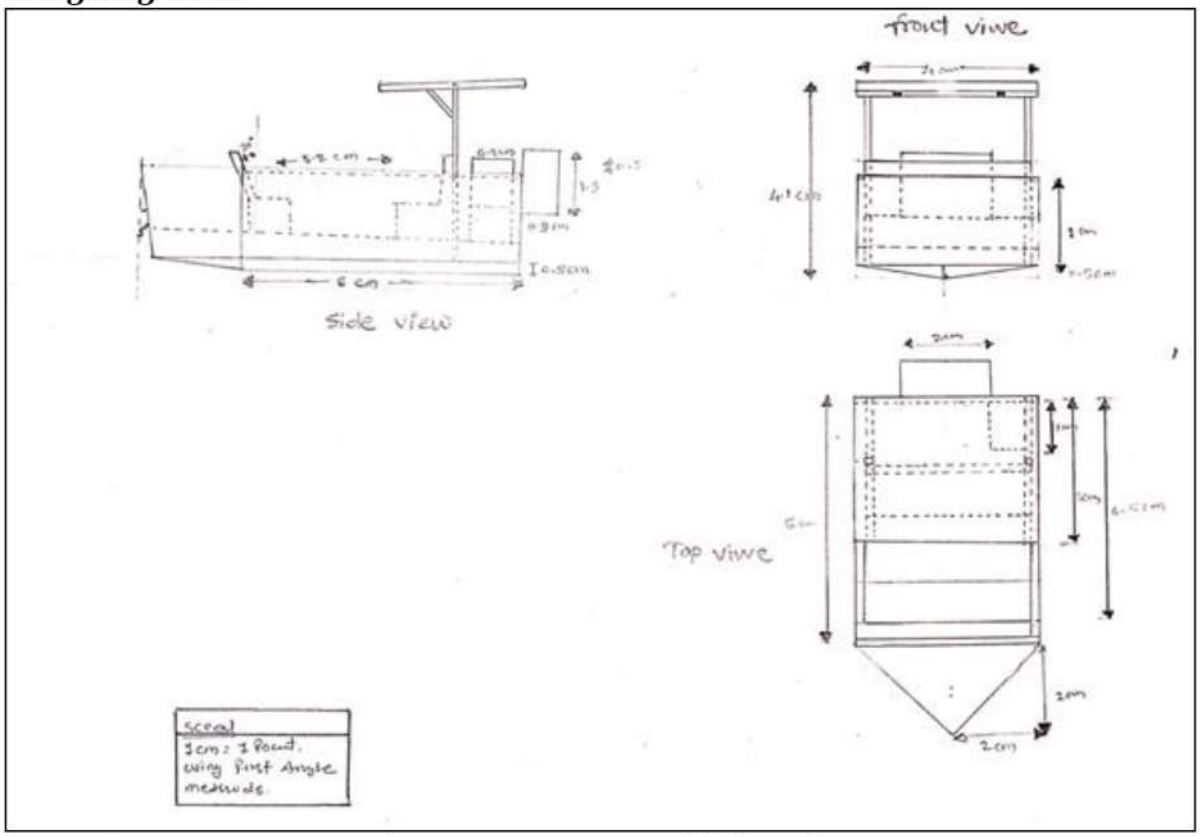

Figure 1: On Paper Graphical Design

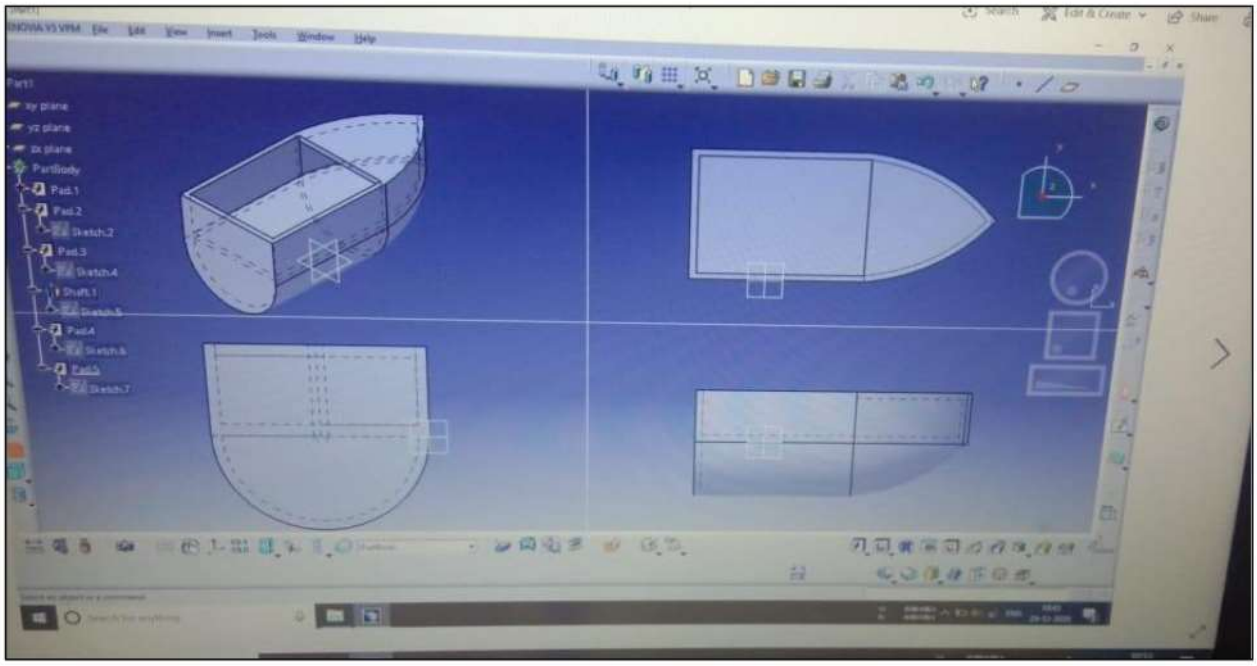

Figure 2: Design on CATIA V5 Software

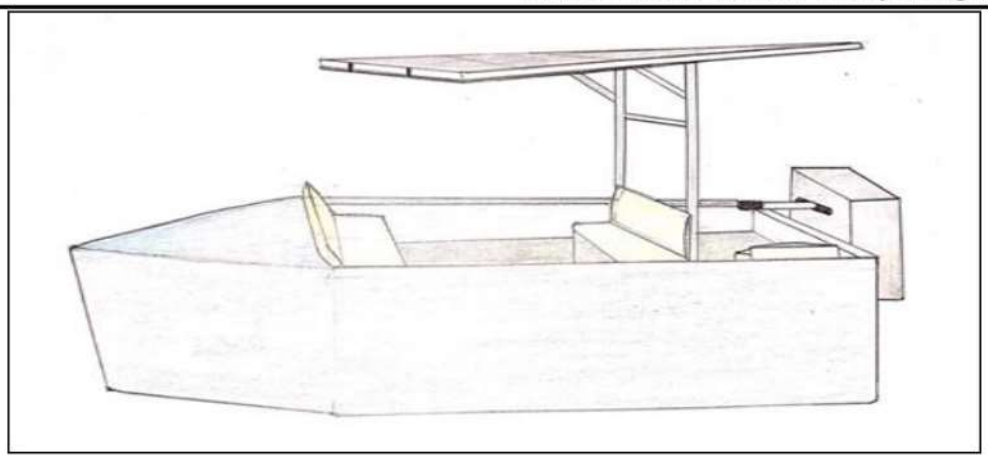

Figure 3: 3D Design on Paper

Conclusion

- This solar powered boat will put advancement in the fishing industry and also has no bad effects like global warming.
- The solar power is the most efficient in daylight and can generate full voltage depending on the capacity of solar panel used.
- Electricity produced by photovoltaic cells is safer as well as more environment friendly than that of the other conventional sources of energy production.
- This boat will make a huge change in the traditional method of boating as well as in light weight material transportation.
- Over the past few years, the need for environment preservation consciousness and awareness has been felt worldwide. Solar energy is a prodigious renewable energy source, which has enormous energy existing as heat and light, convertible into electricity.

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MULTIPURPOSE FERTILIZER SPREADING MACHINE: DESIGN AND FABRICATION

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ABSTRACT

The paper provides information on the different types of new developments in manure dispenser which are available these days. Fertilizer spreading machine is an important tool in the agriculture part. The modern era is marching towards rapid growth in all sectors including the agricultural sector. Meet the next meal Demands, farmers must adopt new strategies that will not interfere soil texture however will increase overall crop production. This paper is interactive with various throwing of the fertilizer methods used in India to distribute the fertilizer machine. Comparison between traditional dumping of the fertilizer method and proposed new machine, which can make a price simultaneous operation and has a number of benefits. Fertilization of land is one of the important and common procedure before the cropping of seeds this work is carried out mostly by the machineries and labours which will include the cost for fertilization process for big and large farms it also become costly and time required to do also more. The main objective of our multipurpose fertilizers spreading machine is to reduce time and cost for fertilizers process by reducing the human efforts. Along with Fertilizers we can spread seeds as well. As daily activity availability becomes a major

concern for farmers and labour costs are higher, this machine reduces the total effort and cost of composting the throwing of throwing fertilizer and manure. In this work, we are discussed about multipurpose fertilizer spreading machine.

Keywords: Hopper, Bevel Gear, Wheel, Chain sprocket, Flexible Pipes.

Introduction

Agriculture has always been the backbone of India's continued growth. As the population of India continues to grow, so does the demand for production. Therefore, there is a great need to grow more crops on farms and this requires efficient and time-saving equipment. This paper discusses the different types of fertilizer spreading machines that will help the agricultural industry to move forward with the use of mechanical gadgets. A multipurpose fertilizer spreading machine is a tool that helps to dispose of manure and seeds in the farm. The desired position thus helps farmers save time and money. Basic the purpose of throwing a fertilizer operation is to put seeds and fertilizers in rows the desired depth and the seeds to the seed holes, cover the composting with the soil once give proper density over seeds. The paper discusses various aspects of a spreading machine that will help the agricultural industry move forward machine. The agricultural industry has always been the backbone of India continued growth. As the Indian population continues to grow, the demand for productivity is growing too. Therefore, there is a great need for more cutting in farms and this sequence requires highly efficient and powerful equipment. The machine India's agricultural sector is still in the growth phase due to shortages knowledge and unavailability of state-of-the-art equipment and equipment. According to tradition ways the fertilizers are spread by manually by labours.

Literature Survey

Mahesh R. Pundkar and A. K. Mahalle [1] presented the review provides a brief overview about the different types of innovations made in the manure spreading machine available planting machine. It is an important part of agriculture. Device performance has a dramatic impact on the cost and profitability of agricultural products. Right now there are many ways to see what it is the application of seed fertilizer application fertilizer. Sowing depth is shown an important factor affecting seed strength and crop yield. The seed measuring device is the heart of a fertilizer distribution machine tested for seed grade, seeds size between seed varieties. High precision air containers are made in many species of plants, in many species of seed sizes, which leads to matching throwing of fertilizer distribution along the way, in separating seeds. Laukik P.Raut [2] studied to meet the nutritional needs of growing population and industrialization rapidly, agricultural development is inevitable. The use of equipment allows you to save inputs with precision meter to ensure better distribution, reducing the amount required for better turnaround to prevent the loss or damage of installed items. Using equipment reduces unit costs for high productivity and input saving. Farmers use the same methods and equipment for years.

Objectives

1. To investigate various types of fertilizer distribution machine.
2. To develop a solar fertilizer spreading machine.
3. To experiment the developed solar fertilizer spreading machine in the agricultural farm.

Methodology

Following steps are followed for designing and fabricating the multipurpose fertilizer spreading machine:

Research

In our country, farming is done in the traditional way, be aware of the fact that there is a great development in industry and the resource sector compared to agriculture. Fertilizer spraying is traditionally done by carrying a backpack sprayer that requires a lot of human effort. Cultivation is usually done with the help of Bulls which results in high costs for farmers who have a small amount of arable land. So in order to overcome the two problems above, we have tried to eliminate these problems and designed tools that will be helpful to the farmer in the process of throwing and plowing.

Selection of Spreading of Fertilizer and Planting Machines

Various fertilizer distribution projects improved crop manure disposal. The basic difference between the machine and the human work is the accuracy of the work and saves time and cost in the work. Therefore, it is important to choose a machine with a unit for measuring the plant and soil conditions.

Selection of Components

On the basis of above study, we selected the components required to hopper, bevel gear, wheel, chain sprocket, flexible pipes etc. Further we worked on the selection of specification of component which is required to run the project.

Manufacturing Process of the Machine

- Measurement of the material required dimension
- Cutting operation as per dimension
- Machining operation on required parts
- Welding the material as per dimension
- Assembling the parts of machine

Rotating Disk:

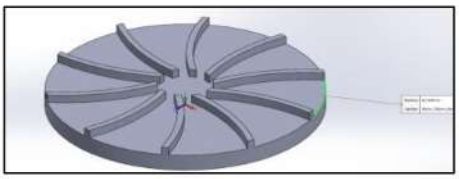

Figure 1: Rotating Disk

Fertilizer spreader is a piece of agricultural equipment people can use to apply even, aerated coats of fertilizer to lawns, beds, and fields. Fertilizer spreaders can come in the form of tractor attachments or standalone devices and are readily available through agricultural suppliers and gardening stores.

- Rotating disc is look like impeller.
- Rotating disc is mounted on motor shaft.
- Hopper opens on rotating disc eccentrically and due to centrifugal force fertilizer spread in farm.
- Wood is used for making a rotating disc.

Hopper:

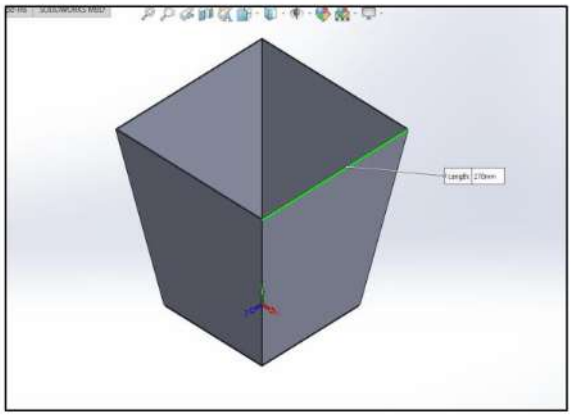

Figure 2: Hopper

Hoppers are used for the temporary storage of materials. It is having storage capacity up to 20 kg which is loaded on the frame and hole is provided at bottom in which ball valve is fitted for controlling flow of Fertilizers.

- Hopper is used to keep fertilizer.
- Hoper is used for convey the fertilizer to the rotating disc.
- In this machine material used for hopper is PVC.
- At the lower end of the hopper short PVC valve is attached
- Flow control mechanism is provided in hopper.

Chain and Sprocket Mechanism:

Figure 3: Chain and Sprocket Mechanism

Chain and sprocket mechanisms perform the same task as a belt and pulley system, i.e. they transfer motion and force from one shaft to another. A belt can slip on a pulley but the teeth on the sprocket prevent the chain from slipping. Chain and Sprocket Mechanism connected with Bevel gear mechanism.

Bevel Gear Mechanism:

Figure 4: Bevel Gear Mechanism

Bevel gears can be used in mechanisms to change the axis of rotation. Although they can be designed to work at other angles, they are most often used to change the axis of rotation by 90 degrees. Similar to spur gears, bevel gears may also feature straight or helical teeth. Bevel gear connected between chain sprocket and rotating disk.

3-D Model

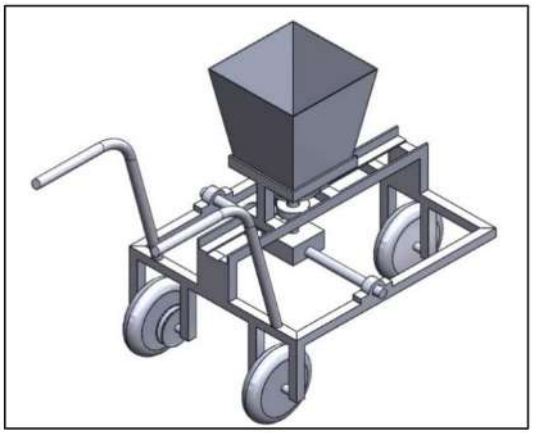

Figure 5: 3-D Model

CATIA V5 (Version 5) is primarily a CAD software used for parametric and non-parametric modelling. It is capable of working alongside products with different brands. CATIA V5 is modular, meaning customers can buy as much or as little functionality as required. We have designed the total model of our project on CATIA V5 Software.

Actual Fabricated Model

After fabrication of each part, we started to assemble all the components.

Figure 6: Actual Assembly

Figure 7: Front & Top View of Fabricated Model

When the equipment is push forward by using handles, the rotary motion of the horizontal bevel gear is transfer to vertically due to this arrangement. Front wheel rotates and the gear is mounted at the rear axle of wheel is start to rotate and its rotation is then transferred to the vertical bevel gear. A circular disk with impeller pattern mounted on vertical bevel shaft which will start rotating and plastic ball valve will control flow of fertilizers falling on

circular disk from hopper then it will be drop on the disk. Disk will spread it. Spreading speed depend on operating speed and opening of valve.

Components and Their Specification

Table.1: Component and specification

Component	Purpose	Specification
Hopper	Fertilizer storage bucket	20 kg
Bevel Gear	Power transmission to rotate spreader mechanism	12:20
Wheel	Spread mechanism loaded and connected with chain drive for moving forward and backward	Diameter 25 cm
Chain and Sprocket	transfer motion and force from one shaft to another shaft	1:1

Conclusions

Our project has been successfully implemented for a fertilizer distribution application. The machine is designed with the intention that farmers with small plots of land say 5-6 acres. It is ready to be distributed at low cost to the farmer so that he can afford it. The equipment will be of great benefit if it is placed in wet soil for the purpose of planting it, due to the wet soil the weed cutter can easily penetrate and dig the soil thus easily completing the fertilization process. The efficiency of the machinery will increase if it is operated on a smooth surface or in an uneven area and will work best when used on plants of about the same height and with less space between the two plants.

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DESIGN AND DEVELOPMENT OF ONION SEGREGATION MACHINE

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ABSTRACT
Onion is an important vegetable crop which is seasonal in production but grown all over the India. According to journey of market six of bulbs plays an important role in its price large size onion bulbs produced in Gujarat, Maharashtra, Karnataka & Tamilnadu and are exported from Mumbai & Kolkata ports to Dubai, Kuwait, Saudi, Singapore. Small size onion bulbs produced in Karnataka & Andhra is exported from Chennai to Singapore, Srilanka and Other countries while medium bulb type onion stored for long term storage. Roller segregation is fast & accurate but a little damage to bulbs. Literally it is solution over consuming, labor intensive which improves economic considerations of farmer. Grading of onion bulb is usually important steps in processing operations which brings overall improvement not only in Marketing system but also in raising its quality. In India traditional method is followed which is manual segregation. Onion grades were developed but that cost more than usual & is not affordable by ordinary farmers. So, keeping in view we have designed onion segregator based on chain arrangement.

Keywords: Segregation, Onion Bulbs,PLA, 3D Printing, Onion Graders.

1. Introduction

Onion is one of the important crops cultivated in India. India is the second largest producer of onion in the world.

Improvement of quality and value addition of agricultural produces has gained higher concern in recent times in India due to creation of new opportunities for sale of agricultural commodities in open market at competitive prices. Until now almost everywhere in India, the onion segregation is done manually.

This manual segregation increases the cost of onion tremendously to customers and to producers. The manual segregation also needs more labour. Now the need of automation arrives in the agricultural sector also due to the higher competition from across the globe. So, we have to increase the quality and efficiency of the segregation process. This type of new ideas will surely help a lot of people, to focus back to agriculture and this will lead to new innovations in the agriculture sector. Segregation according to the sizes is an important value adding technique for most agricultural products. And also, the price of the many agricultural products varies significantly according to their uniformity in size. Uniformity in size not only makes the product more attractive to consumers but also improve its processing qualities. In order to achieve uniform size of onion the proper segregation is required, with the aid of automation that goal can be achieved.

A simple, manually operated machine is designed and developed for grading onion bulbs. The grader was fabricated in the Arunoday Enterprises, Kolhapur. The following factors were considered while developing the grader: (a) Suitability of machine for the grading of onion bulbs in the fields. (b) Ease of operation and maintenance. (c) Energy efficient and low cost of operation. (d) Minimum damage to bulbs.

The developed prototype On-farm Onion Grader Unit consisted of (i) Feed hopper, (ii) Rollers, (iii) Collection unit, (iv) Mainframe

Feed hopper

The horizontal section of feed hopper is rectangular in shape and is fabricated out of PLA Polylactic Acid of 5 mm thickness. The hopper was inclined for smooth delivery of bulbs over rotating rollers.The feed hopper was mounted on the main frame to feed the onion bulbs on to the grading unit.

Collection unit

The Collection unit partitioned into four compartments on one side. The first compartment was located from the start of feed end of the roller, while the second and the third and fourth compartment were provided at some distances respectively, from the feed end to the rear end. This was arranged based on the required grade of onion and space between the rollers available above the compartment. The overall dimension of the collection unit is measured in millimetres. The collection unit is provided with vertical dividers to guide the bulbs in appropriate compartments.

Main frame

The feeding hopper unit and the collection unit all are assembled on a structural frame. The main frame of the machine was fabricated out of rectangular bar mild steel. The machine is having length of 30-inch, width of 7 inch and height of 15 inch. We have assembled some of the parts with each other with the help of glue gun.

Roller

There are four rollers which are mounted on the four shafts. These shafts are mounted parallelly. Over the first roller we have made holes of diameter 15 mm, 25 mm diameter holes over second roller, 35 mm diameter holes over second roller, 45 mm diameter holes over second roller for the purpose of separation of onion through holes.

Material Selection

PLA

1. PLA material boasts high strength and stiffness, comparable topolystyrene (PS) at room temperature.
2. Energy consumption by PLA while production is less than other plasticand greater thermal processing capabilities.
3. It is a thermoplastic which means it can be reheated several times withoutany significant change in the mechanical properties.

ABS

1. High impact strength and ductility, which combine to give exceptional toughness.
2. Good chemical resistance.

3. Design of Machine

CATIA V5 (Version 5) is primarily a CAD software used for parametric and non-parametric modelling. It is capable of working alongside products with different brands. CATIA V5 is modular, meaning customers can buy as much or as little functionality as required.

We have designed the total model of our project on CATIA V5 Software.

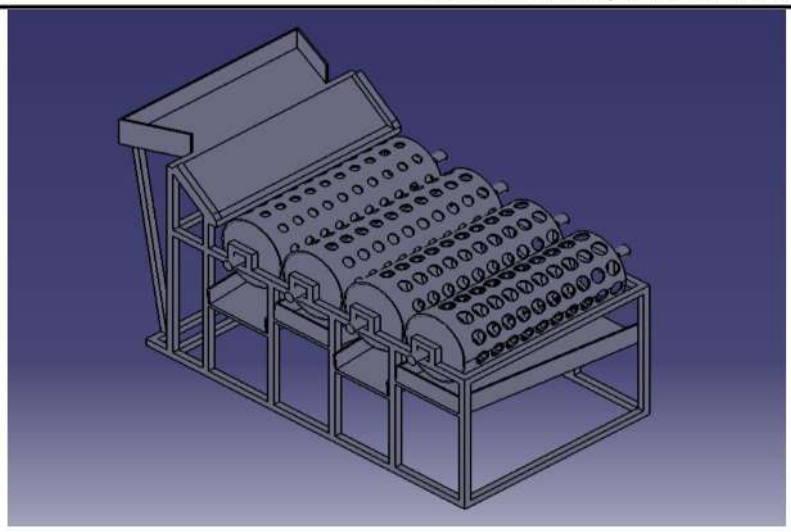

Figure 1: Design of Machine on CATIA V5 Software.

3.Development of Machine

Rollers

Rollers of the machine are made using material called PLA (PolylacticAcid).

Figure 1: Different Types of Rollers.

Figure 2: Top View of Machine

Figure 3: Front View of Machine.

4. Result and Discussion

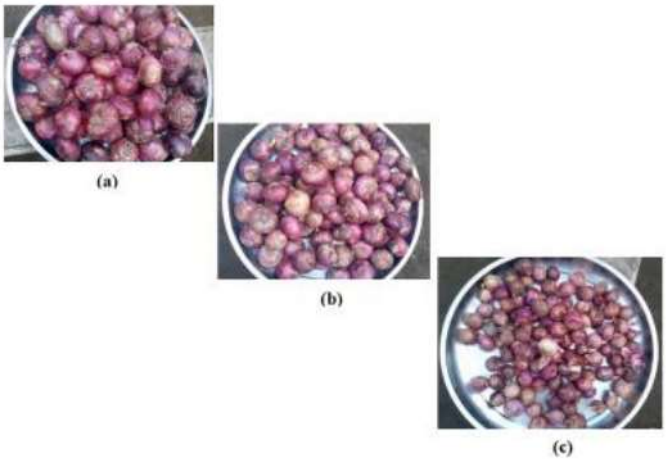

Figure 4: Result after Sorting.

The first roller separates the onion having diameter size less than 15 mm, second roller separates the onion having diameter size less than 25 mm, third roller separates the onion having diameter size less than 35 mm and fourth roller separates onion having diameter size less than 45 mm.

The percentage of feed collected and percentage of target onion size collected from a particular outlet was calculated by using the following relationships:

Feed collected (%)= (Weight of onion in the outlet (kg) /Weight of feed (kg)) * 100

[Target onion size collected (%)] = Weight of target size collected in the outlet (kg) / Weight of onion in the oulet (kg) x100

Bulb damage

The mechanical damage to onion bulbs during grading operation was determined by visual observation.

The graded bulbs were manually sorted for damage of bulbs due to abrasion and the weight of total damaged bulbs collected in each outlet was noted. Thereafter, the damage percentage was computed using the following relation:

Mechanical damage (%) = (D/W)×100

Where,

D = Weight of damaged onion bulbs in all outlets, kg

W = Total weight of onion bulbs in all outlets, kg

Grading capacity

The grading capacity of the onion grader was estimated by weighing the total onion bulbs collected per unit time from the all outlets of the grader and was calculated by using the following relationship:

Grading capacity (kg/h) = Weight of onion bulbs collected in all outlets(kg) / Grading time (h)

5. Conclusions

An efficient, fast, precise and automatic system for Grading of different varieties of onions. It can be an alternative to the traditional methods with better productivity and effectiveness. We have developed and implemented a working model of onion grading machine successfully with very effective performance. From this model of onion grading machine, we have studied many the mechanical concepts which comes under this project.

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Fabrication of Micro-channels using CO_2 LASER Machining & Soft Lithography for Lab-on-Chip Applications

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ABSTRACT

Microchannels are one of the most significant parts for the Lab-on-Chip applications. The microchannels fabrication is a crucial task. The Soft Lithography is one of the most favored methods of microchannel fabrication. The use of CO_2 LASER machining for microchannel fabrication using Acrylic sheet is studied in this paper. The experimentation is carried out to see the effect of LASER scanning speed and laser power on the depth of the microchannel mold. It has observed that the channel depth is increasing linearly with increasing LASER power and decreasing with increase in speed. The straight microchannel configuration with Y shaped inlet having circular & elliptical obstacles has been fabricated using CO_2 laser machining on acrylic sheet. Also, the fabricated molds are used to prepare the further microchannel molds using the Soft Lithography technique and then the microchannels prepared from Soft Lithography are used as a mold for the lab-on-chip applications like check the mixing length & mixing phenomenon etc.

Keywords: CO_2 LASER, Soft Lithography, Acrylic Sheet, Micro-Channel, Molds, Lab-on-chip.

1 Introduction

Now a day's micro total analysis systems (μTAS) play significant role in many of the applications and Microchannel is one of the prominent part of these systems. The Microchannels are having applications in various fields like medical, diagnostics, chemical, biological, etc. [1][2]. The Microchannels can be fabricated by using the Acrylic material more economically and efficiently as compared to other materials like Polymers, Silicon, and Glass. Due to low cost and straight forward fabrication these Microchannels are mostly used in Engineering and Medical applications [3] [4] [13] [15]. There are various methods to fabricate the Microchannels such as hot-embossing [5][6][14] injection molding [7] micro milling [8] infrared laser ablation [9] Photo chemical machining [10] [11] [12].

The CO_2 laser machining is mostly suitable for fabrication of Microchannels or molds of it [16]. The use of CO_2 laser machining not only speeds up the fabrication process, also there is flexibility to change the channel design as per the requirements. The CO_2 laser machining is very more useful for micromachining [17]. The use of CO2 LASER machining for microchannel fabrication using Acrylic sheet is studied in this paper. The experimentation is carried out to see the effect of LASER scanning speed and laser power on the depth of the microchannel mold. It has been observed that the channel depth is increasing linearly with increasing LASER power and decreasing with increase in speed. The transparent acrylic sheet is used for the fabrication of molds using LASER machining. The straight Microchannel configuration with Y shaped inlet having circular & elliptical obstacles has been fabricated using CO_2 laser machining on an acrylic sheet. Also, the fabricated channel molds are used to prepare the microchannel using the Soft Lithography method

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and then the microchannels prepared from Soft Lithography are used as a mold for the lab-on-chip applications like check the mixing length & mixing phenomenon etc.

2 Materials and Methods

The acrylic sheet is commonly used material for various applications. We have used this material (an acrylic sheet) in transparent shown in figure 1 below from for fabrication of microchannel molds or directly microchannels. The channels fabricated from this material will be used for lab-on-chip applications. The CO_2 LASER machining process is used for fabrication of molds using acrylic sheet and. The Soft Lithography is also one of the techniques used for the fabrication of channels or molds. The molds fabricated from laser machining are also be used in the Soft Lithography techniques based on requirement of channel in lab-on-chip applications. As per the requirement we can use any mold or channel fabricated from LASER machining and the Soft Lithography.

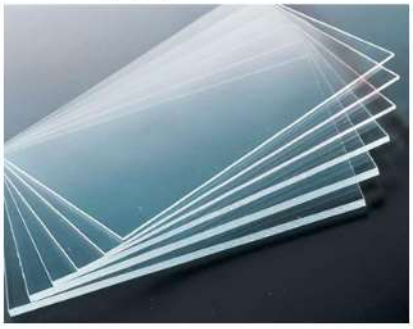

Figure 1: Acrylic Sheet

3 Fabrication of Micro-channels or Molds using LASER Machining

In the Laser cutting technology laser is used to cut the materials and mostly used in industrial applications. Laser machine works by giving high laser power as an output through computer and then it cuts the material as per design. The melting of material taking place and leaving the edges with a high surface finish. This machine can cut the various materials like acrylic, paper, pressboard, rubber, fiberglass wood, plastic, cloth, leather etc.

Thus, the CO_2 LASER machining is mostly useful for micromachining. The use of CO2 LASER machining for microchannel fabrication using Acrylic sheet is studied in this paper. Then, the detailed experimentation is carried out to check the effect scanning speed and laser power on its depth. It is observed that there is increase in depth of channel or molds, when laser power increases and vice-versa.

Figure 2: CO_2 LASER Machine

The above figure 2 indicates the CO_2 LASER machine used for the microchannels or molds fabrication. The acrylic sheet will keep cutting or engraving area of machine. The input will be

given through computer as image or Auto-CAD or CATIA drawing. We have to set required cutting laser power and travel speed through same computer and the fabrication is carried out as per given inputs and molds or channels are fabricated.

3.1 Design of Micro-channel or Molds

The following figure 3 indicates the drawings (with dimensions in mm) of microchannels with different configurations (Y type channel with Circular & Elliptical obstacles). This drawing will be given as a input to the machine and accordingly the fabrication will be carried out on acrylic sheet.

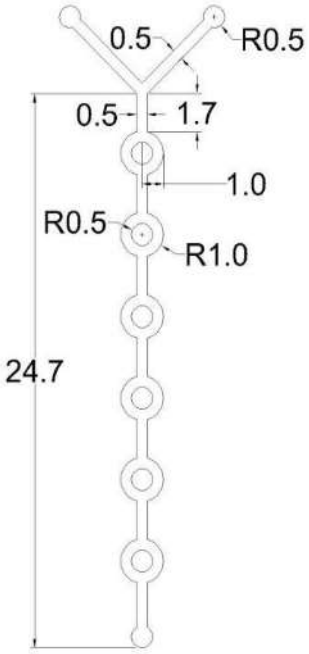

Figure 3: Microchannel with Circular Obstacles

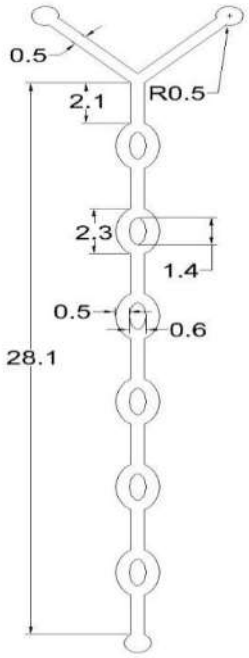

Figure 4: Microchannel with Elliptical Obstacles

3.2 Fabrication of Micro-channels or Molds using LASER Machine

Laser machine works by giving high laser power as an output through computer and then it cuts the material as per design. The following micro-channels shown in figure 5 & figure 6 with Circular & Elliptical obstacles are fabricated using LASER machining process and using following selected parameters on LASER machine.

Table 1: Performance Parameters of LASER Machine

Width of Channel	Scanning Speed	Laser Power	Depth of channel Achieved
0.5	100	60	0.516
	100	40	

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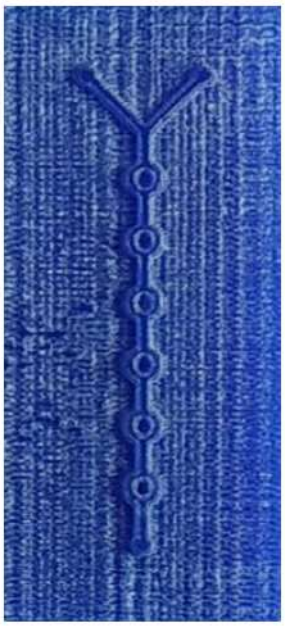

Figure 5: Fabricated microchannel or mold with Circular Obstacles

Figure 6: Fabricated microchannel or mold with Elliptical Obstacles

4 Fabrication of Micro-channels or Molds using the Soft Lithography

The Soft Lithography process includes fabrication channel or mold using Polydimethylsiloxane (PDMS). After the CO_2 fabrication of channel or mold it is filled by PDMS and then degassed in vacuum designator to remove the sir bubbles. Then, the PDMS solution is cured at room temperature or by baking in oven. After cooling, the PDMS mold can be peeled off from the mold and it will be used for micro molding. The detailed soft lithography process used for fabrication of channels is shown by following figures 7 & 8.

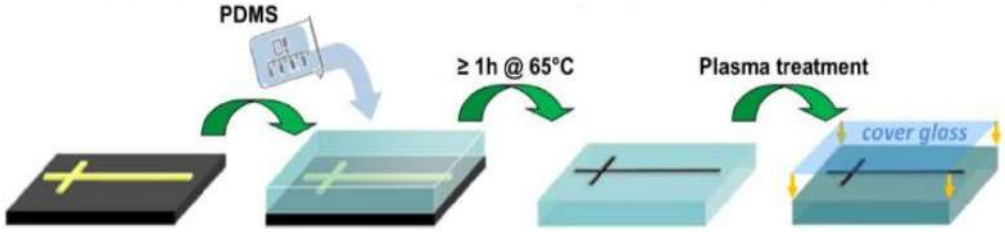

Figure 7: Soft Lithography Process for Microchannels fabrication

Figure 8: Pouring of PDMS during fabrication of Microchannels using Soft Lithography

5 Conclusions

The Microchannel is one of the essential components for Lab-on-Chip applications like biological, medical and chemical applications. The fabrications of Y-shaped micro-channels are carried out using Laser machining with circular & elliptical obstacles is straight microchannel or molds. The fabrication is carried out for given dimensions. The depths recorded as around 0.5 mm. The fabricated molds from laser machining are used the soft lithography process for fabrication of PDMS micro-channels.

The Y-shape micro mixers with two different geometries such as circular and elliptical have designed. CO_2 Laser Machining is used for mold making of micro mixer. The Y-shape PDMS channel with circular and elliptical obstacles will be used for further experimental analysis or testing in Lab-on-Chip applications.

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Parametric Influence Study for Laser Cutting on Acrylic

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ABSTRACT

Laser has been employed for producing the complex specimens very efficiently and magnificently. The use of acrylic components is becoming prevalent day by day. Hence it is required to study the various machining techniques for engraving or cutting of acrylic material. The one of the non-traditional machining processes which can be employed efficiently for machining of acrylic is CO_2 laser machining. The parametric study of acrylic materials by using CO_2 laser machining is discussed in this paper. The scanning speed and the laser power were considered as process parameters and the influence of these parameters is studied on the depth as response measure. The engraving depth is observed to be increasing with increase in power and noted to be decreasing with increase in the scanning speed.

Keywords: CO_2 laser machining, acrylic, laser power, scanning speed.

1 Introduction

The use of non-conventional machining processes is continuously increasing day by day due to growing demand for machining accuracy, quality and efficiency. CO_2 laser machining can be effectively used for engraving the different shapes on metals, acrylic and woods. There are other techniques also available like CNC engraving, milling, etc. The conventional methodology like hand graving using knife or some other tools is time consuming method and also less accurate for producing intricate parts or shapes.

For a cutting metal and non-metallic Material, CO_2 laser is acting as an appropriate tool which is frequently employed in industry. It's application in the non-metals extends in acrylic cutting and engraving, wood material cutting and engraving, etc. The advantage of CO_2 laser cutting is its capability to produce complex shapes easily with at micrometer scale [1-6]. Various researchers have reported the similar type of study using different non-conventional machining processes like photochemical machining, laser engraving, laser cutting for the fabrication of different components like microchannels, microchannel heat sinks, micro components, etc. [7-20]. CO_2 laser machining is efficient not only in speed but also in accuracy. So, CO_2 laser machining is useful for fabrication micro channel. The parameters reported in CO_2 laser machining were laser power, scanning speed, etc. In this paper, the square shaped geometry is manufactured with the help of CO_2 laser machining with six different parametric combinations.

2 Materials and Methods

The methodology is explained in Figure 1.

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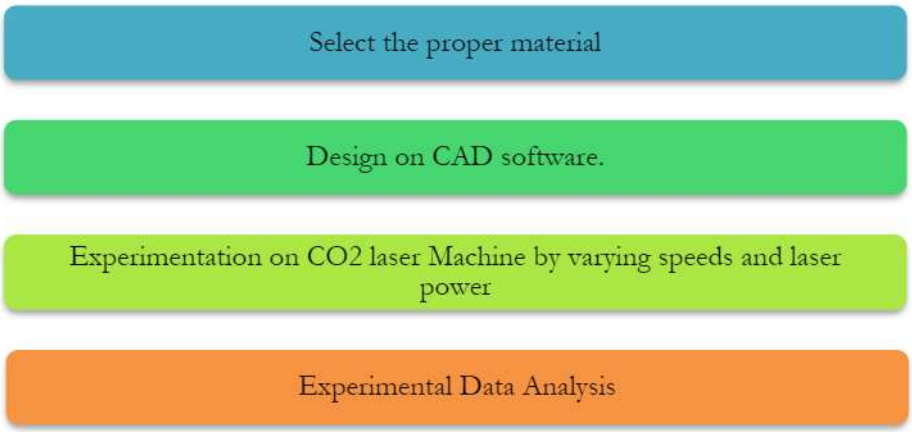

Figure 1*: Methodology*

- **Material:** In this research, the material used was acrylic having thickness of 2 mm. It's Chemical formula is $(C_5O_2H_8)n$. The properties of acrylic material are mentioned below:
  - Acrylic material having good impact resistance.
  - Acrylic Material is light weight.
  - It also UV radiant.
- **Design on CAD Software:** At first, the design of the required configuration is prepared with the help of two-dimensional drawing in AutoCAD software. The designed diagram is acting as an input for a CO_2 laser machining. The CO_2 laser cut machining takes input as 2D CAD drawing in dxf format and it analyses the path of channel which is given in CAD drawing.
- **Experimentation:** The CO_2 laser machining setup is as depicted in figure 2. The CO_2 laser is a multi-gas laser cutting machine. It mainly uses carbon dioxide, nitrogen, hydrogen and helium gas. This gas combines to form a laser beam. It can work on wood, plastic, metals. When power is supplied to the machine light is formed in it and the same light passes through the tube containing gas. There are mirrors on both sides of the tube. With the help of this mirror, they pass through the resonator that generates light energy in the beam and this beam comes to the nozzle with high intensity and collides on the acrylic sheet. As soon as the input is given, the machine starts working with the help of laser and the output is observed as the somewhat small cut on acrylic, The CO_2 laser cutting is performed selecting the values of power and scanning speed parameters.

Figure 2: *CO_2 Laser Machining Set-up*

The specifications of CO_2 Laser machine is as given below:

1. Model- TIL6090
2. Laser Type Sealed Hermetic CO_2 Laser Tube
3. Laser Power 60W/80W/100W
4. Engraving Area 600 x 900 mm
5. Accuracy± 0.025 mm
6. Power Supply220 V±10%/50HZ.
7. Gross Power1800 watt. Approximate
8. Cutting Speed 500 mm/s (Max)
9. Engraving Speed 500 mm/s (Max)

Experimental Data Analysis: By using digital micrometer, the depth of cut is measured and the readings at different laser power and laser scanning speeds are recorded and further analysed.

3 Results and Discussion

CO_2 laser machining is performed on acrylic sheet varying the laser cutting machining parameters like power and scanning speed. The sample specimens after CO_2 laser machining are depicted in Figure 3

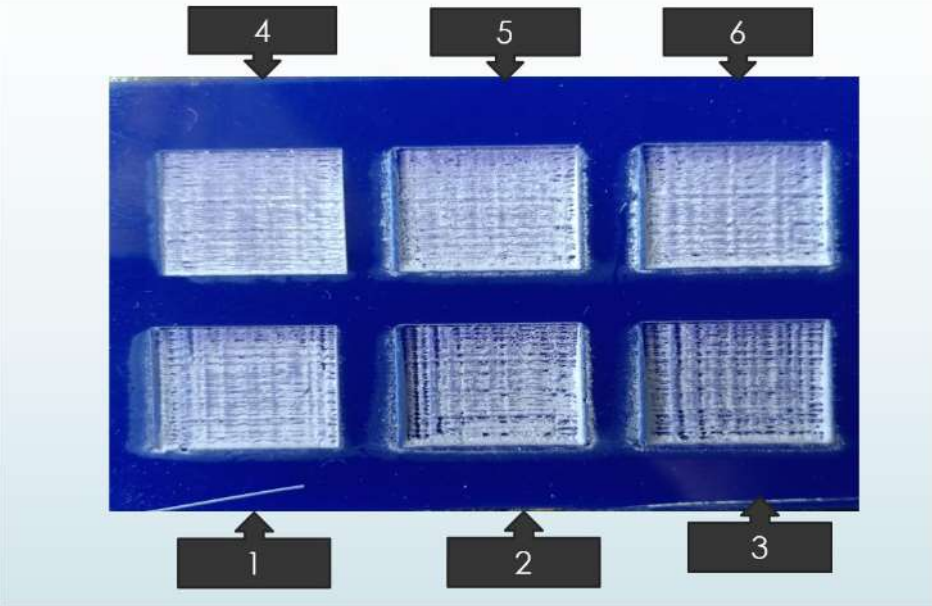

Figure 3: *Sample specimens*

The experimentation details with the recorded depth for various speed and power combinations are presented in Table 1.

Table 1: *Recorded depth for Speed and power combinations*

Expt. No.	**1**	**2**	**3**	**4**	**5**	**6**
Speed (mm/sec)	100	100	100	150	150	150
Power (Watt)	30	60	90	30	60	90
Depth (mm)	0.254	0.368	0.527	0.195	0.274	0.416

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It is observed from the table 1 that as power increases the depth also increases. Further, the depth is noted to be decreasing with increase in the scanning speed.

4 Conclusions

The parametric influence study for CO_2 laser machining on acrylic material is carried out and based on the experimentations, the following conclusions are drawn:

- Higher the intensity of power then greater the engraving in acrylic and increases depth of cut.
- As the scanning speeds increase, engraving on acrylic decreases and also depth of cut decreases.

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Estimation of Settlement of Stepped Pile in Granular Soil

Ravikant S. Sathe, Jitendra Kumar Sharma & Bharat P. Suneja

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Abstract

Pile foundation is a mostly used type of deep foundation to transfer superstructure load into the subsoil and bearing layers. However, accurate prediction of the elastic settlement of pile is difficult concerning complicated pile–soil interaction phenomenon. The present paper deals with the analysis of single and double-stepped pile and proposed evaluation are conducted with the aid of finite element software PLAXIS 2D. In this analysis, load-settlement behaviour of a single conventional, single stepped and double-stepped pile is evaluated in granular soil. For the single conventional pile, single stepped and double-

stepped pile, the parameters like the total volume of the pile, the total length of pile, the deformation properties of surrounding soil and pile kept constant for all the cases to study the variation in behaviour. In the double-stepped pile, the diameter of the pile for upper, middle, and lower portion has been varied to study the effect on the load-settlement response for regular and inverted manner. The results obtained from the analysis of the single conventional pile, single stepped pile, and double-stepped pile were compared with the experimental results of F. Kirzhner, and G. Rosenhouse which were performed in 1982 in Ashkelon South power station in Israel. Results show the better performance behaviour of the regular double-stepped pile as compared to the inverted double-stepped pile; single stepped and single conventional pile.

Keywords

Single conventional pile **Single stepped pile**

Double-stepped pile **Load-settlement**

Granular soil

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MODELING AND FINITE ELEMENT ANALYSIS OF WATER FETCHING AID

Sonali P. Patil and Keshav K. Sangle
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ABSTRACT

Water fetching aid a device is important for fetching water in rural area. It is designed to with stand stresses from the fetching 50liters water at one time. The purpose of a water fetching aid is to reduce the burden of rural women while fetching the water. The most effective feature of a water fetching aid is that it should be easy for handling and lighter in weight. The main purpose of this paper is to analyse the stresses developed in water fetching aid under static loading conditions with different angle of inclination. And thenlookforwardforweightreductionofwaterfetchingalongwithmaterial optimization. The model of the water fetching aid is developed using CATIAV5 and ANSYS is used for stresses analysis by simulation (this method is also known as Finite Element Analysis by simulation). This is the cost and time effective method of analysis. Mild steel are is a material considered as the optimizing material.

Keywords: ANSYS, CATIAV5, FEA, water fetching aid.

1. INTRODUCTION

Water scarcity is one of the greatest issues in many parts of the earth. Due to this problem, women from rural areas are taking water 2-3 km away from home for domestic purposes, for drinking purposes, for bathing purposes [1]. Maximum time's rural women use traditional methods of water fetching. Every day, the maximum number of women and children from rural areas is increased, so that water fetching is considered to be a job for women and children. This information of water fetcher collected through the survey in the draught area and assessment of different postures of water fetching is made [2, 7]. For reducing the reducing [8] the burden of rural water fetching women, water fetching aid is a device which is made. This device is useful to collect 50litre water at one time so that stresses and pain produces in rural women will beget reduces. Also the time required for fetching the water also reduces so rural women can use her time for the other work. Sometimes small children also help their mother of etch water by the methods of tradition like on head mode; hand mode so it will be becomes very difficult to collect water from long distance [4]. By considering all the issue of rural women about fetching the water new water fetching device is made which is helpful to rural women having light in weight and less in cost. This device can use the small children also, it is based on the concept like the pulling, pushing the device instead of carrying on head, carrying in hand. Figure-1 shows the water fetching device with the drum having the capacity to collect water is about the 50litre which is made of plastic.

Figure-1.

2. METHOD

This water fetching device is made with a different component like a handle, adjustable rod, clamping screw, water drum with capacity of 50kg water and wheels. While making the device of water fetching aid attention is taken towards optimization and reducing the cost of product [6]. The geometry of water fetching aid is prepared in CATIA V5 software [5]. After making Geometry in CATIA V5 software it will be imported in the ANSYS software for the analysis. Figure-2 shows the geometry made in the CATIA V5software.

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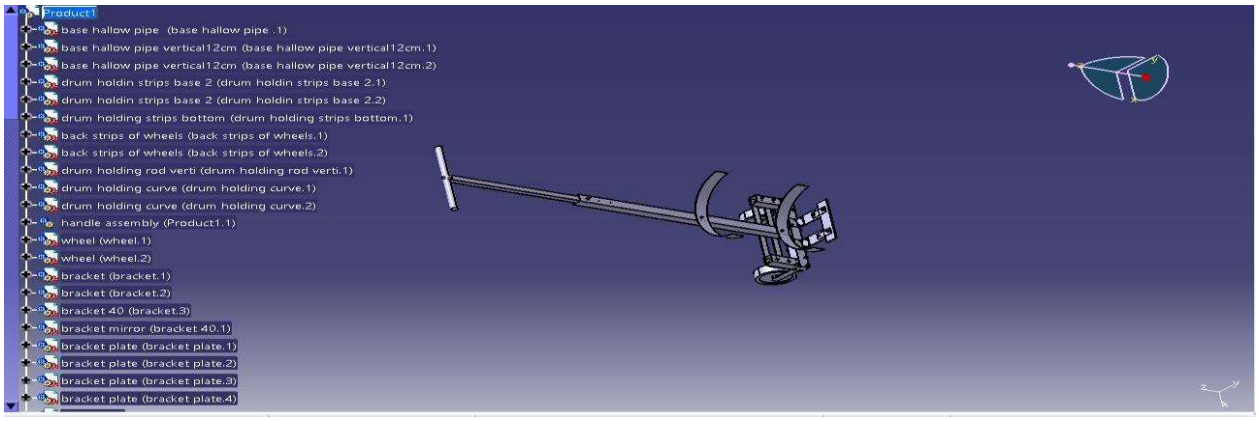

Figure-2.

The CATIA V5 file is imported in the ANSYS software for analysis of water fetching device by considering the women carrying water at different inclination angle like a 30^0, 60^0, and 90^0. At different inclination angle the analysis of water fetching aid is made with the stresses, strains and deformation produces in the water fetching aid. Table-1 shows the properties of the material used for making device of water fetching aid.

Table-1. Properties of the materials.

Properties of materials	Mild Steel	Polyurethane
Young's modulus (E)	210GPa	6MPa
Poisson' sratio	0.303	0.39
Density	7860Kg/m^3	1250Kg/m^3
Tensile strength	440MPa	29.6MPa

The basic mild steel is used for making the water fetching aids with properties are shown in the Table-1. Mild steel is used for making the water fetching Aid except the wheel. Water fetching wheels are made up of plastic material. Figure-3 shows the water fetching device is imported in ANSYS software and after that the meshing has been done in ANSYS workbench.

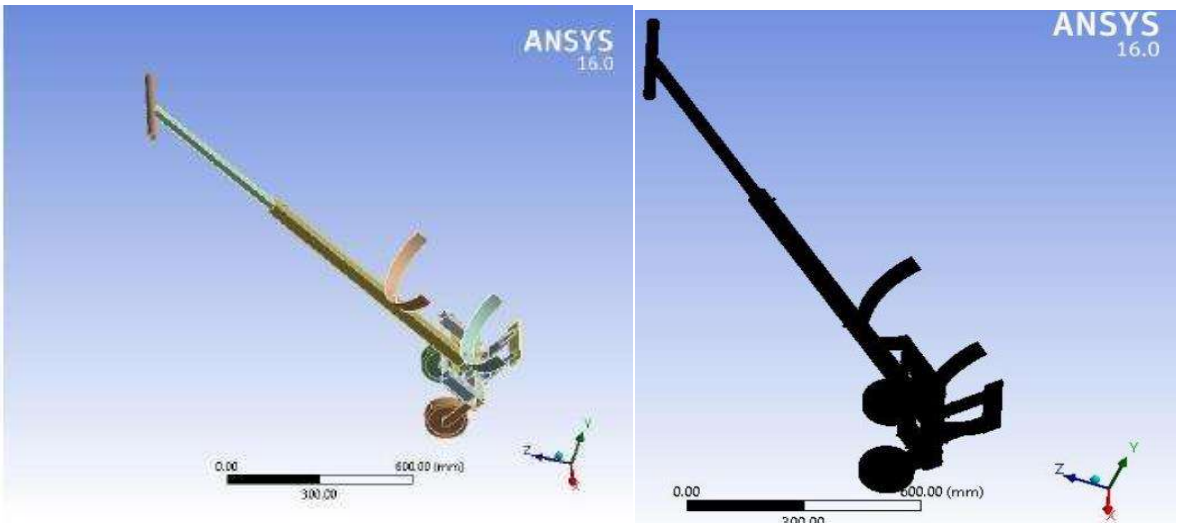

Figure-3.

After importing the Water fetching device in the ANSYS software loading conditions are applied on the water fetching device. Total load ofapproximately700N load applied on the water fetching device. It is a statics analysis of water fetching device so that fixed support is applied at the wheel. Figure-4 shows load acting on the water fetching device with a fixed support at wheels.

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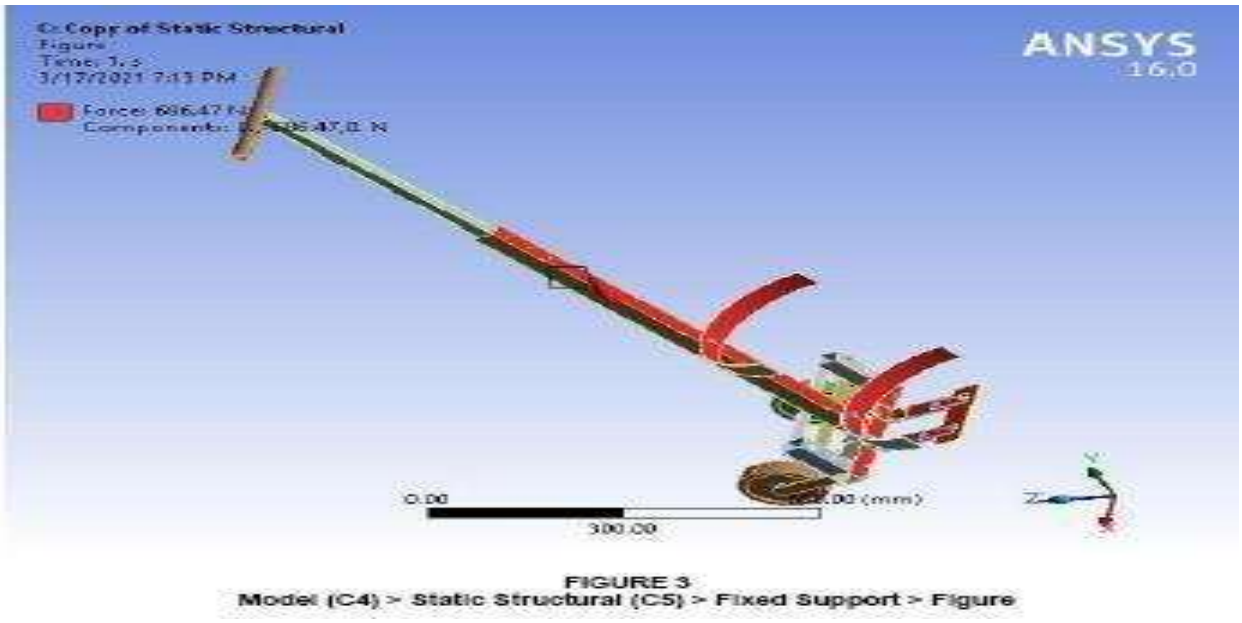

FIGURE 3
Model (C4) > Static Structural (C5) > Fixed Support > Figure

Figure-4.

Importing the geometry in ANSYS workbench and applying the boundary condition and loading condition the analysis have been made with a different inclination angle 30^0, 60^0, 90^0.

3. RESULT

The water fetching device is analysed by the ANSYS work bench through this software get the results about the stresses, strains and deformation with different inclination angle.

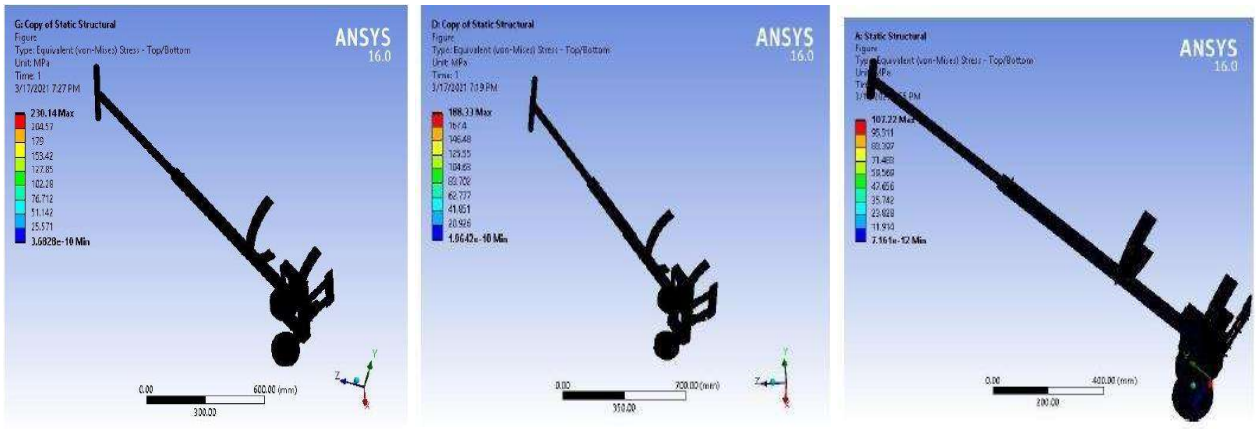

Figure-5.

ANSYS workbench gives the result about the stresses which is shown in Figure-5 it is observed that stress developed at the inclination of 30^0 is more as compared to other two inclinations. Maximum stress developed in the water fetching aid is 230.14 MPa with the inclination of 30^0. The stress developed in $90^0$is less because at this stage the total load is on the supporting plate to the ground. So stress will be less at the 90^0.

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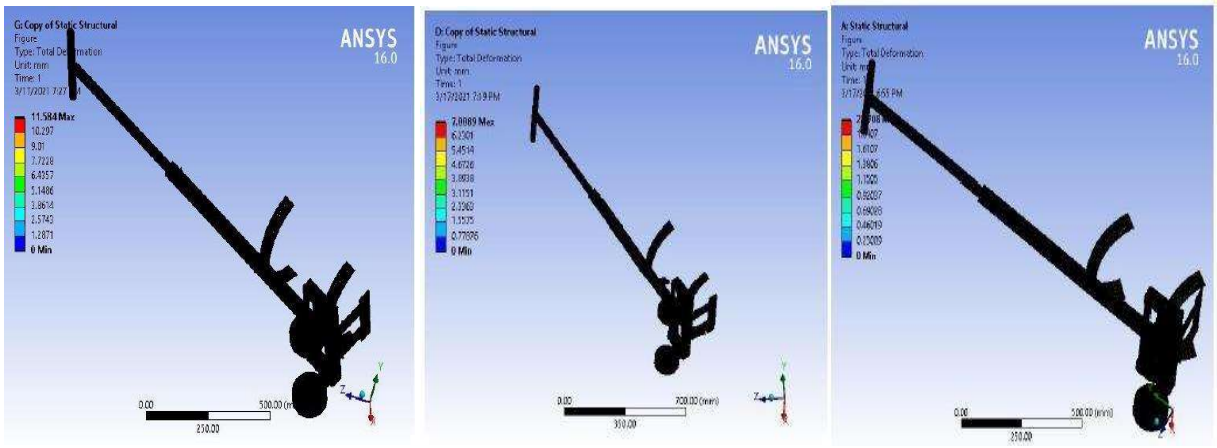

Figure-6.

Total deformation is produced in the water fetching device is maximum with 30^0 inclination which is11.58mm. Total deformation producedin60^0 inclination of water fetching aidis7.00mm and inclination of 90^0 is 2.07mm. As per result for ANSYS workbench total maximum stress and total maximum deformation produced in water fetching aid with handling in 30^0inclinations is maximum.

Table-2. Properties of the materials.

Water fetching with inclination (Angle)	Stress	Deformation
30^0	230.14MPa	11.58mm
60^0	188.33MPa	7.00mm
90^0	107.22MPa	2.07mm

4. CONCLUSIONS

The water fetching aid is device used for the water fetching from long distance. It will result in variation in stresses for while handling the water fetching aid with different inclination. Water fetching is at 90^0gives less stress and deformation as compared with other. At 90^0Water fetching device come at rest position so that stresses will reduce device total load is transfer towards the ground with the help of supporting plates in the device. The stresses and deformation produced in the equipment are Yield strength of Mild steel is 370 Mpa. Stress Generated is 230.14 Mpa from this results we conclude that Design is safe.

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Research Article

Forecasting river basin yield using information of large-scale coupled atmospheric–oceanic circulation and local outgoing longwave radiation

Satyawan D. Jagdale, Satishkumar S. Kashid & Ajay U. Chavadekar

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ABSTRACT

Global and local climate parameters influence the distribution of precipitation over continents. The spatio-temporal distribution of rainfall and the depth of rainfall over a river basin influence the river basin yield. This study deals with the prediction of the river basin scale yield of the 'Upper Bhima River basin' from the Maharashtra State of India. The information on large-scale circulation patterns El Nino-Southern Oscillation (ENSO), Equatorial Indian Ocean Oscillation (EQUINOO) index,

Multivariate ENSO Index (MEI), and local meteorological input viz. Outgoing longwave radiation (OLR) has been used to predict the river basin scale yield. The

prediction models. Ten different combinations of input variables are attempted for the development of monthly river basin yield models to arrive at the best input variable combination for the best predictions with varying lead times. Also, three combinations of input variables were tested for the prediction of 'Seasonal Yield'. The findings of this research work indicate that GP-derived monthly River Basin Scale Yield forecasting models are successful in the prediction of yield with a correlation coefficient of 0.83. The seasonal yields could be predicted with a correlation coefficient of 0.75.

KEYWORDS: River basin-scale yield ENSO EQUINOO MEI OLR genetic programming

Disclosure statement

No potential conflict of interest was reported by the author(s).

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An IoT and Machine Learning based Framework to detect Black spots on Highways to prevent Road Accidents

Rakesh Arya, Dr. S. Thenmozhi, Dr. A. Ravi Kumar, Prolay Ghosh, Manik Deshmukh, Dr. Sushma Jaiswal

ABSTRACT

In the current state of affairs, human beings are involved in numerous accidents when traveling by car. In those mishaps, they suffer the loss of both their lives and their possessions. Due to fading lanes, uneven potholes, inadequate and hidden road signs, many accidents, lost lives, and significant automobile damage have occurred on rural and suburban roads in India. The most challenging part of driving is seeing potential hazards on the road. The underlying principle is to build a system that can identify obstacles in the path of the cars and alert the driver. This project uses the Raspberry Pi Camera module to recognize and acquire images of objects. The best method for identifying picture boundaries is tested on a test image in a detailed investigation. The framework uses the Mean Subtracted Difference Enhancement (MSDE) approach to conduct preprocessing before segmentation. The categorization is done by employing the suggested Advanced Classifier for the detection of items. Vehicles, animals, humans, and more may all be categorized by the system. When an object is spotted, the system provides a voice message instructing the driver to slow down. The results are consolidated by conducting a thorough study. As a consequence, the suggested approach is more accurate and efficient than the current one.

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Study the Suitability of M-Sand as Fine Aggregate in HPC High- Performance Concrete

Manik G. Deshmukh*, Mukund M. Pawar, Vidyarani S. Kshirsagar, Ram S. Pant & Suresh G. Patil

Keywords: suitability, m-sand, aggregate, hpc, high.

Abstract

The rapid development of construction industry across the world has been increasing the demand of conventional construction materials. In plain cement concrete, aggregate accounts for 66% to 78% of its volume. Fine aggregate occupy 20% to 30% of the total volume of concrete. Natural sand, which is dredged from river beds, has been commonly considered as fine aggregate for making concrete. The extraction of sand from river bed causes the environmental issues which also creates the ecological problems. In many countries, environmental legislation prevents dredging sand from river beds. In an effort to conserve the natural resources, it is necessary to explore alternate construction materials and minimize the adverse effect in the environment. The abundant quantity of surplus material (25% to 45%) when coarse aggregate is produced from hard rock quarries depending on the parent rock is possible to collect while crushing and screening process of coarse aggregate. The fine particle obtained from the surplus mineral is processed further in to the level of sand called Manufactured Sand (M-Sand). Many researchers have already been conducted investigation on the suitability of M-sand in conventional mortar and concrete. However, the studies on the suitability of M-sand in High Strength Concrete (HSC) and High Performance Concrete (HPC) are limited. This investigation was intended to evaluate the suitability of M–sand as fine aggregate in FA and SF based ternary blended High strength high performance concrete.

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Guest/ Expert Lecture Report Date: **15/7/22**

1	Name of Expert Faculty	Dr.Saba Fatima
2	Affiliation	Adjunct Professor/ Emeritus Professor – Academics / Industry
3	Correspondence Address	ECE, SECAB Institute of E & Technology, Bijapur. H.No.5 993-48-5/B/1 Syed Barry Residency, Kalaburgi Karnataka
4	E-mail & Contact no	fatima.saba635@gmail.com
5	Date & Time	8/7/22 11:00am-1:00pm 9/7/22 9:30am - 11:30am
6	Beneficiary	Students/ Faculty students: Class- SY Div- A & B.
7	Content Covered	☑ Curriculum ☐ Curriculum gap ☐ Content beyond syllabus
8	Topic of Lecture/Subject	Receiver Design in Digital comm. system.
9	Details of Lecture	→ Introduction to digital comm. system - Introduction of receiver. - Types of digital receiver Integrate & dump filter, matched filter receiver. - Synchronization carrier synchronization symbol synchronization frame synchronization
10	COs (if applicable)	ET223.4 - Describe mathematical & analytical concepts of matched filter & correlation receiver & explain synchronization techniques
11	POs mapped	2, 4,

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COEPR/2021-22/ENTC/ 432

Date: 07/07/2022

Department of Electronics and Telecommunication Engineering

To,

Dr. Saba Fatima,
Associate Professor,
Electronics & Communication Engg. Department,
SECAB Institute of Engineering and
Technology, Bijapur

Subject: Invitation for Expert/ Guest Lecture on " Receiver Design in Digital Communication"

Respected Madam,

We are happy to invite you as an expert guest lecturer for our Second Year Electronics and Telecommunication Engineering Department students of SVERI'S COE, Pandharpur for Conducting ONLINE Guest Lecture on **"**Receiver Design in Digital Communication**"** on 8th & 9th July 2022.

You are requested to accept our invitation and please give your consent for the same.

Thank You,

Yours faithfully,

(Dr.Mrs. M.M.Pawar)
HOD ENTC

Head
Dept. of Electronics & Telecomm.
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Department of Electronics and Telecommunication Engineering

To,

Dr. Saba Fatima,
Associate Professor,
Electronics & Communication Engg. Department,
SECAB Institute of Engineering and
Technology, Bijapur

Subject: Thanks Letter

Respected Madam,

This is to express our heartfelt gratitude towards you for accepting invitation as Expert Guest and conducting ONLINE session on **"Receiver Design in Digital Communication"** for SY students on 8th &9th July. 2022.

Your valuable guidance will always keep the students inspiring & motivating.

I request the same kind of co-operation in future also.

Thank you,

Yours faithfully,

(Dr.Mrs. M.M.Pawar)
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Guest/ Expert Lecture Report

Date: 12-7-2022

1	Name of Expert Faculty	Ms. Pradnya Narvekar	
2	Affiliation	Adjunct Professor/ Emeritus Professor – Academics / Industry	
3	Correspondence Address	QA Engineer, @Claritech Solutions, Pune.	
4	E-mail & Contact no	pradnyanarvekar20@gmail.com	9175578196
5	Date & Time	09-07-2022 01:00 to 03 pm	
6	Beneficiary	Students/ Faculty students: Class- SY Div- A & B	
7	Content Covered	☑ Curriculum ☐ Curriculum gap ☐ Content beyond syllabus	
8	Topic of Lecture/Subject	Analog Integrated Circuits : Special ICs & It's Applications.	
9	Details of Lecture	1] Introduction of Voltage regulator IC's LM317, LM337, IC 78XX & IC 79XX. 2] Introduction of timer IC 555 with block diagram. 3] Applications of IC 555 in the design of multivibrators.	
10	COs (if applicable)	CO5 :- Understand and describe the concept of Special ICs and its applications.	
11	POs mapped	1.4.1, 3.1.5.	

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Date: 08/07/2022

Department of Electronics and Telecommunication Engineering

To,

Mrs. Pradnya Kumbhar
Software Engineer
ClariTech Solution LLP,
Pune.

Subject: Invitation for Expert session on "Analog Integrated Circuits: Special ICs and It's application"

Respected Madam,

We are happy to invite as an expert guest for our SY B. Tech Electronics and Telecommunication Engineering students of SVERI's COE, Pandharpur for Conducting Guest/Expert session "Analog Integrated Circuits: Special ICs and It's application" on 9th July 2022 at 1.00pm.

You are requested to accept our invitation and please give your consent for the same.

Thank you,

Yours faithfully,

HOD ENTC

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
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Ref: COEPR/E&TC/2021-22/ 434

Date: 09/07/2022

Department of Electronics and Telecommunication Engineering

To,

Mrs. Pradnya Kumbhar
Software Engineer
ClariTech Solution LLP,
Pune.

Subject: Thanks giving Letter for Expert session on "Analog Integrated Circuits: Special ICs and It's application"

Respected Madam,

We are very much thankful to you for accepting our invitation as an expert guest for our SY B. Tech (A & B) Electronics and Telecommunication Engineering Department students of SVERI'S COE, Pandharpur and Conducting Guest/Expert Lecture on "Analog Integrated Circuits: Special ICs and It's application" on 9th July 2022.

This session was really fruitful and knowledgeable for our students. Students will definitely get benefited with your advanced vision towards this topic.

Hope for similar cooperation in future

Thank you,

Yours faithfully,

HOD ENTC

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

SVERIS's College of Engineering, Pandharpur

Electronics and Telecommunication Engineering Department

Guest/ Expert Lecture Report Date: **08/06/2022**

1	Name of Expert Faculty	Dr. Sajeed S. Mulla	
2	Affiliation	Associate Professor	
3	Correspondence Address	S.S.P.M. College of Engineering, Kankavli, Maharashtra	
4	E-mail & Contact no	sajeedsm@gmail.com	9422410013
5	Date & Time	29/05/2022	1.00pm-3.00pm
6	Beneficiary	Students/ Faculty students: Class- Final year Div-A & B	
7	Content Covered	☐ Curriculum	
8	Topic of Lecture/Subject	Microwave Network Analysis	
9	Details of Lecture	Initially started with an introduction, covering different frequency bands and their applications. Properties of S parameters Working principles of multiport devices and the respective S parameters.	
10	COs (if applicable)	ET421.1 ET421.3	
11	POs mapped	1.2.2,1.2.2,1.3.1,1.3.2,1.3.3	

ONLINE

Sign of Expert

Class Coordinator

HOD ENTC

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

1

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COEPR/2021-22/ENTC/412

Date: 27/05/2022

Department of Electronics and Telecommunication Engineering

To,

Dr. Sajeed S.Mulla
Associate Professor,
S.S.P.M. College of Engineering,
Kankavli, Maharashtra.

Subject: Invitation for Expert/ Guest Lecture on "Microwave Solid state devices."

Respected sir,

We are happy to invite as an expert guest for our Final Year Electronics and Telecommunication Engineering Department students of SVERI's COE, Pandharpur for Conducting ONLINE Guest Lecture on **"Microwave Solid state devices."** on 29th May. 2022.
You are requested to accept our invitation and please give your consent for the same.

Thank You,

Yours faithfully,

Vaishnav 19.V.9.Jeel

HOD ENTC

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

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COEPR/2021-22/ENTC/ Date: 29/05/2022

Department of Electronics and Telecommunication Engineering

To,

Dr. Sajeed S.Mulla
Associate Professor,
S.S.P.M. College of Engineering,
Kankavli, Maharashtra.

Subject: Thanks Letter

Respected Sir,

This is to express our heartfelt gratitude towards you for accepting invitation as Expert Guest and conducting ONLINE session on "Microwave Solid state devices" for Final Year students on 29th May 2022.

Your valuable guidance will always keep the students inspiring & motivating.

I request the same kind of co-operation in future also.

Thank you,

Yours faithfully,

Vaishnavi Dr. V. G. Kale

HOD ENTC

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

SVERIS's College of Engineering, Pandharpur

Electronics and Telecommunication Engineering Department

Date: 4/6/22

Guest/ Expert Lecture Report

1	Name of Expert Faculty	Mr. Sanjay. Bhaskar. Jogalekar
2	Affiliation	Adjunct Professor/ Emeritus Professor – Academics / Industry
3	Correspondence Address	Kannad Electronation Sangli
4	E-mail & Contact no	sanjayjogalekar@rediffmail.com 9422040871
5	Date & Time	4-6-2022
6	Beneficiary	Students/ Faculty students: Class- TY Div- A & B
7	Content Covered	☑ Curriculum ☐ Curriculum gap ☐ Content beyond syllabus
8	Topic of Lecture/Subject	Embedded System (ARM LPC2148)
9	Details of Lecture	- Interfacing and programming in Embedded system using LPC2148 - Case Study of Embedded system like "Digital camera", Smartcard.
10	COs (if applicable)	CO4 CO6
11	POs mapped	2, 3, 10

Sign of Expert

Class Coordinator

HOD ENTC

Head

Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

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COEPR/ENTC 2021-22- 417(A)

Date: 03/06/2022

Department of Electronics and Telecommunication Engineering

To,

Mr.Sanjay Bhaskar Jogalekar
Industry: Director,
KANAAD ELECTROMATION SOLUTIONS PRIVTE LIMITTED, Sangli

Subject: Invitation for Expert Guest on "Interfacing and programming in Embedded System using LPC2148".

Respected Sir,

We are happy to invite as an expert guest for our Third Year Electronics and Telecommunication Engineering Department students of SVERI'S COE, Pandharpur for Conducting Expert Lecture on "Interfacing and programming in Embedded System using LPC2148" on 4th & 5th June 2022.

You are requested to accept our invitation and please give your consent for the same.

Thank you,

Yours faithfully,

H.O.D. (ENTC)

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

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COEPR/ENTC 2021-22- 417(B)

Date: 5/06/2022

Department of Electronics and Telecommunication Engineering

To,
Mr.Sanjay Bhaskar Jogalekar
Industry: Director,
KANAAD ELECTROMATION SOLUTIONS PRIVTE LIMITTED, Sangli

Subject: Thanks Letter

Respected Sir,

This is to express our heartfelt gratitude towards you for accepting invitation as Expert Guest for conducting session on "Interfacing and programming in Embedded System using LPC2148"for TY students on 4th & 5th March 2022. Your valuable guidance will always keep the students inspiring & motivating.

I request the same kind of co-operation in future also.

Thank you,

Yours faithfully,

Vaishnavi

H.O.D. (ENTC)
Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

SVERIS's College of Engineering, Pandharpur

Electronics and Telecommunication Engineering Department

Guest/ Expert Lecture Report Date:

1	Name of Expert Faculty	mr. Sanjay B. Jogalekar	
2	Affiliation	Adjunct Professor/ Emeritus Professor – Academics / Industry	
3	Correspondence Address	Kamad Electromation solutions, Sangli	
4	E-mail & Contact no	sanjay jogalekar@rediffmail.com	94220 40871
5	Date & Time	31.5.2022	10 – 3PM
6	Beneficiary	Students/ Faculty students: Class- TY Div- A, B	
7	Content Covered	☑ Curriculum ☐ Curriculum gap ☑ Content beyond syllabus	
8	Topic of Lecture/Subject	Electronic system Design	
9	Details of Lecture	- Industrial applications - diffrent types of sensors - design of V-I, I-V convertor - introduction to PLC - use of PLC as controllers in automation. - demo of various automations.	
10	COs (if applicable)	ET323.4 ET323.5	
11	POs mapped		

Sign of Expert

(SAI)
Class Coordinator

HOD ENTC

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

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COEPR/2021-22/ENTC/ Date: 27/05/2022

Department of Electronics and Telecommunication Engineering

To,

Mr. Sanjay Bhaskar Jogalekar
Director,
KANAAD ELECTROMATION SOLUTIONS
PRIVATE LIMITED,Sangli.

Subject: Invitation for Expert/ Guest Lecture on "Electronic System Design"

Respected sir,

We are happy to invite as an expert guest for our Third Year Electronics and Telecommunication Engineering Department students of SVERI'S COE, Pandharpur for Conducting Guest Lecture on **"**Electronic System Design**"** on 31st May. 2022.

You are requested to accept our invitation and please give your consent for the same.

Thank You,

Yours faithfully,

HOD ENTC

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

Received

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COEPR/2021-22/ENTC/

Date: 31/05/2022

Department of Electronics and Telecommunication Engineering

To,

Mr. Sanjay Bhaskar Jogalekar
Director,
KANAAD ELECTROMATION SOLUTIONS
PRIVATE LIMITED,Sangli.

Subject: Thanks Letter

Respected Sir,

This is to express our heartfelt gratitude towards you for accepting invitation as Expert Guest and conducting session on **"Electronic System Design"** for TY students on 31st May 2022.

Your valuable guidance will always keep the students inspiring & motivating.

I request the same kind of co-operation in future also.

Thank you,

Yours faithfully,

Received

HOD ENTC

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

SHRI VITHAL EDUCATION & RESEARCH INSTITUTE's
COLLEGE OF ENGINEERING, PANDHARPUR.

DEPAERTMENT OF ELECTRONICS & TELECOMMUNICATION ENGINEERING

Attendance Report **Date-** 31/5/2022

Guest lecture by- Mr. S.B. Jogalekar **Class : TY ENTC**

Sr.No.	Name of the Student	DIV & R.No	Sign
1	Badake Shubham Satish	A 25	Badake
2	Zingade Omkar Ankush	A 51	
3	Chavan Audumbar Kanifnath	B-35	
4	Rajput Rahul laxmansing	B-42	
5	Mahesh Sunil Deshmukh	A-27	
6	Kale Sandesh Subhash	B-37	Kale
7	Chabukswar Amar Shrihari	B-34	
8	Waghmode Pratik Balbhim	B-50	
9	Ghadge Ranvijay Popatrao	B-36	
10	Sawant Sagar Kalyandas	B-45	Sawant
11	Bhosale Vishvaraj Hanumant	A-26	
12	Madgyal Omkar Ashok	B-38	
13	Patil Sagar Ashok	B-40	
15	Prabhav madhav kharat	A-36	Prabhav
16	Ganesh Nilappa Rupanar	A-45	
17	Waghmode pratyush Dinesh	A-50	P.D. Waghmode
18	Mesal Vaibhav chandrakant	A-40	Vaibhav
19	Narsale Sudarshan Balasaheb	A-41	Sudarshan
20	Nimbalkar Shivraj Narayan	A-42	
21	Shubham Atul Shirkhane	A-46	
22	Shripad Nishikant umbarkar	A-49	Shripad
23	Suhas Sanjay Pawar	A-43	Suhas
24	Shriram Ashok Kulpati	A-28	Shriram
25	Rashid Aditya Bibhishan	A-32	Rashid
26	Pol Rushikesh Uttam	A-44	

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DEPAERTMENT OF ELECTRONICS & TELECOMMUNICATION ENGINEERING

Attendance Report

Guest lecture by- Class : TY ENTC Date-

Sr.No.	Name of the Student	Div & R.No	Sign
27	Unnase Sudarshan Shatrughan	A-47	Sudarshan
28	Gaikwad Sumedh Sanjaykumar	A-31	
29	Kavade Ganesh Dadarao	A-35	
30	Sathe Abhishek Jaysing	A-52	
31	Koli Krishna Mahadev	A-34	
32	Aeekar Shirani Hanumant	B-01	
33	MULUK ROOPAM REVANNATH	B-22	Rupam.
34	Nipase Shweta R.	B-24	Nipase.
35	Saguna Ashok Unhale	B-30	Shweta
36	Vaishnavi Digambar Walke	B-31	
37	Rutuja Sanjay Shelke	B-27	Rutuja.
38	Ronge Pratiksha Raghunath	B-25	Ronge.
39	Bansode Ankita Annasaheb	A-03	Bansode
40	Sanadi Ankita Suresh	B-26	Sanadi
41	Kate Sonali Sunil	B-12	
42	Shefali Ajay Gaddam	B-08	Shefali
43	Rutuja Suryakant Mane	B-19	
44	Nagatgoje vaishali kundlik	B-23	Vaishali
45	More Ashvini Dhanaji	B-21	
46	Suryawanshi Pratibha Prasad	B-28	
47	Lokhande Smita Uttesheorao	B-18	Smita
48	Deshmukh vaishnavi sharadkumar	A-06	Deshmukh
49	Jadhav Aakanksha Anil	A-09	
50	Aarti Kishor Bandgar.	A-02	Aarti
51	Pratiksha Ashok Yadav	A-24	Yadav
52	Srushti Rajendra Bhinge.	A-04	Bhinge
53	Joshi Gayatri Jaywant	A-10	Joshi
54	Patil Aditi Devidas	A-15	Aditi
55	Patane Aishwarya Raosaheb	A-14	
56	Pendave Sayali Shivaji	A-11	
57	Thorat Komal Sanjuvan	A-23	Komal
58	Rasal Swati Arvind.	A-18	
59	Sawant kajal	A-19	
60	Trupti Govind Sonar	A-21	
61	chaitali vikram shinde	A-20	
62	Sonal Arun Nikam	A-13	
63	Bhandare Rohini Baban	B-04	Bhandare.

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DEPAERTMENT OF ELECTRONICS & TELECOMMUNICATION ENGINEERING

Attendance Report **Date-**

Guest lecture by- **Class : TY ENTC**

Sr.No.	Name of the Student	Div & R.No	Sign
64	Kamble Prajakta Pramod	B-11	
65	Chavan Vaishnavi Sudhir	A_05	
66	Aikale Shivani Ramdas	A_01	
67	Phamane Minal Shrikant	B-20	
68	Kulkarni Shreya Dipak	B-14	S.D Kulkarni
69	Das Dnyaneshwari Balasaheb	B-06	
70	Phalphale Madhura Sunil	A-17	
71	Londhe priyanka Balaso	B-15	
72	Devkule Aishwarya Appa.	B.07	Devkule
73	Srishti satyavan Jagdale	B-09	
74	Lokare Amruta Rajdeo	B-16	
75	Bhamma sakshi Shivsharan	B-05	
76			
77			
78			
79			

(SAZ)
Class Coordinator

HOD ENTC

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

SVERIS's College of Engineering, Pandharpur

Electronics and Telecommunication Engineering Department

Guest/ Expert Lecture Report

Date: 24/05/22

1	Name of Expert Faculty	Dr. Veerendra Dakulagi	
2	Affiliation	Adjunct Professor/ Emeritus Professor – Academics / Industry	
3	Correspondence Address	Gurunanak dev Engineering college, Mailoor road, Bidar-585403	
4	E-mail & Contact no	veerendra@ieee.org	8296721601
5	Date & Time	24/05/2022	2PM-4PM
6	Beneficiary	Students/ Faculty students: Class- SY Div- A&B	
7	Content Covered	☑ Curriculum ☐ Curriculum gap ☐ Content beyond syllabus	
8	Topic of Lecture/Subject	sampling in signal & system	
9	Details of Lecture	sampling theorem, conversion of Analog signal into digital signal & How to calculate sampling rate.	
10	COs (if applicable)	solve numerical on convolution integral, convolution sum and sampling theorem.	
11	POs mapped	Engineering knowledge.	

Sign of Expert

online-

Class Coordinator
SY A&B.

HOD ENTC

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Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

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Ref: COEPR/2021-22/ENTC/ 408

Date: 23/05/2022

Department of Electronics and Telecommunication Engineering

To,

Dr. Veerendra D
INSA visiting Scientist to IIT Delhi
Dean(Research & Development),
Associate Professor, Department Of ECE
Guru Nanak Dev Engineering College, Bidar

Subject: Invitation for Expert/ Guest Lecture on "Signal Processing"

Respected sir,

We are happy to invite as an expert guest for our S.Y.B.Tech Electronics and Telecommunication Engineering Department students of SVERI'S COE, Pandharpur for Conducting ONLINE Guest Lecture on **"**Signal Processing**"** on 24th May. 2022.

You are requested to accept our invitation and please give your consent for the same.

Thank You,

Yours faithfully,

(Dr. V. G Kale)
HOD ENTC

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

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Ref: COEPR/2021-22/ENTC/ 409 Date: 24/05/2022

Department of Electronics and Telecommunication Engineering

To,

Dr. Veerendra D
INSA visiting Scientist to IIT Delhi
Dean(Research & Development),
Associate Professor, Department Of ECE
Guru Nanak Dev Engineering College, Bidar

Subject: Thanks Letter

Respected Sir,

This is to express our heartfelt gratitude towards you for accepting invitation as Expert Guest and conducting ONLINE session on "Signal Processing" for SY.Tech students on 24th May. 2022.

Your valuable guidance will always keep the students inspiring & motivating.
I request the same kind of co-operation in future also.

Thank you,

Yours faithfully,

(Dr. V. G Kale)
HOD ENTC

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

SVERIS's College of Engineering, Pandharpur

Electronics and Telecommunication Engineering Department

Guest/ Expert Lecture Report

Date: 07/05/22

1	Name of Expert Faculty	Mr. Amol Dattatraya Dalavi
2	Affiliation	Industry
3	Correspondence Address	Sarvadnya Infosolutions Pvt. Ltd., Pune
4	E-mail & Contact no	7040689040 Email:- amold@sarvadnya.in
5	Date & Time	07-05-2022 at 10.30am to 12.30pm
6	Beneficiary	Students/ Faculty students: Class- TY E&TC Div- A&B
7	Content Covered	☐ Curriculum ☐ Curriculum gap ☐ Content beyond syllabus
8	Topic of Lecture/Subject	Sensors applications in Industrial Products used for Security and Domestic automation
9	Details of Lecture	Exploring practical knowledge of Sensors and use of various sensors in various domain areas such as Security, Automation, Monitoring systems etc this session is helpful. Students are benefited by understanding practical use of various sensors in today's digital world.
10	COs (if applicable)	CO:- ET325.3
11	POs mapped	PO:- 04 & 05

Online mode.
Sign of Expert

Class Coordinator

HOD ENTC

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

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COEPR/2021-22/ENTC/ 381

Date: 02/05/2022

Department of Electronics and Telecommunication Engineering

To,

Mr.Amol Dalavi
Sales & Marketing Executive,
Sarvadnya Infosolutions Pvt. Ltd., Pune

Subject: Invitation for Expert/ Guest Lecture on "Sensors applications in Industrial Products used for Security and Domestic automation"

Respected sir,

We are happy to invite as an expert guest for our Third Year Electronics and Telecommunication Engineering Department students of SVERI'S COE, Pandharpur for Conducting ONLINE Guest Lecture on **"**Sensors applications in Industrial Products used for Security and Domestic automation**"** on 07th May. 2022.

You are requested to accept our invitation and please give your consent for the same.

Thank You,

Yours faithfully,

(Dr.Mrs. M.M.Pawar)
HOD ENTC

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

ShriVithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Pandharpur- 413 304, District: Solapur (Maharashtra)Tel.: 02186-216063, 9503103757, Toll Free No.: 1800-3000-4131, E-mail: coe@sveri.ac.in,Web: www.sveri.ac.in (Approved byA.I.C.T.E., New Delhi and Affiliated to P.A.H.Solapur University, Solapur **NBA**Accredited all eligible UG Programmes,**NAAC** Accredited Institute, Accredited by The Institution of Engineers (India), Kolkata and TCS, Pune. ISO 9001-2015 Certified Institute

COEPR/2021-22/ENTC/ 382

Date: 07/05/2022

Department of Electronics and Telecommunication Engineering

To,

Mr.Amol Dalavi
Sales & Marketing Executive,
Sarvadnya Infosolutions Pvt. Ltd., Pune

Subject: Thanks Letter

Respected Sir,

This is to express our heartfelt gratitude towards you for accepting invitation as Expert Guest and conducting ONLINE session on **"**Sensors applications in Industrial Products used for Security and Domestic automation**"** for TY students on 07th May 2022.

Your valuable guidance will always keep the students inspiring & motivating.

I request the same kind of co-operation in future also.

Thank you,

Yours faithfully,

(Dr.Mrs. M.M.Pawar)
HOD ENTC

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

SVERIS's College of Engineering, Pandharpur

Electronics and Telecommunication Engineering Department

Guest/ Expert Lecture Report

Date: 29/4/22

1	Name of Expert Faculty	Dr Ravi M Yadahalli
2	Affiliation	Adjunct Professor/ Emeritus Professor – Academics / Industry
3	Correspondence Address	Kamdhenu Plaza CTS No 2964, 5th cross adarsh Nagar, Hindwadi, Belgaum
4	E-mail & Contact no	yadahalliravim@gmail.com
5	Date & Time	28/4/22 & 29/4/22 — 4hrs
6	Beneficiary	Students/ Faculty students: Class- TY Div- A & B
7	Content Covered	☑ Curriculum ☐ Curriculum gap ☐ Content beyond syllabus
8	Topic of Lecture/Subject	Slot Antenna & Helical Antenna
9	Details of Lecture	Slot Antenna - Babinets principle & Complementary antennas impedance of slot antennas Helical Antenna - Helical geometry, transmission & radiation modes
10	COs (if applicable)	CO3 - Determine various parameters of antenna
11	POs mapped	2.1.2 , 2.2.3

Sign of Expert

Class Coordinator

HOD ENTC

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COEPR/2021-22/ENTC/ 366

Date: 27/04/2022

Department of Electronics and Telecommunication Engineering

To,

Dr. Ravi M Yadahalli
Professor ,
Department of ECE,
Methodist College of Engineering And Technology,
ABIDS Hyderabad- 5000001.

Subject: Invitation for Expert/ Guest Lecture on "Helical Antenna & Slot Antenna"

Respected sir,

We are happy to invite as an expert guest for our Third Year Electronics and Telecommunication Engineering Department students of SVERI'S COE, Pandharpur for Conducting ONLINE Guest Lecture on "Helical Antenna & Slot Antenna" on 28th & 29th Apr. 2022.

You are requested to accept our invitation and please give your consent for the same.

Thank You,

Yours faithfully,

(Dr.Mrs. M.M.Pawar)
HOD ENTC

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

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COEPR/2021-22/ENTC/ 377

Date: 29/04/2022

Department of Electronics and Telecommunication Engineering

To,

Dr. Ravi M Yadahalli
Professor ,
Department of ECE,
Methodist College of Engineering And
Technology,
ABIDS Hyderabad- 5000001.

Subject: Thanks Letter

Respected Sir,

This is to express our heartfelt gratitude towards you for accepting invitation as Expert Guest and conducting ONLINE session on "Helical Antenna & Slot Antenna" for TY students on 28th & 29th Apr. 2022.

Your valuable guidance will always keep the students inspiring & motivating.

I request the same kind of co-operation in future also.

Thank you,

Yours faithfully,

(Dr.Mrs. M.M.Pawar)
HOD ENTC

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

SVERIS's College of Engineering, Pandharpur

Electronics and Telecommunication Engineering Department

Guest/ Expert Lecture Report

Date: 16/4/22.

1	Name of Expert Faculty	Dr. Sanjay Gowave
2	Affiliation	Adjunct Professor/ Emeritus Professor – Academics / Industry
3	Correspondence Address	B 1274-202, R.V. Bidap Colony, OPP. Sidharudh Math, Bidar.
4	E-mail & Contact no	sanjaygowave@gmail.com
5	Date & Time	16/4/22 10.30 a.m. - 12.30pm
6	Beneficiary	Students/ Faculty students: Class- TY Div- A & B.
7	Content Covered	☐ Curriculum ☐ Curriculum gap ☑ Content beyond syllabus
8	Topic of Lecture/Subject	Photonics & its future applications.
9	Details of Lecture	In this lecture, Sir has covered an advanced type of fiber, i.e. photonics crystal fiber, its mfg. process, types, advantages & disadvantages. Also he has guided on future trends of optical communication & related project ideas.
10	COs (if applicable)	ET325.1 – To Demonstrate working of fiber.
11	POs mapped	PO1, PO2.

Sign of Expert

Class Coordinator

HOD ENTC

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Dept. of Electronics & Telecomm.
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COEPR/2021-22/ENTC/ 361

Date: 15/04/2022

Department of Electronics and Telecommunication Engineering

To,

Dr. Sanjaykumar Gowre
Professor & Dean Academics,
BKIT, Bhalki.
Karnataka.

Subject: Invitation for Expert/ Guest Lecture on "Photonics and its future applications"

Respected sir,

We are happy to invite as an expert guest for our Third Year Electronics and Telecommunication Engineering Department students of SVERI'S COE, Pandharpur for Conducting ONLINE Guest Lecture on **"**Photonics and its future applications**"** on 16th Apr. 2022.

You are requested to accept our invitation and please give your consent for the same.

Thank You,

Yours faithfully,

Received 15/4/22

(Dr.Mrs. M.M.Pawar)
HOD ENTC

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

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COEPR/2021-22/ENTC/ 362

Date: 16/04/2022

Department of Electronics and Telecommunication Engineering

To,

Dr. Sanjaykumar Gowre
Professor & Dean Academics,
BKIT, Bhalki.
Karnataka.

Subject: Thanks Letter

Respected Sir,

This is to express our heartfelt gratitude towards you for accepting invitation as Expert Guest and conducting ONLINE session on **"**Photonics and its future applications**"** for TY students on 16th Apr. 2022.

Your valuable guidance will always keep the students inspiring & motivating.

I request the same kind of co-operation in future also.

Thank you,

Yours faithfully,

(Dr.Mrs. M.M.Pawar)
HOD ENTC

Received
16/04/22

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

SVERIS's College of Engineering, Pandharpur

Electronics and Telecommunication Engineering Department

Guest/ Expert Lecture Report

Date: 25/03/2022

1	Name of Expert Faculty	Mr. Rahul Arun Bal	
2	Affiliation	Adjunct Professor/ Emeritus Professor – Academics / Industry	
3	Correspondence Address	Technopark Solutions Pvt. Ltd, Pune	
4	E-mail & Contact no	rahulbal688@gmail.com	9096809390
5	Date & Time	25/03/2022 01:00 to 03:00pm	
6	Beneficiary	Students/ Faculty students: Class- LY Div- A&B	
7	Content Covered	☑ Curriculum ☑ Curriculum gap ☐ Content beyond syllabus	
8	Topic of Lecture/Subject	Design Rules & Layout in CMOS	
9	Details of Lecture	- Circuit design Process - CMOS layers. - fabrication steps. - Design Rules & Layout - stick diagram representation - Lamda based design rules.	
10	COs (if applicable)	ET422.2	
11	POs mapped	PO2, PO3, PO4, PSO1	

Sign of Expert

Class Coordinator

HOD ENTC

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

1

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Ref. No.: COEPR/ENTC/2021-22/350(a)

Date: 24/03/2022

Department of Electronics and Telecommunication Engineering

To,

Mr. Rahul Bal
Senior Technical Trainer,
Technopark Solutions pvt. Ltd.
Pune.

Subject: Invitation for Expert Guest on "Design Rules and Layout in CMOS".

Respected Sir,

We are happy to invite as an expert guest for our Final Year Electronics and Telecommunication Engineering Department students of SVERI'S COE, Pandharpur for Conducting Expert Lecture on "**Design Rules and Layout in CMOS**" on 25th March 2022.

You are requested to accept our invitation and please give your consent for the same.

Thank you,

Yours faithfully,

H.O.D. (ENTC)
Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

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Ref. No.: COEPR/ENTC/2021-22/350(b)

Date: 25/03/2022

Department of Electronics and Telecommunication Engineering

To,

Mr. Rahul Bal
Senior Technical Trainer,
Technopark Solutions pvt. Ltd.
Pune.

Subject: Thanks Letter

Respected Sir,

This is to express our heartfelt gratitude towards you for accepting invitation as Expert Guest for conducting session on **"Design Rules and Layout in CMOS"** for LY students on 25th March 2022.

Your valuable guidance will always keep the students inspiring & motivating.

I request the same kind of co-operation in future also.

Thank you,

Yours faithfully,

H.O.D. (ENTC)

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

SVERIS's College of Engineering, Pandharpur

Electronics and Telecommunication Engineering Department

Date: 19/3/22

Guest/ Expert Lecture Report

1	Name of Expert Faculty	Mr. Akshay Gundewar	
2	Affiliation	Adjunct Professor/ Emeritus Professor - Academics/ Industry	
3	Correspondence	Microsoft, Banglore	
4	E-mail & Contact no	g.akshayp@gmail.com	7829473877
5	Date & Time	19-03-2022	2:00 PM
6	Beneficiary	Students/ Faculty students: Class- TY Div-____	
7	Content Covered	☐ Curriculum ☐ Curriculum gap ☑ Content beyond syllabus	
8	Topic of Lecture/Subject	Recent trends in the Industry	
9	Details of Lecture	- Diffrent field / project area - societal problems and solutions - use of modern software tools. - current market scenario.	
10	COs (if applicable)	—	
11	POs mapped		

Sign of Expert

Class Coordinator

HOD ENTC

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COEPR/2021-22/ENTC/345

Date: 17/03/2022

Department of Electronics and Telecommunication Engineering

To,

Mr.Akshay Gundewar
Senior Software Engineer,
Microsoft, Banglore.

Subject: Invitation for Expert/ Guest Lecture on "Latest trends in the Industry "

Respected sir,

We are happy to invite as an expert guest for our Third Year Electronics and Telecommunication Engineering Department students of SVERI'S COE, Pandharpur for Conducting Guidance session on **"**Latest trends in the Industry**"** on 19th Mar. 2022.

You are requested to accept our invitation and please give your consent for the same.

Thank You,

Yours faithfully,

Recieved
G.Akay

(Dr.Mrs. M.M.Pawar)
HOD ENTC

HEAD
Dept. of Electronics & Telecom. Engg.
C O E Pandharpur

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COEPR/2021-22/ENTC/346

Date: 19/03/2022

Department of Electronics and Telecommunication Engineering

To,

Mr.Akshay Gundewar
Senior Software Engineer,
Microsoft, Banglore.

Subject: Thanks Letter

Respected Sir,

This is to express our heartfelt gratitude towards you for accepting invitation as Expert Guest and conducting ONLINE session on "Latest trends in the Industry" for TY students on 19th Mar. 2022.

Your valuable guidance will always keep the students inspiring & motivating.

I request the same kind of co-operation in future also.

Thank you,

Yours faithfully,

(Dr.Mrs. M.M.Pawar)
HOD ENTC

Recieved

HEAD
Dept. of Electronics & Telecom. Engg.
C.O.E. Pandharpur

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Date-19/03/2022

Attendance for Guidance session by our Alumnus
Mr.Akshay Gundewar, Senior Software Developer, Microsoft Bangalore

Roll No	Name of Student	Class	Div	Sign
20	Shinde Chaitali	T.Y.B.Tech	A	Shinde
22	Swami Himani	T.Y.B.Tech	A	
16	Patil Meenakshi	T.Y.B.Tech	A	Minakshi
A01	Atkale shivani	T.Y.B Tech	A	Atkale
A03	Bansode Ankita	T.Y.B.Tech	A	Bansode
A-05	Chavan Vaishnavi	T.Y.B.Tech	A	Chavan
B-27	Rutuja Shelke	TY B.Tech	B	Rutuja
B-31	Vaishnavi Walke	TY B.Tech	B	Walke
B-24	Shweta Nipase	TY B Tech	B	Nipase
B-25	Pratiksha Ronge	TY B Tech	B	RongePR
B-14	Shreya Kulkarni	TY B Tech	B	S.P.Kulkarni
B-01	Arekar Shivani	TY B Tech	B	Arekar
A-09	Jadhav Aakanksha	TY B Tech	A	Aakanksha
A-06	Doshmukh Vaishnavi	TY B Tech	A	Doshmukh.V.S.
A-18	Rasal Swati	TY B.Tech	A	S.A.Rasal
A-23	Thorat Komal	TY.B.Tech	A	Komal
A-13	Nikam Sonal	TY.B.Tech	A	Sonal
A-21	Sonar Trupti	TY.B.Tech	A	
A-36	Kharat Pravin	T.Y.B.Tech	A	Pravin
A-24	Gaikwad Sumedh	T.Y.B.Tech	A	Sumedh
A-40	masal vaibhav	T.Y.B Tech	A	V.Vmasal
A-41	Narsale Sudarshan	T.Y.B.Tech	A	Sudarshan
A-35	Kavade Ganesh	T.Y.B.Tech	A	Ganesh
A-50	Waghmode pratyush	T.Y.B.Tech	A	Pratyush
A-32	Kashid Aditya	T.Y.B Tech	A	Akashid
A-42	Nimbalkar Shivraj	T.Y.B Tech	A	Nimbalkar
A-25	Badake shubham	T.Y.BTech	A	Shubham
A-33	Kashid laxman	TY.BTech	A	Kashid

Head
Dept. of Electronics & Telecomm.
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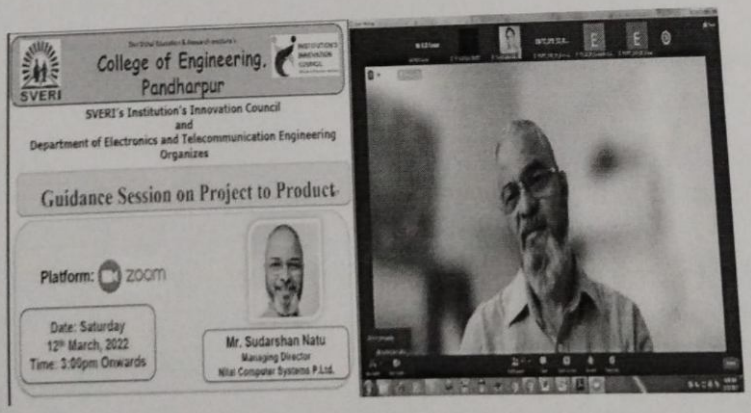
Date: 12/03/2022

Department of Electronics and Telecommunication Engineering

Activity Report

- **Name of Activity**: Guidance Session on Project to Product for SY & TY Class
- **Topic Name**: Evaluation Process of Project to Product.
- **Date: 12th March 2022**
- **No. of Participants**: 186
- **Brief report**: As per the directives from Hon. Principal, E&TC Engineering Department has organized Guidance session on Project to Product for SY & TY Classes in collaboration with Institution's Innovation Council SVERI's COE, Pandharpur & ELITE forum of E&TC Department. **Mr.Sudarshan Natu Managing Director of Nital Computer Pvt.Ltd** has given guidance to the students on **"Evaluation Process of Project to Product"** from 3.30 am to 5.30 PM. During the session he has given lot of information about how to select the topic for evaluation of Project to Product as per current market scenario in field of E&TC Engineering concerned. Ms.V.A Patil Madam has introduced brief about the Guest and Dr.V.G Kale sir has given a vote of thanks.



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Date: 12/03/2022

Department of Electronics and Telecommunication Engineering

To,

Mr. Sudarshan Natu

Managing Director

Nital Computer Systems P.Ltd.

Subject: Thanks giving letter for guidance session on "Project to Product".

Respected Sir,

We are very much thankful to you for accepting our invitation as a resource person and conducting valuable and informative session on topic "Project to Product"

This session will surely very fruitful and knowledgeable for all students and faculties. The students will definitely get benefited with your advanced vision towards this topic.

Hope for the similar co-operation in future.

Thanking You,

Yours Sincerely,

HOD ENTC

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

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Dist. Solapur (Maharashtra) Ph.: (02186) 225083, Fax: (02186) 225082.
(Approved by AICTE, New Delhi and affiliated to Solapur University, Solapur)
E-mail :- coe@sveri.ac.in

Date: 11/03/2022

Department of Electronics and Telecommunication Engineering

To,
Mr. Sudarshan Natu
Managing Director
Nital Computer Systems P.Ltd.

Subject: Invitation for Guidance Session on "Project to Product".

Respected sir,

We are happy to invite as an expert session for our students of Electronics and Telecommunication Engineering Department of SVERI'S COE, Pandharpur for Conducting Guidance session on "Project to Product "on 12th March 2022 at 3.00 pm onwards.

We request you to kindly accept our invitation and share your knowledge with us on the intellectual property rights and patents.

Thank You,

Yours Sincerely,

HOD ENTC

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

SVERIS's College of Engineering, Pandharpur

Electronics and Telecommunication Engineering Department

Guest/ Expert Lecture Report

Date: 21/12/2021.

1	Name of Expert Faculty	Dr. Reshma Gavali	
2	Affiliation	Adjunct Professor/ Emeritus Professor - Academics/ Industry	
3	Correspondence	Assistant Professor in M.B.A. Dept. at Hirachand Nemchand College of Commerce, Solapur.	
4	E-mail & Contact no	reshmas67@gmail.com 9552529271	
5	Date & Time	18/12/2021 21/12/2021	3.00pm - 5.00pm 2.00pm - 4.00pm.
6	Beneficiary	Students/ Faculty students: Class- T.Y Div- A & B.	
7	Content Covered	☐ Curriculum ☑ Curriculum gap ☑ Content beyond syllabus	
8	Topic of Lecture/Subject	Ethical issues in civil Society & environment.	
9	Details of Lecture	1. Concept of Corporate & ethics in corporate. & p 2. Practical guidelines for corporate life. 3. Concept of CSO & its types, 4. Ethical issues in Civil Society & Environment.	
10	COs (if applicable)	4. Understand & identify ethical issues from various stakeholders point of context.	ET315.4
		5. Understand the impacts of globalization on the nature & extent of the role played by Civil Society towards corporation.	ET315.5
11	POs mapped	PO1, PO2, PO3	

28/12/2021

Sign of Expert

Class Coordinator

HOD ENTC

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

ShriVithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Pandharpur- 413 304, District: Solapur (Maharashtra)Tel.: 02186-216063, 9503103757, Toll Free No.: 1800-3000-4131, E-mail: coe@sveri.ac.in,Web: www.sveri.ac.in (Approved byA.I.C.T.E., New Delhi and Affiliated to Solapur University, Solapur **NBA**Accredited all eligible UG Programmes,**NAAC** Accredited Institute, Accredited by The Institution of Engineers (India), Kolkata and TCS, Pune. ISO 9001-2015 Certified Institute

COEPR/2021-22/ENTC/ 302

Date: 18/12/2021

Department of Electronics and Telecommunication Engineering

To,

Dr.Reshma Gavali
MBA Department,
Hirachand Nemchand College of Commerce,
Solapur. (MH)

Subject: Thanks Letter

Respected Sir,

This is to express our heartfelt gratitude towards you for accepting invitation as Expert Guest and conducting ONLINE session on "Ethical Issues in Civil Society and Environment" for TY students on 18th Dec. 2021.

Your valuable guidance will always keep the students inspiring & motivating.

I request the same kind of co-operation in future also.

Thank you,

Yours faithfully,

(Dr.Mrs. M.M.Pawar)
HOD ENTC

HEAD
Dept. of Electronics & Telecomm. Engg.
S.C.O.E. Pandharpur

ShriVithal Education & Research Institute's
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COEPR/2021-22/ENTC/ 301

Date: 17/12/2021

Department of Electronics and Telecommunication Engineering

To,

Dr.Reshma Gavali
MBA Department,
Hirachand Nemchand college of commerce,
Solapur. (MH)

Subject: Invitation for Expert/ Guest Lecture on "Ethical Issues in Civil Society and Environment"

Respected sir,

We are happy to invite as an expert guest for our Third Year Electronics and Telecommunication Engineering Department students of SVERI'S COE, Pandharpur for Conducting ONLINE Guest Lecture on **"**Ethical Issues in Civil Society and Environment**"** on 18th Dec. 2021.

You are requested to accept our invitation and please give your consent for the same.

Thank You,

Yours faithfully,

(Dr.Mrs. M.M.Pawar)
HOD ENTC

HEAD
Dept. of Electronics & Telecom. Engg.
S.V.C.E. Pandharpur

SVERIS's College of Engineering, Pandharpur

Electronics and Telecommunication Engineering Department

Guest/ Expert Lecture Report

Date: 11/12/2021

1	Name of Expert Faculty	Mr. Rahul Arun Bal	
2	Affiliation	Adjunct Professor/ Emeritus Professor - Academics/ Industry	
3	Correspondence	Sr. technical trainer Technopark Solutions. Pvt. Ltd.	
4	E-mail & Contact no	rahulbal688@gmail.com	9096809390
5	Date & Time	11/12/2021 02:00 pm to 04:00 pm	
6	Beneficiary	Students/ Faculty Faculty : 02 Students : 85 students: Class- TY Div- A & B	
7	Content Covered	☐ Curriculum ☑ Curriculum gap ☐ Content beyond syllabus	
8	Topic of Lecture/Subject	State Machine and it's applications.	
9	Details of Lecture	→ finite state machine → Mealy & Mooze state machine → Sequence detector using mealy and Mooze state machine. → Comparison between Mealy and Mooze state machine. → Applications of state Machine → Coffee Vending Machine → VHDL code for Coffee Vending Machine.	
10	COs (if applicable)	ET312.2	
11	POs mapped	PO4, PO5, PO12	

Sign of Expert

Class Coordinator

HOD ENTC

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

1

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COEPR/2021-22/ENTC/ 298

Date: 10/12/2021

Department of Electronics and Telecommunication Engineering

To,

Mr.Rahul Bal
Senior Technical Trainer
Technopark Solutions Pvt. Ltd., Pune

Subject: Invitation for Expert/ Guest Lecture on "State machine and its applications "

Respected sir,

We are happy to invite as an expert guest for our Third Year Electronics and Telecommunication Engineering Department students of SVERI'S COE, Pandharpur for Conducting ONLINE Guest Lecture on **"State machine and its applications"** on 11th Dec. 2021.

You are requested to accept our invitation and please give your consent for the same.

Thank You,

Yours faithfully,

HEAD
Dept. of Electronics & Telecom. Engg.
S. O. E. Pandharpur

HOD ENTC

ShriVithal Education & Research Institute's
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9503103757, Toll Free No.: 1800-3000-4131, E-mail: coe@sveri.ac.in,Web: www.sveri.ac.in (Approved byA.I.C.T.E., N
Delhi and Affiliated to Solapur University, Solapur **NBA**Accredited all eligible UG Programmes,**NAAC** Accredited Instit
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Ref. NO- COEPR/ENTC/2021-22/298

Department of Electronics and Telecommunication Engineering

Date: 11/12/2021

To,
Mr.Rahul Bal
Senior Technical Trainer
Technopark Solutions Pvt. Ltd.
Pune

Subject: Thanks Letter

Respected Sir,

This is to express our heartfelt gratitude towards you for accepting invitation as Expert Guest and conducting session on "State machine and its applications " for Third year students on 11th December 2021.

Your valuable guidance will always keep the students inspiring & motivating.

I request the same kind of co-operation in future also.

Thank you,

Yours faithfully,

(Dr.Mrs.M.M.Pawar)

H. O. D ENTC

HEAD
Dept. of Electronics & Telecom. Engg.
C.O.E. Pandharpur

SVERIS's College of Engineering, Pandharpur

Electronics and Telecommunication Engineering Department

Guest/ Expert Lecture Report

Date: 7/12/2021

1	Name of Expert Faculty	Mr. Rahul Bal	
2	Affiliation	Adjunct Professor/ Emeritus Professor - Academics/ Industry	
3	Correspondence	Senior Technical Trainer Techno Pavek Solutions Pvt. Ltd. Pune	
4	E-mail & Contact no	rahulbal688@gmail.com	7620170627 9096809390
5	Date & Time	04/12/2021	3:00 to 5:00PM
6	Beneficiary	Students/ Faculty students: Class- BTech Div- A&B	
7	Content Covered	☐ Curriculum ☐ Curriculum gap ☑ Content beyond syllabus	
8	Topic of Lecture/Subject	"Machine Learning in Industry"	
9	Details of Lecture	1. what is machine learning (ML) 2. Difference between AI & ML 3. Types of ML 4. Programming for ML 5. Advanced ML 6. Generalized ML flows 7. ML tools required for Job 8. Required Job ready skills for ML entry level 9. Required job ready skills for data engineer, data Scientist & ML engineer 10. Introduction to ANN & CNN	
10	COs (if applicable)	CO1: Describe fundamental aspects of ML CO2: Distinguish various characteristics of ML CO6: Apply ML techniques that enable to solve real world problems	
11	POs mapped	PO1, PO2, PO5, PO6, PO12, PSO3	

Sign of Expert

Class Coordinator

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Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

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Department of Electronics and Telecommunication Engineering

Date: 02/12/2021

To,

Mr.Rahul Bal

Senior Technical Trainer

Technopark Solutions Pvt. Ltd.

Pune

Subject: Invitation for Expert/ Guest Lecture on "Machine Learning in Industry"

Respected sir,

We are happy to invite as an expert guest for our Final Year Electronics and Telecommunication Engineering Department students of SVERI'S COE, Pandharpur for Conducting ONLINE Guest Lecture on "Machine Learning in Industry" on 04th December 2021.

You are requested to accept our invitation and please give your consent for the same.

Thank You,

Yours faithfully,

(Dr.Mrs.M.M.Pawar)

H. O. D ENTC

HEAD
Dept. of Electronics & Telecom. Engg.
C.O.E. Pandharpur

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Department of Electronics and Telecommunication Engineering

Date: 05/12/2021

To,
Mr.Rahul Bal
Senior Technical Trainer
Technopark Solutions Pvt. Ltd.
Pune

Subject: Thanks Letter

Respected Sir,

This is to express our heartfelt gratitude towards you for accepting invitation as Expert Guest and conducting session on "Machine Learning in Industry" for Final year students on 4th December 2021.

Your valuable guidance will always keep the students inspiring & motivating.

I request the same kind of co-operation in future also.

Thank you,

Yours faithfully,

(Dr.Mrs.M.M.Pawar)
H. O. D ENTC

HEAD
Dept. of Electronics & Telecom. Engg.
S. O. E. Pandharpur

SVERIS's College of Engineering, Pandharpur

Electronics and Telecommunication Engineering Department

Guest/ Expert Lecture Report

Date: 6/12/2021

1	Name of Expert Faculty	Mr. Sanjay B. Jogalekar	
2	Affiliation	Adjunct Professor/ Emeritus Professor - Academics/ Industry	
3	Correspondence	Kannad services, Sangli	
4	E-mail & Contact no	sanjay jogalekar @ rediffmail.com	9422040871
5	Date & Time	6-DEC-2021	11 AM - 4 PM
6	Beneficiary	Students/ Faculty students: Class- TY Div- A, B	
7	Content Covered	☐ Curriculum ☐ Curriculum gap ☑ Content beyond syllabus	
8	Topic of Lecture/Subject	PIC Microcontroller	
9	Details of Lecture	- what is Embedded system. - Applications of E.S. - use of microcontroller in Embedded system - Architecture of PIC controller - PIC instruction set	
10	COs (if applicable)	314.4 314.5	
11	POs mapped	PO5	

Sign of Expert

(CSAI)
Class Coordinator

HOD ENTC

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

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COEPR/2021-22/ENTC/ 294

Date: 05/12/2021

Department of Electronics and Telecommunication Engineering

To,

Mr. Sanjay B. Joglekar
Kannad Services,
Sangli

Subject: Invitation for Expert/ Guest Lecture on "PIC Microcontrollers"

Respected sir,

We are happy to invite as an expert guest for our Third Year Electronics and Telecommunication Engineering Department students of SVERI'S COE, Pandharpur for Conducting ONLINE Guest Lecture on **"**PIC Microcontrollers**"** on 06th DEc. 2021.

You are requested to accept our invitation and please give your consent for the same.

Thank You,

Yours faithfully,

(Dr. Mrs.M.M.Pawar)
HOD ENTC

HEAD
Dept. of Electronics & Telecom. Engg.
C.O.E. Pandharpur

ShriVithal Education & Research Institute's
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COEPR/2021-22/ENTC/ 295 Date: 06/12/2021

Department of Electronics and Telecommunication Engineering

To,

Mr. Sanjay B. Joglekar
Kannad Services,
Sangli

Subject: Thanks Letter

Respected Sir,

This is to express our heartfelt gratitude towards you for accepting invitation as Expert Guest and conducting ONLINE session on **"PIC Microcontrollers"** for TY students on 06th Dec. 2021.

Your valuable guidance will always keep the students inspiring & motivating.

I request the same kind of co-operation in future also.

Thank you,

Yours faithfully,

(Dr.Mrs. M.M.Pawar)
HOD ENTC

HEAD
Dept. of Electronics & Telecomm. Engg.
S.V.E.R. Pandharpur

SVERIS's College of Engineering, Pandharpur

Electronics and Telecommunication Engineering Department

Guest/ Expert Lecture Report

Date: 30/11/21

1	Name of Expert Faculty	Dr. Taruja. Satish. Dhape.
2	Affiliation	Adjunct Professor/ Emeritus Professor - Academics/ Industry
3	Correspondence	Department of E&TC. Bharati Vidyapeeth (Deemed to be University) College of Engineering, Pune.
4	E-mail & Contact no	taruja_dhape@yahoo.com.
5	Date & Time	30/11/2020 10:00 am to 12:00 pm.
6	Beneficiary	Students/ Faculty students: Class- LY Div- A & B.
7	Content Covered	☑ Curriculum ☐ Curriculum gap ☐ Content beyond syllabus
8	Topic of Lecture/Subject	Data. Communication - computer networks
9	Details of Lecture	Network. layer. Circuit & packet switching. IPV4 & IPV6
10	COs (if applicable)	CO-4
11	POs mapped	PO-2,3,

Sign of Expert

Class Coordinator

HOD ENTC

Dept. of Electronics & Telecom. Engg.
S.V.C.E. Pandharpur

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COEPR/ENTC/2021-22/288

Date: 25/11/2021

Department of Electronics and Telecommunication Engineering

To,

Dr. Tanuja Satish Dhope
Professor,
Department of Electronics and Communication Engineering
Bharati Vidyapeeth, College of Engineering,
Dhankawadi, Pune-411043

Subject: Invitation for Expert/ Guest Lecture on "Computer Networks"

Respected sir,

We are happy to invite as an expert guest for our Final Year Electronics and Telecommunication Engineering Department students of SVERI'S COE, Pandharpur for Conducting ONLINE Guest Lecture on **"**Computer Networks**"** on 30th Nov. 2021.

You are requested to accept our invitation and please give your consent for the same.

Thank You,

Yours faithfully,

(Dr. M. M. Pawar)
H. O. D ENTC

Dept. of Electronics & Telecom. Engg
C. O. E. Pandharpur

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COEPR/ENTC/2021-22/293

Date: 30/11/2021

Department of Electronics and Telecommunication Engineering

To,

Dr. Tanuja Satish Dhope
Professor,
Department of Electronics and Communication Engineering
Bharati Vidyapeeth, College of Engineering,
Dhankawadi, Pune-411043

Subject: Thanks Letter

Respected Sir,

This is to express our heartfelt gratitude towards you for accepting invitation as Expert Guest and conducting session on "Computer Networks" for Final Year students on 30th Nov. 2021.

Your valuable guidance will always keep the students inspiring & motivating.

I request the same kind of co-operation in future also.

Thank you,

Yours faithfully,

(Dr. M.M.Pawar)
HOD ENTC

HEAD
Dept. of Electronics & Telecom. Engg.
C.O.E. Pandharpur

SVERIS's College of Engineering, Pandharpur

Electronics and Telecommunication Engineering Department

Guest/ Expert Lecture Report

Date: 30/11/2021

1	Name of Expert Faculty	Dr. Nagashettappa M. Biradar	
2	Affiliation	Adjunct Professor/ Emeritus Professor - Academics/ Industry	
3	Correspondence	Principal, BKIT, Bhalki	
4	E-mail & Contact no	bkitbhalki@gmail.com	9448505353
5	Date & Time	30.Nov.2021	
6	Beneficiary	Students/ Faculty students: Class- TY Div- A & B	
7	Content Covered	☐ Curriculum ☑ Curriculum gap ☐ Content beyond syllabus	
8	Topic of Lecture/Subject	DSP Applications	
9	Details of Lecture	DSP applications in Audio, Radar and image processing.	
10	COs (if applicable)	·ET313.6	
11	POs mapped	·	

Sign of Expert

Class Coordinator

HOD ENTC

Head
Dept. of Electronics & Telecomm
Engg. SVERI'S C.O.E. Pandharpur

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Ref. COEPR/ ENTC/ 298

Date: 29/11/2021

Department of Electronics and Telecommunication Engineering

To,

Dr. NAGASHETTAPPA BIRADAR
Principal,
Bheemanna Khandre Institute of Technology, Bhalki ,
Dist: Bidar,
(Karnataka)

Subject: Invitation for Expert/ Guest Lecture on "DSP applications"

Respected sir,

We are happy to invite as an expert guest for our Third Year Electronics and Telecommunication Engineering Department students of SVERI'S COE, Pandharpur for Conducting ONLINE Guest Lecture on **"DSP applications"** on 30th Nov. 2021.

You are requested to accept our invitation and please give your consent for the same.

Thank You,

Yours faithfully,

(Dr. M.M.Pawar)
H. O. D ENTC

HEAD
Dept. of Electronics & Telecom. Engg.
C.O.E. Pandharpur

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Ref.: COEPR/ENTC/292

Date: 30/11/2021

Department of Electronics and Telecommunication Engineering

To,

Dr. NAGASHETTAPPA BIRADAR
Principal,
Bheemanna Khandre Institute of Technology, Bhalki ,
Dist: Bidar,
(Karnataka)

Subject: Thanks Letter

Respected Sir,

This is to express our heartfelt gratitude towards you for accepting invitation as Expert Guest and conducting ONLINE session on "DSP applications" for TY students on 30th Nov. 2021.

Your valuable guidance will always keep the students inspiring & motivating.

I request the same kind of co-operation in future also.

Thank you,

Yours faithfully,

(Dr. M.M.Pawar)
HOD ENTC

HEAD
Dept. of Electronics & Telecom. Engg.
C.O.E. Pandharpur

SVERIS's College of Engineering, Pandharpur

Electronics and Telecommunication Engineering Department

Guest/ Expert Lecture Report

Date: 29/11/21.

1	Name of Expert Faculty	Dr. Veerendra Dakulagi.	
2	Affiliation	Adjunct Professor/ Emeritus Professor - Academics/ Industry	
3	Correspondence	Associate Professor of EfCE dept. Dean(R&D) Guru Nanak Dev Engineering College, Bidar Karnataka INDIA.	
4	E-mail & Contact no	Veerendra.gndec@gmail.com	8296721601.
5	Date & Time	29/11/2021.	12.00 TO 1.00.
6	Beneficiary	Students/ Faculty students: Class- TY. Div- A & B.	
7	Content Covered	☐ Curriculum ☐ Curriculum gap ☑ Content beyond syllabus	
8	Topic of Lecture/Subject	Applications of electromagnetic theory.	
9	Details of Lecture	Expert has explained detail appln of electromagnetic. faraday's law & gauss law detail explaination along with applications. He has explained field of appln like domestic or residential.	
10	COs (if applicable)	CO-3,4.	
11	POs mapped	PO-1,2,11.	

Sign of Expert
(Ms. S.S. Kadam)

29/12/2021

Class Coordinator

HOD ENTC

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

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Date: 24/11/2021

Department of Electronics and Telecommunication Engineering

To,

Dr. Veerendra Dakulagi
Associate Professor,
E&CE Dept.,
Guru Nanak Dev Engineering College, Bidar
Karnataka.

Subject: Invitation for Expert/ Guest Lecture on "Applications of electromagnetic theory"

Respected sir,

We are happy to invite as an expert guest for our Third Year Electronics and Telecommunication Engineering Department students of SVERI'S COE, Pandharpur for Conducting ONLINE Guest Lecture on **"**Applications of Electromagnetic theory**"** on 29th Nov. 2021.

You are requested to accept our invitation and please give your consent for the same.

Thank You,

Yours faithfully,

(Dr. M.M.Pawar)
HOD ENTC

HEAD
Dept. of Electronics & Telecom. Engg.
S.V.C.E. Pandharpur

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Date: 29/11/2021

Department of Electronics and Telecommunication Engineering

To,

Dr. Veerendra Dakulagi
Associate Professor,
E&CE Dept.,
Guru Nanak Dev Engineering College, Bidar
Karnataka.

Subject: Thanks Letter

Respected Sir,

This is to express our heartfelt gratitude towards you for accepting invitation as Expert Guest and conducting ONLINE session on **"**Applications of Electromagnetic theory**"** for TY ENTC students on 29th Nov. 2021.

Your valuable guidance will always keep the students inspiring & motivating.

I request the same kind of co-operation in future also.

Thank you,

Yours faithfully,

(Dr. M.M.Pawar)
HOD ENTC

HEAD
Dept. of Electronics & Telecom. Engg
C.O.E. Pandharpur

SVERIS's College of Engineering, Pandharpur

Electronics and Telecommunication Engineering Department

Date: 27-11-2021

Guest/ Expert Lecture Report

1	Name of Expert Faculty	Mr. Mallikarjun S. Bale	
2	Affiliation	Adjunct Professor/ Emeritus Professor - Academics/ Industry ✓	
3	Correspondence	Lead Engineer, Tejas Networks Pvt. Ltd. Bangalore.	
4	E-mail & Contact no	mallikarjunbale@gmail.com	8553651335
5	Date & Time	27-11-2021	3:00 – 4:30 pm.
6	Beneficiary	~~Students~~/ Faculty ✓ students: Class- S.Y Div- A&B	
7	Content Covered	☐ Curriculum ☑ Curriculum gap ☐ Content beyond syllabus	
8	Topic of Lecture/Subject	Industry Exposure & Product Developement	
9	Details of Lecture	1] Importance of basic subjects like Network theory, ECAD, Analog & Digital Electronics for product developements in the industry. 2] Embedded developement life cycle process. 3] Importance of EDA tools for Electronics product design and developement.	
10	COs (if applicable)	Analyze linear circuit with the help of different Network theorems CO2: ET 213.1.	
11	POs mapped	1,2,3,4,5,6,7,8,9,11.	

PSO 1,2,3

online.

Sign of Expert

Class Coordinator

HOD ENTC

HEAD

Dept. of Electronics & Telecomm. Engg.
S.V.C.E. Pandharpur

1

ShriVithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Pandharpur- 413 304, District: Solapur (Maharashtra)Tel.: 02186-216063, 9503103757, Toll Free No.: 1800-3000-4131, E-mail: coe@sveri.ac.in,Web: www.sveri.ac.in (Approved byA.I.C.T.E., New Delhi and Affiliated to Solapur University, Solapur, **NBA**Accredited all eligible UG Programmes,**NAAC** Accredited Institute, Accredited by The Institution of Engineers (India), Kolkata and TCS, Pune. ISO 9001-2015 Certified Institute

Date: 25/11/2021

Ref. No: COEP/E&TC/289

Department of Electronics and Telecommunication Engineering

To,
Mr. Mallikarjun S. Bale
Lead Engineer,
Tejas Networks Pvt. Ltd.
Bangalore.

Subject: Invitation for Expert/ Guest Lecture on "Industry Exposure and Product Developement"

Respected Sir,

We are happy to invite as an expert guest for our **Second Year** Electronics and Telecommunication Engineering Department students of SVERI'S COE, Pandharpur for Conducting ONLINE Guest Lecture on **"Industry Exposure and Product Developement"** on **27thNov. 2021.**

You are requested to accept our invitation and please give your consent for the same.

Thank You,

Yours faithfully,

(Dr. M. M. Pawar)
H.O.D ENTC

HEAD
Dept. of Electronics & Telecomm. Engg.
S.C.O.E. Pandharpur

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9503103757, Toll Free No.: 1800-3000-4131, E-mail: coe@sveri.ac.in,Web: www.sveri.ac.in (Approved byA.I.C.T.E., New
Delhi and Affiliated to Solapur University, Solapur, **NBA**Accredited all eligible UG Programmes,**NAAC** Accredited Institute,
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Ref. No: CoEP/E&Tc/290 **Date: 27/11/2021**

Department of Electronics and Telecommunication Engineering

To,

Mr. Mallikarjun S. Bale
Lead Engineer,
Tejas Networks Pvt. Ltd.
Bangalore.

Subject:Thanks Letter

Respected Sir,

This is to express our heartfelt gratitude towards you for accepting invitation as Expert Guest and conducting session on **"Industry Exposure and Product Developement"** for SY students on **27th Nov. 2021**

Your valuable guidance will always keep the students inspiring & motivating.

I request the same kind of co-operation in future also.

Thank you,

Yours faithfully,

(Dr. M. M. Pawar)
H.O.D ENTC

HEAD
Dept. of Electronics & Telecom. Engg.
C.O.E. Pandharpur

SVERIS's College of Engineering, Pandharpur

Electronics and Telecommunication Engineering Department

Date: 09/11/2021

Guest/ Expert Lecture Report

1	Name of Expert Faculty	Mr. Sanjay Jogalekar
2	Affiliation	Adjunct Professor/ Emeritus Professor - Academics/ Industry
3	Correspondence	Director, Kanaad Electrowation Solutions Pvt. Ltd, Sangli
4	E-mail & Contact no	
5	Date & Time	08/11/2021 12:30pm to 04:00pm
6	Beneficiary	Students/ Faculty students: Class- TY Div- A & B
7	Content Covered	☐ Curriculum ☑ Curriculum gap ☑ Content beyond syllabus
8	Topic of Lecture/Subject	Architecture of Commercial devices.
9	Details of Lecture	- Basics of PLDs - Architecture of PLDs. - CPLDs & it's Architecture. - Xilinx & Altera CPLD features and Architectures. - Application of CPLD - FPGA & it's features. - Difference between CPLD & FPGA - ASIC (Application Specific Integrated Ckt). - SOC (System-on-Chip)
10	COs (if applicable)	ET312.5
11	POs mapped	PO1, PO2, PO5, PO12

09/11/2021

Sign of Expert

Class Coordinator

HOD ENTC

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

1

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Date: 07/11/2021

Department of Electronics and Telecommunication Engineering

To,

Mr. S. B. Joglekar

Director,
Kannad Sevices, Sangli

Subject: Invitation for Expert/ Guest Lecture on "Architecture of commercial devices"

Respected sir,

We are happy to invite as an expert guest for our Second Year Electronics and Telecommunication Engineering Department students of SVERI'S COE, Pandharpur for Conducting ONLINE Guest Lecture on **"Architecture of commercial devices"** on 08th Nov. 2021.

You are requested to accept our invitation and please give your consent for the same.

Thank You,

Yours faithfully,

(Dr. M.M.Pawar)
H. O. D ENTC

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

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Date: 08/11/2021

Department of Electronics and Telecommunication Engineering

To,

Mr. S. B. Joglekar

Director,
Kannad Sevices, Sangli

Subject: Thanks Letter

Respected Sir,

This is to express our heartfelt gratitude towards you for accepting invitation as Expert Guest and conducting session on "Architecture of commercial devices" for SY students on 08th Nov. 2021.

Your valuable guidance will always keep the students inspiring & motivating.

I request the same kind of co-operation in future also.

Thank you,

Yours faithfully,

(Dr. M.M.Pawar)

HOD ENTC

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

SVERIS's College of Engineering, Pandharpur

Electronics and Telecommunication Engineering Department

Date: 2/11/21

Guest/ Expert Lecture Report

1	Name of Expert Faculty	Dr- Anushka Dipak Kadage.	
2	Affiliation	Adjunct Professor/ Emeritus Professor - Academics/ Industry ✓	
3	Correspondence	DKTE College of Engg, Ichalkaranji.	
4	E-mail & Contact no	anushdipali@gmail.com	9011395972
5	Date & Time	02/11/21	12:45pm
6	Beneficiary	Students/ Faculty students: Class- SY. Div- A & B	
7	Content Covered	☐ Curriculum ☐ Curriculum gap ☐ Content beyond syllabus ✓	
8	Topic of Lecture/Subject	ABC's of Digital Electronics	
9	Details of Lecture	Dr. Kadage Mam conducted lecture on digital electronics. - Basics of electronics - Digital vs Analog - Level of Integration.	
10	COs (if applicable)	-	
11	POs mapped	PO 1, 3	

Sign of Expert

Class Coordinator

HOD ENTC

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

ShriVithal Education & Research Institute's
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P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Pandharpur- 413 304, District: Solapur (Maharashtra)Tel.: 02186-216063, 9503103757, Toll Free No.: 1800-3000-4131, E-mail: coe@sveri.ac.in,Web: www.sveri.ac.in (Approved by A.I.C.T.E., New Delhi and Affiliated to Solapur University, Solapur **NBA**Accredited all eligible UG Programmes,**NAAC** Accredited Institute, Accredited by The Institution of Engineers (India), Kolkata and TCS, Pune. ISO 9001-2015 Certified Institute

Date: 01/11/2021

Department of Electronics and Telecommunication Engineering

To,

Dr. Mrs. Anushka Deepak Kadage

DKTE Society's Textile and Engineering Institute,
Rajwada, Ichalkaranji - 416115

Subject: Invitation for Expert/ Guest Lecture on "ABC's of Digital Electronic"

Respected sir,

We are happy to invite as an expert guest for our Second Year Electronics and Telecommunication Engineering Department students of SVERI'S COE, Pandharpur for Conducting ONLINE Guest Lecture on "ABC's of Digital Electronic" on 02nd Nov. 2021.

You are requested to accept our invitation and please give your consent for the same.

Thank You,

Yours faithfully,

(Dr. M.M.Pawar)
H. O. D ENTC

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

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Date: 02/11/2021

Department of Electronics and Telecommunication Engineering

To,

Dr. Mrs. Anushka Deepak Kadage

DKTE Society's Textile and Engineering Institute,
Rajwada, Ichalkaranji - 416115

Subject: Thanks Letter

Respected Sir,

This is to express our heartfelt gratitude towards you for accepting invitation as Expert Guest and conducting ONLINE session on "ABC's of Digital Electronic" for SY students on 02nd Nov. 2021.

Your valuable guidance will always keep the students inspiring & motivating.

I request the same kind of co-operation in future also.

Thank you,

Yours faithfully,

(Dr. M.M.Pawar)
HOD ENTC

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

SHRI VITHAL EDUCATION & RESEARCH INSTITUTE'S
COLLEGE OF ENGINEERING (POLYTECHNIC), PANDHARPUR.
Gopalpur -Ranjani Road, Gopalpur, P.B. No. 54, Tal - Pandharpur- 413 304,
Dist. Solapur (Maharashtra) Ph.: (02186) 325782, Fax: (02186) 225082.
(Approved by AICTE, New Delhi and MSBTE, Mumbai)

Ref No.: COE(POLY)/CIVIL/2020-21/ 103 Date:10/02/2021

To,

Mr. C. R Limkar,

From SVERI's COE,

PANDHARPUR

Subject:- Invitation Letter

Respected Sir,

First of all, we wish to put before you few words regarding our College. Ours is Engineering (Poly.) College located in Pandharpur Dist:-Solapur, the "South Kashi" of India and "Spiritual capital" of Maharashtra. "Shri Vitthal Education & Research Institute", Pandharpur, the trust established by group of qualified and experienced Technocrats, runs the College. We offer the following three-year Diploma courses in engineering viz. Civil Engineering ,Electronics & Tele communication Engineering, Computer Engineering, Information Technology, and Electrical Engineering.

To enrich the knowledge of the students it is decided to invite guest faculty from Industry field and Research centre to deliver lectures on related topics.

As per the telephonic discussion with Prof.Mr. Shinde N.A. , I wish to invite you to deliver few lectures on the subject **"Estimating And Coasting"** to the class T.Y. Civil students on **11/03/2020** Sat. Per Day as per your convenience.

Kindly communicate the details about your program.

Thanking you.

Your faithfully,

Head of Civil Department

College of Engineering (poly.), Pandharpur

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SHRI VITHAL EDUCATION & RESEARCH INSTITUTE'S
COLLEGE OF ENGINEERING (POLYTECHNIC), PANDHARPUR.
Gopalpur -Ranjani Road, Gopalpur, P.B. No. 54, Tal - Pandharpur- 413 304,
Dist. Solapur (Maharashtra) Ph.: (02186) 325782, Fax: (02186) 225082.
(Approved by AICTE, New Delhi and MSBTE, Mumbai)

Ref No.: COE(POLY)/CIVIL/2020-21/ 104 Date: 12/02/2021

To,

Mr. Limkar C. R.,

From SVERI's COE ,

PANDHARPUR

Subject: Thanking Letter for giving guest lecture.

Dear Sir,

This is to express our heartfelt gratitude towards you for delivering very excellent Lecture to our S.Y. Civil Engineering students on **12/02/2021**. Per Day on the subject **"Estimating And Coasting"** in our college premises.

Your valuable thoughts will always keep our students inspiring and motivated.

We request same kind of co-operation in future also.

Thank you .

Your faithfully,

Head of Civil Department

College of Engineering (poly.), Pandharpur

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SVERI's College of Engineering, Pandharpur

DEPARTMENT OF ELECTRICAL ENGINEERING
Organizes Expert Talk On

"Sizing of Array output for Matching Inverter"

Prof. Radharaman Shaha

Assistant Professor & Controller of Examinations,
Tulsiramji Gaikwad Patil College of Engineering & Technology, Nagpur

Thursday
16TH February 2022

11:00AM

Platform: zoom

SHRI VITHAL EDUCATION & RESEARCH INSTITUTE'S
COLLEGE OF ENGINEERING, PANDHARPUR
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(Approved by A.I.C.T.E., New Delhi and affiliated to Solapur University, Solapur)
ISO 9001-2000 Certified Institute & Accredited by Institute of Engineers, India,
E-mail : coe@sveri.ac.in Website: www.sveri.ac.in

Date: - 14/02/2022

To,
Mr. Radharaman Shaha,
Assistant Professor at TGPET, Nagpur.

Subject: An invitation for an online expert talk on **"Sizing of Array output for Matching Inverter".**

Respected Sir,

Shri Vithal Education and Research Institute (SVERI), a charitable trust formed by devoted technocrats established its first project, the SVERI's College of Engineering, Pandharpur in 1998 with the approval from AICTE, New Delhi. It has been affiliated to Solapur University, Solapur. Recently, the institute is awarded with "**BEST COLLEGE AWARD**" by Solapur University, Solapur. Four UG eligible programs of our institute are **NBA** accredited and has PG & Ph. D. programs. Further it has extended Diploma in Engineering, Bachelor Degree in Pharmacy, Diploma in Pharmacy and MBA. The Engineering College is **ISO 9001:2015** Certified & Accredited by **NAAC** as well.

On behalf of Electrical Engineering Department, I invite you to give an online expert talk on **"Sizing of Array output for Matching Inverter"** to our students on **16th February 2022, from 11:00 am onwards**. We are sure that your technical knowledge will give dynamic energy in the endeavor of the developmental process of our students and will empower our teaching community as well.

We are very much eager to welcome you & get the knowledge shared by you.

You are requested to accept our invitation and please give your consent for the same.
Thanking you,

Yours faithfully,

Dr. Mrs. D. A. Tamboli
H. O. D. Electrical
HEAD
Dept. of Electrical Engg.
C.O.E. Pandharpur.

SHRI VITHAL EDUCATION & RESEARCH INSTITUTE's
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Ref No: COEPR/2021-22/ Date: 14/02/2022

Department of Electrical Engineering

Notice

As per the discussion held in the meeting and directives from the respected Head of the department, We are conducting an Expert Talk on **"Sizing of Array output for Matching Inverter"** on 16th February 2022. In this regard, following faculties are assigned for smooth conduction of the event.

Sr. No.	Name of Faculty	Responsibilities	Exact Role	Sign
1	Mr. A. A. Tekale	Guest Finalization & Overall Coordination	Finalize the guest or speaker & Overall Coordination of event	
2	Dr. R. M. Patil	Anchoring	Brief Introduction about the Workshop and speaker	14/02/2022
3	Mr. M. S. Yadrami	Flyer making	Prepare flyer as per requirement and check, finalize from HoD & Dean Publicity & Protocol.	
4	Mr. V. A. Sawant	Zoom Link Creation & Attendance Monitoring & Feedback Link Creation	1. Create a link for the session and communicate it to participants via social media with Flyer. 2. Take follow up through CCs to ensure all students participated. 3. Create Feedback Link and share with coordinator.	
5	/Ms. M. K. Pawar	Letter Preparations (Invitation & Thanking Letter)	1. Prepare Invitation Letter 2. Prepare Thanking Letter 3. Take Signature and stamp of Head of Department and share these letters with coordinator. 4. Prepare Registration form and share the response sheet with Coordinator	
6	Mr. D. D. Daphale	Report Making	Prepare Report which will include ➢ Title of Event ➢ Objective of the Event ➢ Speaker Details ➢ Participants Details ➢ 5-6 Screenshots ➢ Key Outcome of the Workshop	
7	Mr. C. Veeresh	Remuneration of guest	Collect Guest Account Details, File Note sheet & Clear the Billing Process.	

Head of the Department
(Dr. Mrs. D. A. Tamboli)

HEAD
Dept. of Electrical Engg.

SHRI VITHAL EDUCATION & RESEARCH INSTITUTE'S
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E-mail : coe@sveri.ac.in Website: www.sveri.ac.in

Ref No.: COEPR/EE/2021-22/24

Date: 16/02/2022

To,
Mr.Radharaman Shaha,
Plot No-72, Deonagar,
Nagpur-440010.

Subject: - Thanking letter for conduction of an expert talk.

Dear Sir,

This is to express our heartfelt gratitude towards you for accepting our invitation and delivering an informative expert talk to our Electrical Engineering Students on 16/02/2022 on the subject **"Sizing of Array output for Matching Inverter"** via online mode.

Your valuable knowledge will always help our students for developing themselves.

We request same kind of co-operation in future also.

Thanking you once again.

(Yours faithfully),

Tamboli

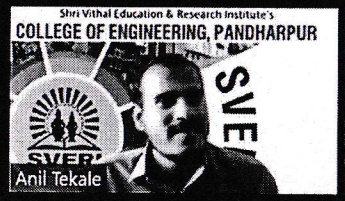
Dr. Mrs. D. A. Tamboli
H. O. D. Electrical
HEAD
Dept. of Electrical Engg
C.O.E. Pandharpur.

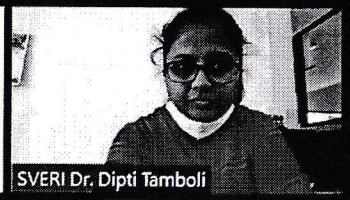
Meeting

cording...

SVERI_Prof. S. P....

SVERI_Prof. S. P. God





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EE_B Tech_16_A...

B Tech_16_Ashwini Mane

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TY 70 Sachin Todkari

EE_B.Tech_33_Shubham Doshi

EE_SYA_13_RUTUJA G Sarvagod

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E_SYA_04_Priya...

SYA_04_Priyanka Devmare

EE_63_Arbaj Tamboli

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44 Vyankatesh Gaikwad

TY 10 Rutuja Gh...

TY 10 Rutuja Ghadage

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EE_B.Tech_57_Shantanu Patil

TY 37 KULDIP D...

TY 37 KULDIP DESAI

TY 13 Swapnali...

TY 13 Swapnali Kamble

Participants (75)

Find a participant

EE TY (Host, me)

Anil Tekale (Co-host)

RS Radharaman Shaha (Co-host)

SS SVERI_Prof. S. P. God (Co-host)

RS Radharaman Shaha

SD SVERI Dr. Dipti Tamboli

26.Payal Salgare

DD Dhanraj Daphale

DR Dr R M Patil

EE.B.Tech_64_ Vinay Waghmare

EB EE_02_Snehal Bhondave

EE_63_Arbaj Tamboli

ET EE_B Tech_16_Ashwini Mane

EE_B.Tech _58_Onkar Raut

PN EE_B.Tech 21 Pratidnya Raju Nav...

ES EE_B.Tech_05_Pooja Samadhan c...

Invite

Mute All

...

ENG
IN

12:40
16-02-2022

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Ref. No. COEPR/EE/2022-23/GL/01-01

Date: 01/07/2022

ATTENDANCE CERTIFICATE

This is to certify that Prof. C. Veeresh, Assistant Professor, Department of Electrical Engineering, NBNSCOE, Kegaon, Solapur has conducted a Guest Lecture at Department of Electrical Engineering, SVERI'S College of Engineering, Pandharpur.

Particulars of the same are as follows:

1. Date of Conduction : 01/07/2022
2. Class : T.Y. B.Tech Electrical Engg.
3. Subject: Power Electronics
4. Number of Students : 69

01/07/2022

H.O.D
(Electrical Engineering)

HEAD
Dept. of Electrical Engg.
C.O.E. Pandharpur.

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Contact No.: 9545553888, 9545553737, **E-mail :** coe@sveri.ac.in, **Website :** www.sveri.ac.in
Approved by **A.I.C.T.E.**, New Delhi and affiliated to Punyashlok Ahilyadevi Holkar Solapur University, Solapur
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Accredited by Institution of Engineers (India) & TCS.

Ref.:- COEPR/EE/2022-23/GL/01-02 Date:- 01/07/2022

To,
Mr. C. Veeresh,
Assistant Professor,
Department of Electrical Enginering,
NBNSCOE, Kegaon, Solapur

Subject: - Thanking letter for conduction of a Guest Lectures.

Dear Sir,

This is to express our heartfelt gratitude towards you for accepting our invitation and delivering a Guest Lecture to our T.Y. Electrical Engineering Students on 01/07/2022 on the subject "**Power Electronics**" via offline mode.

Your valuable knowledge will always help our students for developing themselves.

We request same kind of co-operation in future also.

Thanking you once again.

(Yours faithfully),

01/07/2022
Head,
Electrical Engineering

HEAD
Dept. of Electrical Engg.
C.O.E. Pandharpur.

SVERI COLLEGE OF ENGINEERING, PANDHARPUR
DEPARTMENT OF ELECTRICAL ENGINEERING
GUEST LECTURE SUMMARY
Academic Year: 2021-22

Sr. No	Name of Programme	Name of Topic	Name of Speaker & Address	Students Participated	Mode of Conduction
1	Webinar	"Industrial Automation using PLC & SCADA"	**Mr. Tushar Bhaskarwar** Research scholar, SGGS, Nanded	SY, TY & B. E	Online
2	WORKSHOP	"Problem Solving & Ideation" Workshop	**Mr. Ashok Saraf** Trustee-Science & Technology Park, Pune University. Technical Consultant-Accurate Engineering Co. Pvt Ltd.	SY, TY & B. E & Faculty	Online
3	WORKSHOP	"Industrial Automation"	**Mr. Nayan Chaudhari** Automation Project Engineer, The world of Automation, Pune	All Engg. Branches (SVERI)	Online
4	Expert Talk	"Sizing of Array output for Matching Inverter"	**Prof. Radharaman Shah** Assistant Professor & Controller of Examination, Tulsiramji Gaikwad Patil College of Engineering & Technology, Nagpur	TY & B. E	Online
5	Expert Talk	"Energy Conservation"	**Mr. Amardeep Sudhakar Potdar** Electrical Engineer & Consultant , Pimpri Chinchwad Smart City, Pune	SY, TY & B. E	Online
6	Guidance Session on	Guidance Session on "Research Paper Writing": How to Approach	**Prof. Anil Tekale** Asst. Prof. EE Dept. SVERI's College of Engineering	B. E	Online
7	Expert Talk	Expert Talk on "Solar PV System for Livelihood Development"	**Prof. Nimay Chandra Giri** Asst. Prof. in Department of ECE and CREE, Centurion University of Technology and Management, Odisha.	TY & B. E	Online

/Dr. D. A. Tamboli
H. O. D. Electrical

HEAD
Dept. of Electrical Engg.
C.O.E. Pandharpur.

SVERI's College of Engineering, Pandharpur

Department of Electrical Engineering Organizes Expert Talk on

"Solar PV System for Livelihood Development"

Prof. Nimay Chandra Giri
Assistant Professor, Centurion University of Technology & Management, Odisha

Saturday
26TH March 2022

3:00PM

Platform: zoom

SHRI VITHAL EDUCATION & RESEARCH INSTITUTE'S
COLLEGE OF ENGINEERING, PANDHARPUR
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Tal - Pandharpur- 413 304,
Dist. Solapur (Maharashtra) Ph.(02186)- 282223, 9503103892
(Approved by A.I.C.T.E., New Delhi and affiliated to P.A.H Solapur University, Solapur)
ISO 9001-2000 Certified Institute & Accredited by Institute of Engineers, India,
E-mail : coe@sveri.ac.in Website: www.sveri.ac.in

Date: - 24/03/2022

To,
Sri Nimay Chandra Giri,
Assistant Professor,
Department of ECE &
Center for renewable Energy & Environment,
Centurion University of Technology & Management,
Odisha, India.

Subject: An invitation for an online Expert Talk on **"Solar PV System for livelihood Development"**.

Respected Sir,

Shri Vithal Education and Research Institute (SVERI), a charitable trust formed by devoted technocrats established its first project, the SVERI's College of Engineering, Pandharpur in 1998 with the approval from AICTE, New Delhi. It has been affiliated to Solapur University, Solapur. Recently, the institute is awarded with **"BEST COLLEGE AWARD"** by Solapur University, Solapur. Four UG eligible programs of our institute are **NBA** accredited and has PG & Ph. D. programs. Further it has extended Diploma in Engineering, Bachelor Degree in Pharmacy, Diploma in Pharmacy and MBA. The Engineering College is **ISO 9001:2015** Certified & Accredited by **NAAC** as well.

On behalf of Electrical Engineering Department, I invite you to give an online Expert Talk on **"SOLAR PV SYSTEM FOR LIVELIHOOD DEVELOPMENT"** to our students on **26th March 2022, from 03:00 pm** onwards. We are sure that your technical knowledge will give dynamic energy in the endeavor of the developmental process of our students and will empower our teaching community as well.

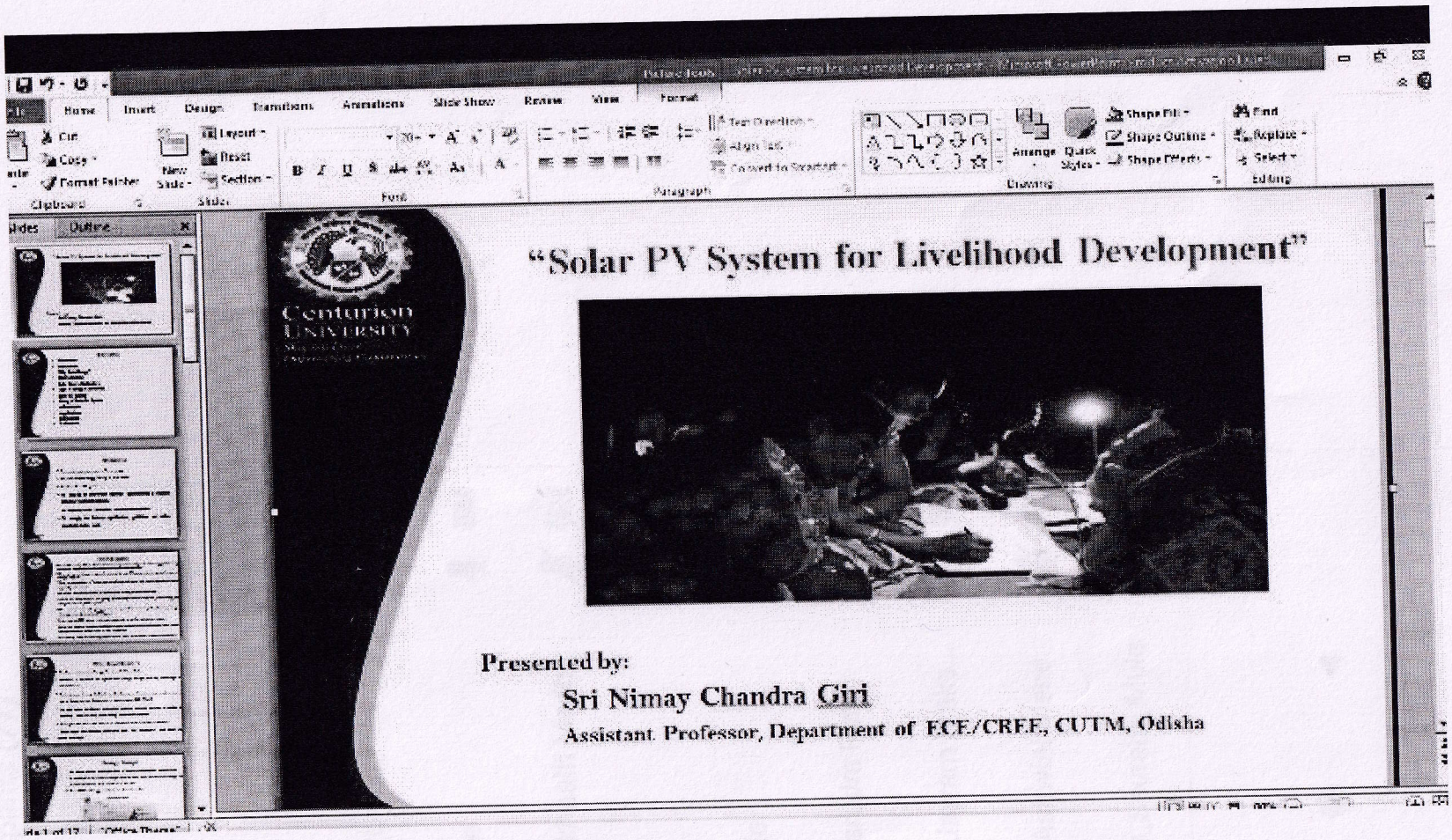
We are very much eager to welcome you & get the knowledge shared by you.

You are requested to accept our invitation and please give your consent for the same.
Thanking you,

Yours faithfully,

Dr. Mrs. D. A. Tamboli
H. O. D. Electrical Engg.

HEAD
Dept. of Electrical Engg.
C.O.E. Pandharpur.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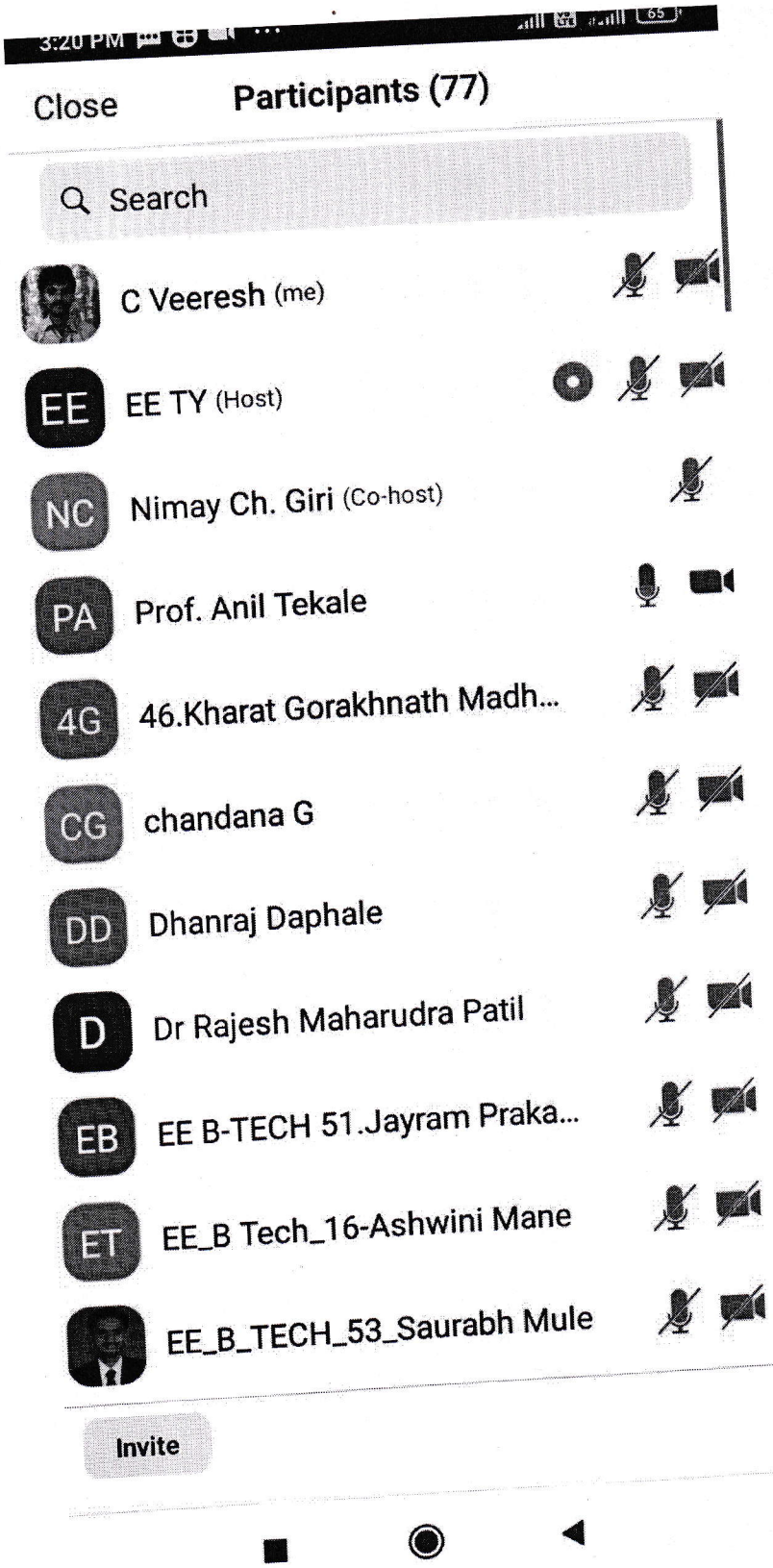
Centurion
UNIVERSITY
"Solar PV System for Livelihood Development"
Presented by:
Sri Nimay Chandra Giri
Assistant. Professor, Department of ECE/CREE, CUTM, Odisha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Participants (77)
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Nimay Ch. Giri (Co-host)
PA
Prof. Anil Tekale
4G
46.Kharat Gorakhnath Madh...
CG
chandana G
DD
Dhanraj Daphale
D
Dr Rajesh Maharudra Patil
EB
EE B-TECH 51.Jayram Praka...
ET
EE_B Tech_16-Ashwini Mane
EE_B_TECH_53_Saurabh Mule
Invite

3. Industrial Visit of Students

SVERI's
College of Engineering, Pandharpur
Department of Computer Science & Engineering

Summary Report

Sr. No.	Particulars	Total
1	Professor	1
2	Associate Professor	1
3	Assistant Professor	18

HOD CSE Dept

HOD,
Department of Computer Science & Engg
SVERI's C.O.E. Pandharpur

SVERI's, COLLEGE OF ENGINEERING , PANDHARPUR

Teaching and Non Teaching Staff List

Department :- Computer Science and Engineering

A.Y. 2021-22

Sr.No	Name of Staff	Designation	Phone No	Email ID
1	Mr.Raut Suhas Dasharath	Professor	9730464070	sdraut@coe.sveri.ac.in
2	Mrs.Pawar Swati Prashant	Assistant Professor	9764524205	sppawar@coe.sveri.ac.in
3	Dr.Thigale Somnath Balasaheb	Associate Professor	9970158565	sbthigale@coe.sveri.ac.in
4	Ms.Jadhav Vanita Dnyandev	Assistant Professor	9545553837	vdjadhv@coe.sveri.ac.in
5	Mr.Dyade Antosh Madappa	Assistant Professor	9545553445	amdyade@coe.sveri.ac.in
6	Mr.Shinde Sahadeo Maruti	Assistant Professor	8508707436	smshinde@coe.sveri.ac.in
7	Ms.Satarkar Prajakta Abhishek	Assistant Professor	9545553842	pasatarkar@coe.sveri.ac.in
8	Ms.Shinde Rupali Ramesh	Assistant Professor	7588019374	rrshinde@coe.sveri.ac.in
9	Ms.Kadam Sanjivani Sachin	Assistant Professor	9766880771	sskadam@coe.sveri.ac.in
10	Mrs.Bhosale Supriya Shrikrisha	Assistant Professor	9503103814	ssbhosale@cod.sveri.ac.in
11	Ms.Dhumal Trupti Arun	Assistant Professor	9421960415	tadhumal@coe.sveri.ac.in
12	Ms.Deval Nimisha Dinesh	Assistant Professor	9689638344	nddeval@coe.sveri.ac.in
13	Mr.Sale Vinayak Macchindra	Assistant Professor	9175799480	vmsale@coe.sveri.ac.in
14	Ms.Chouhan Kanchan Iccharam	Assistant Professor	9588641590	kichouhan@coe.sveri.ac.in
15	Ms.Sirdeshmukh Gayatri Saurabh	Assistant Professor	9850810828	gssirdeshmukh@coe.sveri.ac.in
16	Mr.Mane Pramod Damodar	Assistant Professor	7020606779	pdmane@coe.sveri.ac.in
17	Mr.Dethe Tukaram Hanmant	Assistant Professor	8600264364	thdethe@coe.sveri.ac.in
18	Ms. Rajmane Vaishali Vijay	Assistant Professor	9067287767	vvrajmane@coe.sveri.ac.in
19	Mr. Zambare Vaibhav Vilas	Assistant Professor	8329370038	vvzambare@coe.sveri.ac.in
20	Mr. Salotagi Shreekant C.	Assistant Professor	9740397468	scsalotagi@coe.sveri.ac.in

Sr.No	Non Teaching List	Designation	Phone No	Email ID
1	Mr.A.N.Shinde	Lib Attendant	9970905081	anshinde@coe.sveri.ac.in
2	Mr.P.C.Waghmare	Lib Attendant	9545559676	pcwaghmare@coe.sveri.ac.in
3	Mr.F.A.Shaikh	Lib Assistant	9172074450	fashaikh@coe.sveri.ac.in
4	Mr.D.V.Londhe	Lib Attendant	9850903519	dvlondhe@coe.sveri.ac.in

HOD CSE Dept

HOD,
Department of Computer Science & Engg
SVERI's C.O.E. Pandharpur

INDUSTRIAL VISIT REPORT
OF

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SVERI's College of Engineering, Pandharpur.

(17th June to 18th June 2022)

The Department of Computer Science and Engineering, SVERI's College of Engineering, Pandharpur organized 2 days 1 night Industrial visit to **Jijau IT Solution and Service Pvt. Ltd. Satara and Walstar Technologies Pvt. Ltd Kolhapur** for S. Y B.Tech. CSE engineering students.

Visit was organized with the prior permission and guidance of Honorable Principal **Dr. B. P. Ronge.** It was supported by Respected HOD **Dr. A. S. Budhewar**, Dean Students **Dr. M. S. Mathpati** and Dean academic **Dr. P. M. Pawar** along with Department teaching staff members. Total 100 S. Y. B.Tech A and B students and four staff visited these Companies.

The details of Journey are as follows:-

1. We started traveling from SVERI's COE, Pandharpur on 17th June at 6.00 am.
2. We reached to Satara at 9 a.m. on 17th June 2022.
3. We visited Jijau IT Solutions and Service Pvt. Ltd. Satara on 17th June 2022 at 11 am.
4. On 17th June 2022 afternoon we visited Pratapgade.
5. We visited Walstar Technologies Pvt. Ltd. Kolhapur on 18th June 2022 at 11 am.
6. On 18th June 2022 afternoon we visited.

The students got benefited in terms of the technical details provided by the company on an important part of Web design development and launching the site. And after visiting Walstar Technologies, student will be understand what mobile app Development work is and how search Engine Optimization work in field of computer science.

They conducted seminar session which covered the following details:-
The presentation session was conducted by:

1. (Jijau IT Solution and Pvt.Ltd.)
2. (Walstar Technologies Pvt. Ltd.)

Company Profile:

1. Jijau IT Solution and Pvt. Ltd.:

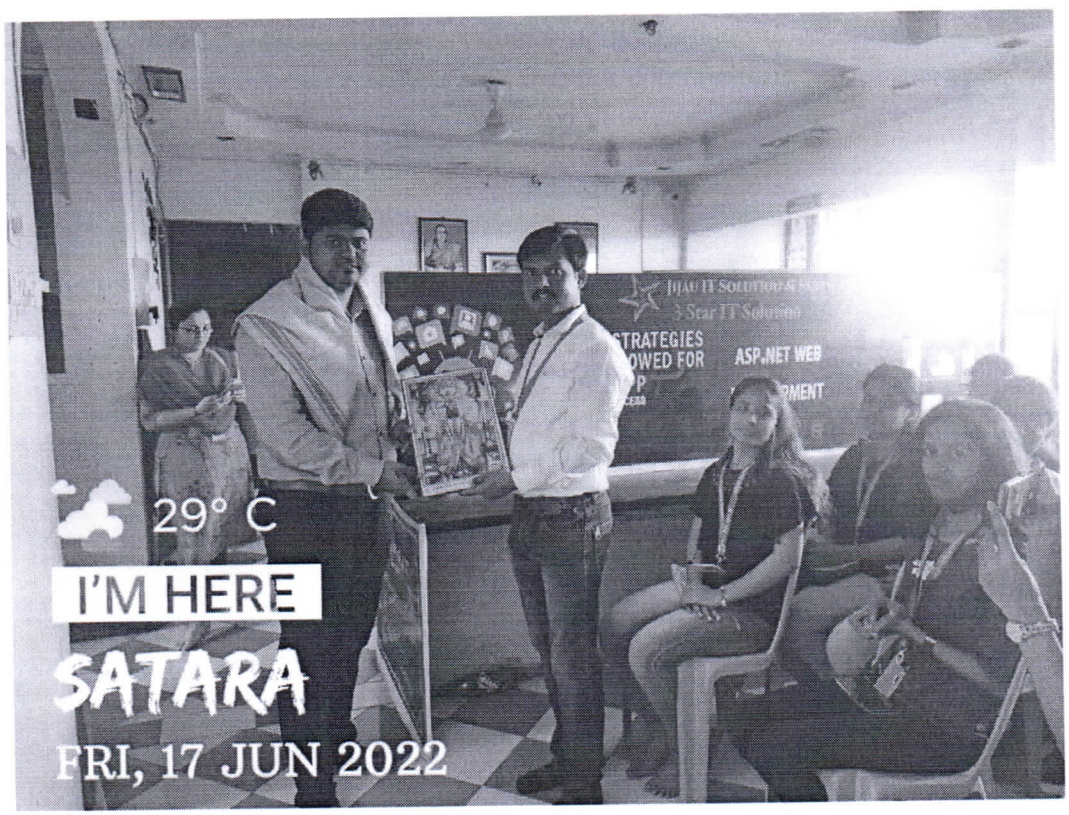
Jijau IT Solution and Services Pvt. Ltd is a 4 year old company specializing in website designing, Digital Marketing, Branding and Advertising services. Currently this company has 200+ clients who are extremely satisfied with their work. It mainly contains following points

1. Web Development: Our ultimate goal has been to convey a professional site, which visually interests customers.

2. Digital Marketing: We offer SEO, Social Media Marketing like Facebook, Twitter, Instagram, LinkedIn, Google Ads.

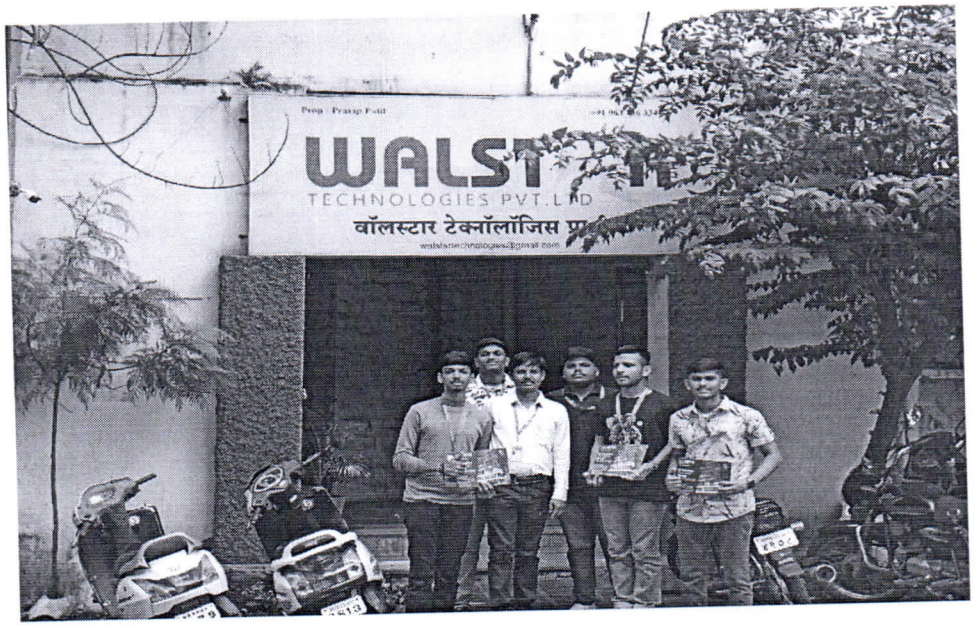
3. Android Development: We are next Generation Technology service provider in Satara, India.

4. Graphic design: We will design creative & trendy graphics for your brand.



2. Walstar Technologies Pvt. Ltd

Walstar Technologies Pvt. Ltd. is a holistically developing company with the quickest Web Designing as a dynamic core of services. A company situated in a town like Kolhapur, India, has captured a magnificent market across India in countries like the USA, Denmark, Australia, Japan, France, Germany, and Canada. This company mainly focuses on developing innovative and high-caliber services like Website Development, Internet Business Arrangements, SEO, and Digital Marketing. They constantly work towards building an effective bond with our customers to keep up the long-haul relationship.



The students of S.Y. Computer Science Engineering and all the four staff members have enjoyed the technical Endeavour at these companies a lot. The company persons also appreciated our students after the question answer sessions. Students were well mannered and disciplined throughout the Tour and no injury or anything bad happened during the industrial tour. All the Staff members and Students are highly thankful to you for providing such an opportunity for the visit.

Thanking You.

Staff Coordinator

Sr.No.	Name	Sign
1	Prof. N. D. Deval	
2	Prof. K. I. Chouhan	
3	Prof. P. D. Mane	
4	Prof. V. V. Zambare	
5	Mr. F. A. Shaikh	

Student Feedback We had the most amazing visits which gave us real technical and research insight. We got the knowledge about working of a software company. Also we learnt about research activities which have given exposure to different project ideas that will help us to decide final year projects. It helped us to explore our skills and was truly enlightening.

We had the most amazing visits which gave us real technical and research insight. We got the knowledge about working of a software company. Also we learnt about research activities which have given exposure to different project ideas that will help us to decide final year projects. It helped us to explore our skills and was truly enlightening.

These visit gave exposure about opportunities in Software industry and how exactly these industries work. It also inspired the students to be an entrepreneur and be updated about the new technologies which will help them in preparing for starting their own start-ups. These types of visits should be carried out for the students regularly so that the students get exact exposure about the working and requirements of the industries which is expected from the students at the time of placement and after the session.

HOD,
Department of Computer Science & Engg
SVERI's C.O.E. Pandharpur

REQUST FOR STUDY TOUR / INDUSTRIAL VISIT

1. Branch and Semester: Computer Science and Engineering, 4th Semester

2. Nature of tour: Study tour/Industrial visit

3. Places or Industries planned to visit: Satara and Kolhapur

4. Proposed dates of tour or visit: 02

5. Mode of journey: By bus

6. Total number of students in class: 154

7. Total number of attending students: 100

8. Number of YD Students: 00

a. Number of Boys: 55

b. Number of Girls: 46

9. Details of accompanying Faculty members

Sr . No	Name	Designation	Department	Contact No.	
1.	Ms. N.D. Deval	Asst-Prof.	CSE	9689638344	NDDeval
2.	Ms. K.T. Chouhan	Asst. Prof	CSE	9588641590	ktchouhan
3.	Mr. P.D. Mane	Asst-Prof	CSE	7020606779	Pmane
4.	Mr. V.V. Zambare	Asst-Prof	CSE	8329370038	Vvz
5.	Mr. F.A. Shaikh	Lab. Asst.	CSE	9172074450	

10. Details of Industry from which permission obtained:
(Attach copy of permission letter)

- **Company Name 1: Jijau IT Solution and Service Pvt. Ltd.**
  Address : Bus Stop, Flat No-9,10, 'C' Wing , City Court Apartment, in front of Molacha Odha, Satara, Maharashtra 415002, Mo. No- 9767372701 Email id: - jijauSoftwares@gmail.com

- **Company Name 2: Walstar Technologies Pvt. Ltd.**
  Address: 1243/56, First Floor, Udyam Chamers, Udyam Nagar, Rajaram Road, Kolhapur 416008,Mo.No-7517312872, Email id:hr@walstartechnologies.com

Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
SVERI
Engineering for Excellence

P. B. No. 54, Gopalpur - Ranjani Road, Gopalpur, **Tal.**: Pandharpur - 413 304, **Dist.**: Solapur (MH)
Contact No.: 9545553888, 9545553737, **E-mail** : coe@sveri.ac.in, **Website** : www.sveri.ac.in
Approved by **A.I.C.T.E.**, New Delhi and affiliated to Punyashlok Ahilyadevi Holkar Solapur University, Solapur
NBA Accredited all eligible UG Programmes, **NAAC** Accredited Institute, ISO 9001 : 2015 Certified Institute.
Accredited by Institution of Engineers (India) & TCS.

Ref.:- COE/CSE/2021-22/2314 Date:- 16/6/2022

To,

HR Manager
Walstar Technologies Pvt.Ltd.
Kolhapur.

Subject: Regarding Industrial Visit to Your Organisation.

Dear Sir/Madam,

Our Institute,SVERI's College of Engineering, affiliated to Punyashlok Ahilyadevi Holkar Solapur University, Solapur, Maharashtra, offers Degree courses in Computer Science and Engineering, Electronics and telecommunication, Mechanical Engineering, Civil Engineering and Electrical Engineering. As a part of curriculum the students of Third Year Computer Science Engineering are required to undertake an Industrial Visit.

We would like to send 100 students accompanied by 5 staff members to visit your esteemed organization on 18/06/2022.

We ensure that our students will follow the rules and regulations of your organisation.

Kindly give us permission so that we can go for train reservation and hotel booking.

Thanking You

HOD CSE

HOD
Department of Computer Science & Engg
SVERI's C.O.E., Pandharpur

Walstar Technologies Pvt.Ltd
Kolhapur

Walstar Technologies Pvt.Ltd
CEO

Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P. B. No. 54, Gopalpur - Ranjani Road, Gopalpur, **Tal.:** Pandharpur - 413 304, **Dist.:** Solapur (MH)
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Accredited by Institution of Engineers (India) & TCS.

Ref.:- COE/CSE/2021-22/334/ Date:- 16/6/22

To,

HR Manager
Walstar Technologies Pvt.Ltd.

Kolhapur.

Dear Sir/Madam,

This is expressing our heartfelt gratitude towards you for giving us permission to visit your organisation on 18th June 2022.

It was very valuable and useful experience for our students. This visit has helped our students to get knowledge which they cannot gain in classrooms as well as helped them to make connections between the different aspects of educational experience.

Thank You for your cooperation.

Thanking You.

HOD CSE

HOD,
Department of Computer Science & Engg
SVERI's C.O.E. Pandharpur

Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
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Accredited by Institution of Engineers (India) & TCS.

Ref.:- COE/CSE/2021-22/234/. Date:- 16/6/22

To,

The CEO,
Jijau IT Solution and Service Pvt. Ltd.

Satara.

Dear Sir/Madam,

This is expressing our heartfelt gratitude towards you for giving us permission to visit your organisation on 17th June 2022.

It was very valuable and useful experience for our students. This visit has helped our students to get knowledge which they cannot gain in classrooms as well as helped them to make connections between the different aspects of educational experience.

Thank You for your cooperation.

Thanking You.

HOD CSE

HOD,
Department of Computer Science & Engg
SVERI's C.O.E. Pandharpur

Jijau Softwares
Satara

CEO
Mr. Rohit B. Bhole
Jijau IT Solution & Services OPC Pvt. Ltd.

Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
SVERI
Engineering for Excellence

P. B. No. 54, Gopalpur - Ranjani Road, Gopalpur, **Tal.:** Pandharpur - 413 304, **Dist.:** Solapur (MH)
Contact No.: 9545553888, 9545553737, **E-mail :** coe@sveri.ac.in, **Website :** www.sveri.ac.in
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Accredited by Institution of Engineers (India) & TCS.

Ref.:- COE/CSE/2021-22/234/6 Date:- 16/6/2022

To,

The CEO,
Jijau IT Solution and Service Pvt. Ltd.

Satara.

Subject: Regarding Industrial Visit to Your Organisation.

Dear Sir/Madam,

Our Institute,SVERI's College of Engineering, affiliated to Punyashlok Ahilyadevi Holkar Solapur University, Solapur, Maharashtra, offers Degree courses in Computer Science and Engineering, Electronics and telecommunication, Mechanical Engineering, Civil Engineering and Electrical Engineering. As a part of curriculum the students of Second Year Computer Science Engineering are required to undertake an Industrial Visit.

We would like to send 100 students accompanied by 5 staff members to visit your esteemed organization on 17/06/2022.

We ensure that our students will follow the rules and regulations of your organisation.

Kindly give us permission so that we can go for train reservation and hotel booking.

Thanking You

HOD CSE

HOD,
Department of Computer Science & Engg
SVERI's C.O.E. Pandharpur.

Jijau Softwares
Satara

CEO
Mr. Rohit B. Bhole
Jijau IT Solution & Services OPC Pvt. Ltd.

Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Pandharpur- 413 304, District: Solapur (Maharashtra)
Tel.: 02186-216063, 9503103757, Toll Free No.: 1800-3000-4131, E-mail: coe@sveri.ac.in, Web: www.sveri.a
(Approved by A.I.C.T.E., New Delhi and Affiliated to Solapur University, Solapur)
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Date: 15/06/2022

To,
The Dean Students,
Sveri's College of Engg,
Pandharpur.

Subject: Seeking permission for two days Industrial Visit on 17 to 18 June 2022.

Dear Sir,

As per the PAHSU curriculum, our Computer Science & Engineering students **(SYCSE)** are expected to visit prominent industries and companies for the practical exposure and insights to the real working environment. Requesting you to kindly accord permission to Visit for organization and do the needful. Your Positive Social response in this regard will be highly solicited.

Visit Details are as below:

Company Name 1: Jijau IT Solution and Service Pvt. Ltd.
Address : Bus Stop, Flat No-9,10, 'C' Wing , City Court Apartment, in front of Molacha Odha, Satara, Maharashtra 415002, Mo. No- 9767372701 Email id: - jijauSoftwares@gmail.com

Company Name 2: Walstar Technologies Pvt. Ltd.
Address: 1243/56, First Floor, Udyam Chamers, Udyam Nagar, Rajaram Road, Kolhapur 416008, Mo.No-7517312872, Email id:hr@walstartechnologies.com

Date: 17th & 18th June 2022

Strength: SY CSE: -102 (Boys-54, Girls-46)

N. D. Deval.
(I.V. Coordinator)
Prof. N. D. Deval
CSE Department

(Head of Department)
Dr. A. S. Budhewar
CSE Department
HOD,
Department of Computer Science & Engg
SVERI's C.O.E. Pandharpur

16/06/22.
(Dean Students)
Dr. M. S. Mathpati

Annexure II

TRAVEL PLAN FOR STUDY TOUR / INDUSTRIAL

VISIT PART A

(To be attached with request of study tour)

1. Branch & Semester: Computer Science and Engineering, 4th Semester

2. Nature of Tour: Study tour/Industrial visit

3. Dates of Journey: From 17-JUNE-2022 to 18-JUNE-2022

4. Total number of days: 02

5. Travel plan

Sr. No	Place	Date	Time
1	SVERI's COE Pandharpur to Satara (By Bus)	17/06/2022	5.00 AM to 11.00 AM
2	Visit to Jijau IT Solutions and Service Pvt Ltd,Satara (By Bus)	17/06/2022	11.00 AM to 1.00 PM
3	Satara to Kolhapur (By Bus)	17/06/2022	2.00 PM to 9.00 PM
5	Visit to Walstar Technologies Pvt.Ltd. Kolhapur (By Bus)	18/06/2022	10.00 AM to 1.00 PM
6	Kolhapur to SVERI's COE Pandharpur (By Bus)	18/06/2022	2:00 PM to 10.00 PM

Signature of Class Representatives/Tour coordinators

1. Name: Amrut Yogesh Virdhe **Signature:**

2. Name: Pradnya Anil Repal **Signature:**

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COLLEGE OF ENGINEERING, PANDHARPUR
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Accredited by Institution of Engineers (India) & TCS.

Ref.:- COE/CSE/2021-22/234/1 Date:- 16/6/2022

Sr.No	Name of Students	Sr.No	Name of Students
1	Shraddha Birajdar	29	Akshay Chavan
2	Khushi Dhotre	30	Atharv Davale
3	Sanskruti Jadhav	31	Atharv Deshpande
4	Priti Kapse	32	Saurabh Gaikwad
5	Rutuja Kupade	33	Pradip Ghadage
6	Sayali Linge	34	Aditya Ghodake
7	Dhanashree Lokhande	35	Ritesh Jadhav
8	Shilpa Mali	36	Ganesh Jagdale
9	Vaishnavi Mandve	37	Ganesh Kaldhone
10	Rutuja Mane	38	Shreyash Kapse
11	Samrudhi Masalekar	39	Yash Kaulwar
12	Ayesha Mujavar	40	Ganesh Naiknavare
13	Akanksha Pasale	41	Harsh Nargide
14	Saifa Patel	42	Mahesh Patil
15	Akanksha Pawar	43	Yash Repal
16	Nikita Pore	44	Digvijay Shinde
17	Sakshi Rajurkar	45	Somnath Shinde
18	Rohini Raut	46	Abhijit Surshetwar
19	Pradnya Repal	47	Sheyas Surwase
20	Sakshi Salvitthal	48	Prasad Thorat
21	Diksha Sasane	49	Amrut Virdhe
22	Prajakta Sathe	50	Vikas Virkar
23	Shivani Shende	51	Aditya Waghmare
24	Nikita Tad	52	Pranav Waghmare
25	Rutuja Thengal	53	Rushikesh Waghule
26	Sandhya Tule	54	Prasad Shinde
27	Nupur Pawar	55	Nikhil Jadhav
28	Rajeshwari Ghodake	56	Malhar Gadade

HOD,
Department of Computer Science & Engg
SVERI's C.O.E. Pandharpur

Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P. B. No. 54, Gopalpur - Ranjani Road, Gopalpur, **Tal.:** Pandharpur - 413 304, **Dist.:** Solapur (MH)
Contact No.: 9545553888, 9545553737, **E-mail :** coe@sveri.ac.in, **Website :** www.sveri.ac.in
Approved by **A.I.C.T.E.**, New Delhi and affiliated to Punyashlok Ahilyadevi Holkar Solapur University, Solapur
NBA Accredited all eligible UG Programmes, **NAAC** Accredited Institute, ISO 9001 : 2015 Certified Institute.
Accredited by Institution of Engineers (India) & TCS.

Ref.:- COE/CSE/2021-22/234/2 Date:- 16/6/2022

Sr.No	Name of Students	Sr.No	Name of Students
1	Swati Ambule	28	Om Dixit
2	Anuja Bile	29	Sudarshan Gaikwad
3	Snehal Darade	30	Ritesh Gangthade
4	Sneha Galande	31	Saurabh Gulamkar
5	Sampada Gavali	32	Atharv Hingmire
6	Pragati Gove	33	Tejas Huke
7	Pranali Hilal	34	Rohit Jagtap
8	Nikita Jagtap	35	Vithhal Kagane
9	Purva Jagtap	36	Viraj Koli
10	Sonali Khude	37	Nilesh Lavate
11	Namrata Kumbhar	38	Sudarshan Mote
12	Akanksha Landage	39	Rohit Parit
13	Aparna Lokare	40	Akshay Patil
14	Kiran Lokhande	41	Mihir Vanave
15	Sakshi Nikam	42	Pradnesh Shevantikar
16	Nishita Patil	43	Parth Kulkarni
17	Aishwarya Rohite	44	Vinayak Jadhav
18	Shreya Kanade		
19	Dipak Aiwale		
20	Rushikesh Aware		
21	Shubham Bandgar		
22	Harshad Bansode		
23	Mustkeem Baraskar		
24	Sudarshan Bhosale		
25	Gaurav Birajdar		
26	Kaivalya Bulbule		
27	Shambhuraje Deshmukh		

HOD,
Department of Computer Science & Engg
COE Pandharpur

Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
SVERI
Engineering for Excellence

P. B. No. 54, Gopalpur - Ranjani Road, Gopalpur, **Tal.:** Pandharpur - 413 304, **Dist.:** Solapur (MH)
Contact No.: 9545553888, 9545553737, **E-mail :** coe@sveri.ac.in, **Website :** www.sveri.ac.in
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NBA Accredited all eligible UG Programmes, **NAAC** Accredited Institute, ISO 9001 : 2015 Certified Institute.
Accredited by Institution of Engineers (India) & TCS.

Ref.:- COE/CSE/2021-22/239/3 Date:- 16/6/2022

To,

HR Manager
Walstar Technologies Pvt.Ltd.

Kolhapur.

Dear Sir/Madam,

This is us expressing our heartfelt gratitude towards you for giving us permission to visit your organisation.

It was very valuable and useful experience for our students. This visit has helped our students to get knowledge which they cannot gain in classrooms as well as helped them to make connections between the different aspects of educational experience.

Thank You for your cooperation.

Thanking You.

HOD CSE

HOD,
Department of Computer Science & Engg
SVERI's C.O.E. Pandharpur

Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
SVERI
Engineering for Excellence

P. B. No. 54, Gopalpur - Ranjani Road, Gopalpur, **Tal.:** Pandharpur - 413 304, **Dist.:** Solapur (MH)
Contact No.: 9545553888, 9545553737, **E-mail :** coe@sveri.ac.in, **Website :** www.sveri.ac.in
Approved by **A.I.C.T.E.**, New Delhi and affiliated to Punyashlok Ahilyadevi Holkar Solapur University, Solapur
NBA Accredited all eligible UG Programmes, **NAAC** Accredited Institute, ISO 9001 : 2015 Certified Institute.
Accredited by Institution of Engineers (India) & TCS.

Ref.:- COE/CSE/2021-22/2345 Date:- 16/6/2022

To,

The CEO,
Jijau IT Solution and Service Pvt. Ltd.

Satara.

Dear Sir/Madam,

This is us expressing our heartfelt gratitude towards you for giving us permission to visit your organisation.

It was very valuable and useful experience for our students. This visit has helped our students to get knowledge which they cannot gain in classrooms as well as helped them to make connections between the different aspects of educational experience.

Thank You for your cooperation.

Thanking You.

HOD CSE

HOD,
Department of Computer Science & Engg
SVERI's C.O.E. Pandharpur

SVERI

Kanchan Chouhan <kichouhan@coe.sveri.ac.in>

About Industrial Visit of SVERI's College of Engineering, Pandharpur

5 messages

Kanchan Chouhan <kichouhan@coe.sveri.ac.in> Wed, Jun 15, 2022 at 3:27 PM
To: jijauSoftwares@gmail.com

Respected Sir/Madam,

I am Ms. Kanchan Iccharam Chouhan working as Asst. Prof. in Computer Science and Engineering of SVERI's College of Engineering, Pandharpur. We are planning an Industrial Visit for SY students on coming Friday or Saturday. We are interested to visit your company for the same. Total 100 students are there.

Looking forward to hearing from you.

Thank you!

Contact Details:
Prof. P. D. Mane - 7020606779
--
Regards,
Ms. Kanchan I. Chouhan
Assistant Professor CSE department,
SVERI'S College of Engg. Pandharpur.

---

jijau Softwares <jijausoftwares@gmail.com> Wed, Jun 15, 2022 at 6:03 PM
To: Kanchan Chouhan <kichouhan@coe.sveri.ac.in>

Respected Ma'am,
Greetings of the day !!

We are glad to inform you that Industrial Visit has been confirmed for 17-June-2022 friday.

Reporting Time:
Office Address: **C-09/city court app molacha odha,gvt ITI Chouk , Satara , 415002**

Below are certain rules that students have to maintain during this visit.

1. Not Connecting any personal devices to systems
2. Wearing of mask.

Regards
CEO,
Jijau Software's
[Quoted text hidden]

Kanchan Chouhan <kichouhan@coe.sveri.ac.in> Wed, Jun 15, 2022 at 7:38 PM
To: jijau Softwares <jijausoftwares@gmail.com>

Thank you for your mail.
[Quoted text hidden]

Kanchan Chouhan <kichouhan@coe.sveri.ac.in> Wed, Jun 15, 2022 at 7:51 PM
To: Nimisha Deval <nddeval@coe.sveri.ac.in>, Pramod Mane <pdmane@coe.sveri.ac.in>, vaibhav zambare <vvzambare@coe.sveri.ac.in>
Cc: Anupama Budhewar <asbhdhewar@coe.sveri.ac.in>

HOD,
Department of Computer Science & Engg
SVERI's C.O.E, Pandharpur.

[Quoted text hidden]

Anupama Budhewar <asbhdhewar@coe.sveri.ac.in> Wed, Jun 15, 2022 at 7:49 PM
To: kichouhan@coe.sveri.ac.in

Dr. Anupama S. Budhewar
Associate Professor, Head of the Department
Shri Vithal Education and Research Institutes
College of Engineering, Pandharpur-413304

--

Dr. Anupama S. Budhewar
Associate Professor, Head of the Department CSE,
Shri Vithal Education and Research Institutes
College of Engineering, Pandharpur-413304

SVERI

Kanchan Chouhan <kichouhan@coe.sveri.ac.in>

About Industrial Visit of SVERI's College of Engineering, Pandharpur

3 messages

Nimisha Deval <nddeval@coe.sveri.ac.in> Mon, Jun 13, 2022 at 4:27 PM
To: hr@walstartechnologies.com
Cc: Anupama Budhewar <asbhdhewar@coe.sveri.ac.in>, Pramod Mane <pdmane@coe.sveri.ac.in>, Kanchan Chouhan <kichouhan@coe.sveri.ac.in>, vaibhav zambare <vvzambare@coe.sveri.ac.in>

Respected Sir/Madam,

I am Ms. Nimisha Dinesh Deval working as Asst. Prof. in Computer Science and Engineering of SVERI's College of Engineering, Pandharpur. We are planning an Industrial Visit for SY students on coming Friday or Saturday. We are interested to visit your company for the same. Total 100 students are there.

Looking forward to hearing from you.

Thank you!

--
Regards,
Ms. Nimisha D. Deval
Mobile No. +91 9689638344
Assistant Professor
CSE department,
SVERI'S College of Engg. Pandharpur.

---

hr@walstartechnologies.com <hr@walstartechnologies.com> Tue, Jun 14, 2022 at 12:49 PM
To: Nimisha Deval <nddeval@coe.sveri.ac.in>
Cc: Anupama Budhewar <asbhdhewar@coe.sveri.ac.in>, Pramod Mane <pdmane@coe.sveri.ac.in>, Kanchan Chouhan <kichouhan@coe.sveri.ac.in>, vaibhav zambare <vvzambare@coe.sveri.ac.in>

[Quoted text hidden]

Respected Ma'am,
Greetings of the day !!

We are glad to inform you that Industrial Visit has been confirmed for 18-June-2022 Saturday.

Reporting Time: 11:00 AM
Office Address: 1243/56, First Floor, Udyam Chamers, Udyam Nagar, Rajaram Road, Kolhapur 416008.

Below are certain rules that students have to maintain during this visit.

1. Not Connecting of any personal devices to systems
2. Wearing of mask

We would be grateful if you provide us the following information in relation with the visit.

1. Preferred date of visit
2. Class/Semester of the students.
3. Total count of students.
4. Total count of faculty members.
5. A topic on which you think we should give a speech/presentation.
6. Technologies on which you would like to gain information.
7. Any other aspects on which you expect us to provide information.

We are looking forward to provide significant knowledge to your students during this visit.
Thank you once again...!

HOD,
Department of Computer Science & Engg
SVERI's C.O.E. Pandharpur

Regards
HR Manager
Walstar Technologies Pvt.Ltd.
Mo.No-7517312872
hr@walstartechnologies.com
www.walstartechnologies.com

Nimisha Deval <nddeval@coe.sveri.ac.in> Wed, Jun 15, 2022 at 1:43 PM
To: hr@walstartechnologies.com
Cc: Anupama Budhewar <asbhdhewar@coe.sveri.ac.in>, Pramod Mane <pdmane@coe.sveri.ac.in>, Kanchan Chouhan <kichouhan@coe.sveri.ac.in>, vaibhav zambare <vvzambare@coe.sveri.ac.in>

Please see the following information regarding our Industrial visit:

1. Preferred date of visit: 18 June, 2022
2. Class/Semester of the students: S.Y.B.Tech (CSE), Semester- II
3. Total count of students: 100
4. Total count of faculty members: 4
5. A topic on which you think we should give a speech/presentation: Search Engine Optimization
6. Technologies on which you would like to gain information: Automated on-age content optimization

Thank you!
[Quoted text hidden]

INDUSTRIAL VISIT REPORT
OF

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SVERI's College of Engineering, Pandharpur.

(28th May To 30th May 2022)

The Department of Computer Science and Engineering, SVERI's College of Engineering, Pandharpur organized a 3 days 2 nights Industrial visit to **ISRO NRSC Hyderabad,Web Ruchi Solutions and Birla Museum** for T.E. CSE engineering students.

Visit was organized with the prior permission and guidance of Honorable Principal **Dr. B. P. Ronge.** It was supported by Respected HOD **Dr.S.B.Thigale**, Dean Students **Dr.M.S.Mathpati** and Dean academic **Dr. P.M.Pawar** along with Department teaching staff members. Total 107 T.E A and B students and four staff visited these Companies.

The details of Journey are as follows:-

1. We started traveling from SVERI's COE, Pandharpur on 27th May at 4.00 pm.
2. We reached to Hyderabad at 6 a.m. on 28th May 2022. We did stay at hotel on the same day in Hyderabad.
3. We visited Web Ruchi Solutions on 28th May 2022 at 11 am.
4. On 29th May 2022 morning we visited Birla Science Museum.
5. We visited ISRO NRSC Hyderabad on 30th May 2022 at 10 am.Students were divided in four groups. And visited laboratories one by one. ISRO had given us presentation on recent trends and started their session at 11:30 am. The activity continued upto 4pm on same day and had started return journey on same day.

The students got benefited in terms of the technical details provided by the company on an important part of Web design development and launching the site. And after visiting research labs, students got information about ISRO's ongoing project activities in the field of computer science.

They conducted seminar session which covered the following details:-
The presentation session was conducted by:

1. Dr. T.S.Prasad
2. Mr. Y.Suresh (Birla Science Museum)
3. Mr. Ranjan Raja (Web Ruchi Solutions)

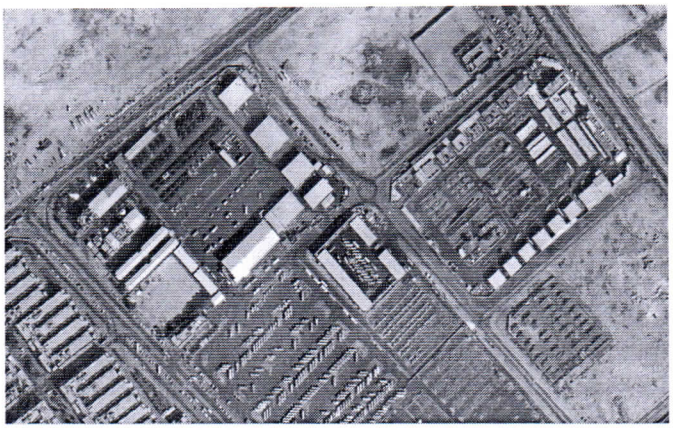
Company Profile:

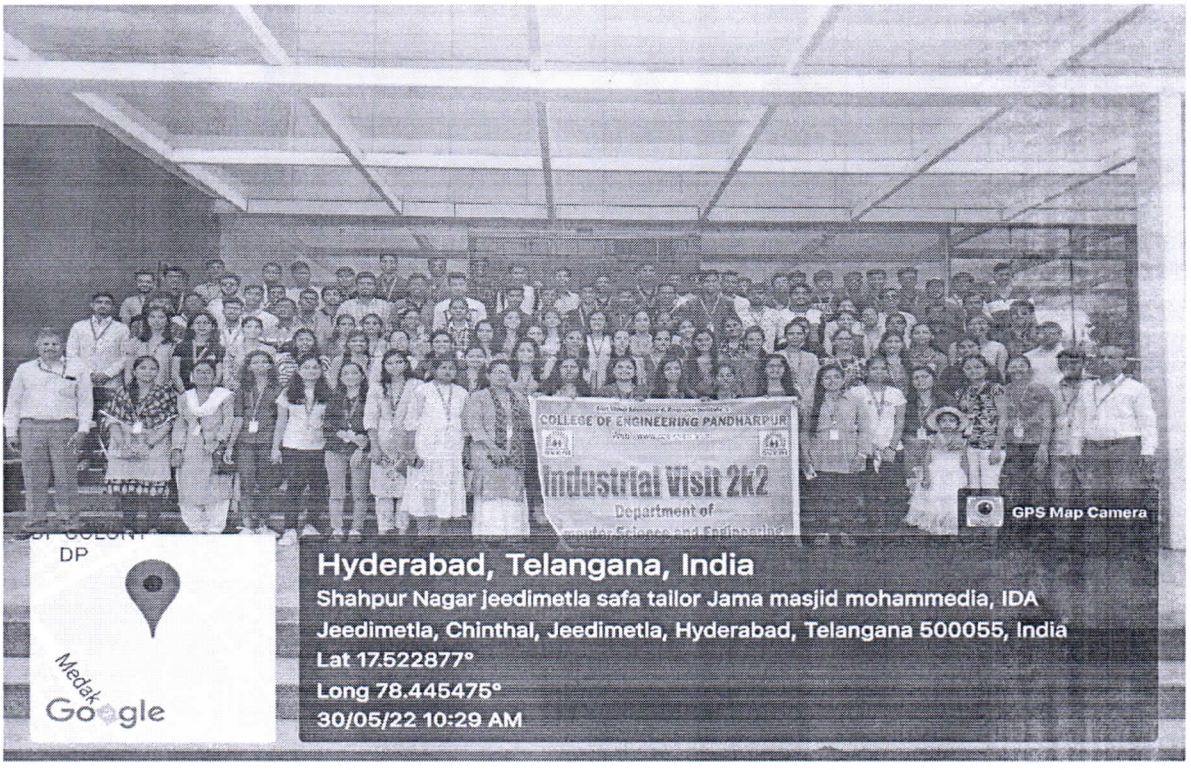
1) ISRO:

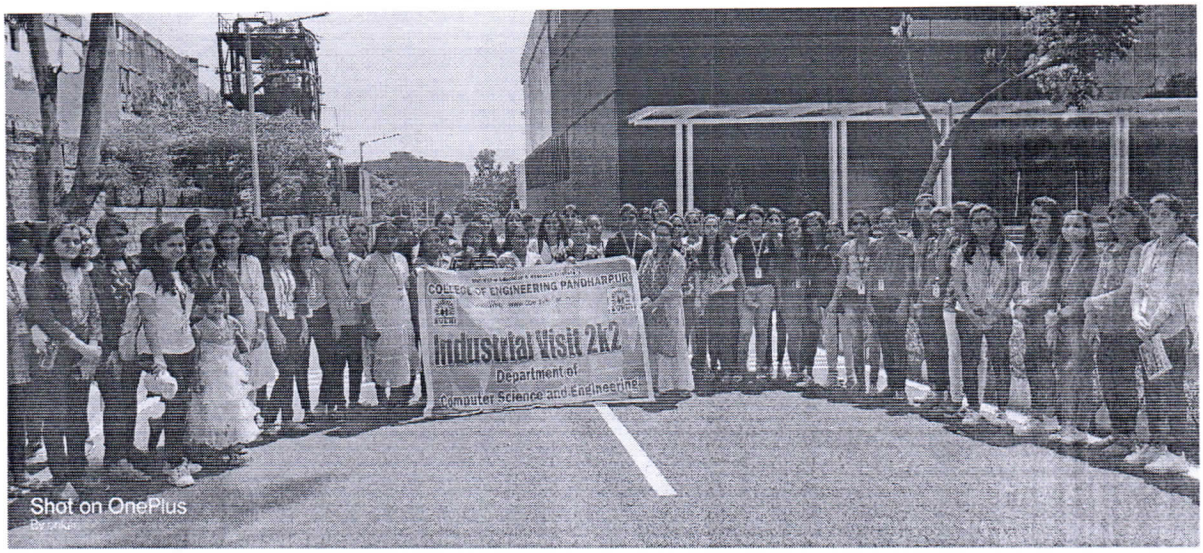
India decided to go to space when Indian National Committee for Space Research (INCOSPAR) was set up by the Government of India in 1962. With the visionary Dr Vikram Sarabhai at its helm, INCOSPAR set up the Thumba Equatorial Rocket Launching Station (TERLS) in Thiruvananthapuram for upper atmospheric research. Indian Space Research Organisation, formed in 1969, superseded the erstwhile INCOSPAR. Vikram Sarabhai, having identified the role and importance of space technology in a Nation's development, provided ISRO the necessary direction to function as an agent of development. ISRO then embarked on its mission to provide the Nation space based services and to develop the technologies to achieve the same independently.Throughout the years, ISRO has upheld its mission of bringing space to the service of the common man, to the service of the Nation. In the process, it has become one of the six largest space agencies in the world. ISRO maintains one of the largest fleet of communication satellites (INSAT) and remote sensing (IRS) satellites, that cater to the ever growing demand for fast and reliable communication and earth observation respectively. ISRO develops and delivers application specific satellite products and tools to the Nation: broadcasts, communications, weather forecasts, disaster management tools, Geographic Information Systems, cartography, navigation, telemedicine, dedicated distance education satellites being some of them.To achieve complete self reliance in terms of these applications, it was essential to develop cost efficient and reliable launch systems, which took shape in the form of the Polar Satellite Launch Vehicle (PSLV). The famed PSLV went on to become a favoured carrier for satellites of various countries due to its reliability and cost efficiency, promoting unprecedented international collaboration. The Geosynchronous Satellite Launch Vehicle (GSLV) was developed keeping in mind the heavier and more demanding Geosynchronous communication satellites.

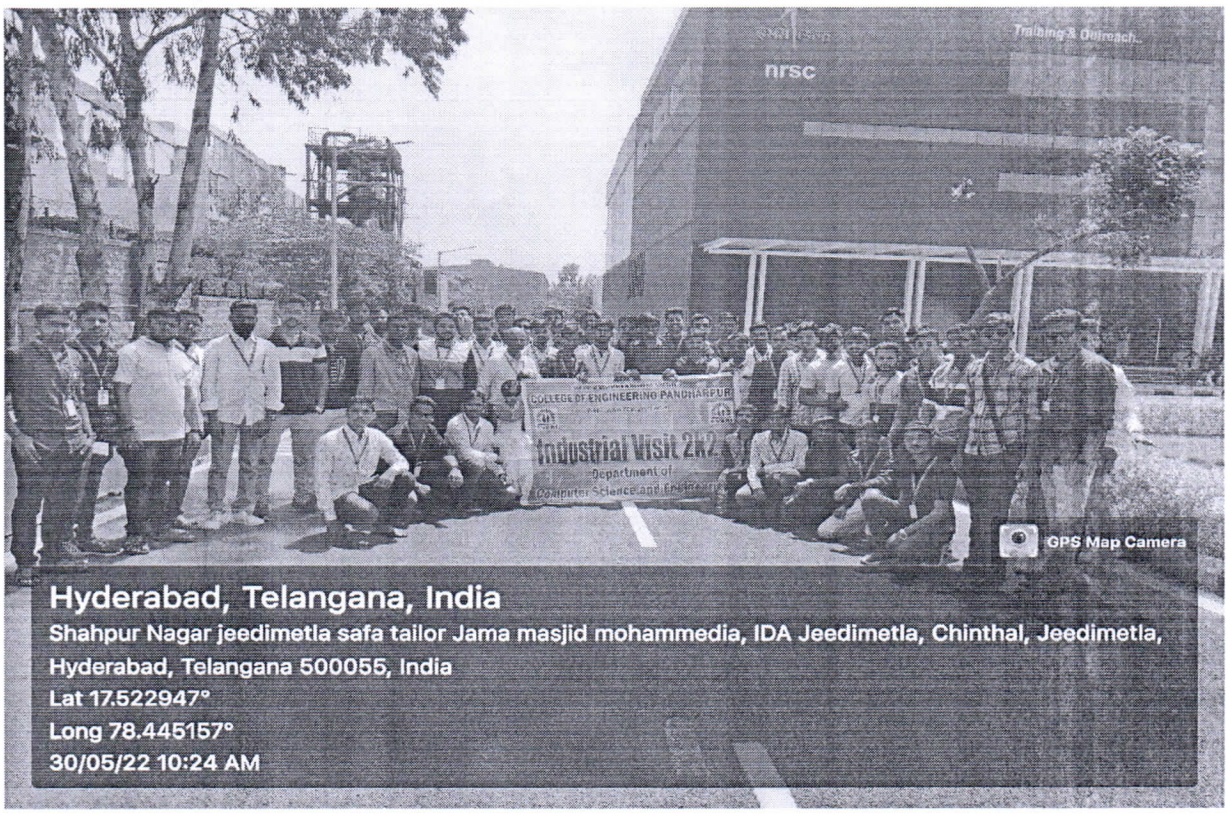
Apart from technological capability, ISRO has also contributed to science and science education in the country. Various dedicated research centres and autonomous institutions for remote sensing, astronomy and astrophysics, atmospheric sciences and space sciences in general function under the aegis of Department of Space. ISRO's own Lunar and interplanetary missions along with other scientific projects encourage and promote science education, apart from providing valuable data to the scientific community which in turn enriches science.

Future readiness is the key to maintaining an edge in technology and ISRO endeavours to optimise and enhance its technologies as the needs and ambitions of the country evolve. Thus, ISRO is moving forward with the development of heavy lift launchers, human spaceflight projects, reusable launch vehicles, semi-cryogenic engines, single and two stage to orbit (SSTO and TSTO) vehicles, development and use of composite materials for space applications etc.




COLLEGE OF ENGINEERING PANDHARPUR
Industrial Visit 2k2
Department of
GPS Map Camera
DP
Medak
Google
Hyderabad, Telangana, India
Shahpur Nagar jeedimetla safa tailor Jama masjid mohammedia, IDA Jeedimetla, Chinthal, Jeedimetla, Hyderabad, Telangana 500055, India
Lat 17.522877°
Long 78.445475°
30/05/22 10:29 AM


COLLEGE OF ENGINEERING PANDHARPUR
Industrial Visit 2k2
Department of
Computer Science and Engineering
Shot on OnePlus


nrsc
COLLEGE OF ENGINEERING PANDHARPUR
Department of
GPS Map Camera
Hyderabad, Telangana, India
Shahpur Nagar jeedimetla safa tailor Jama masjid mohammedia, IDA Jeedimetla, Chinthal, Jeedimetla, Hyderabad, Telangana 500055, India
Lat 17.522947°
Long 78.445157°
30/05/22 10:24 AM

2)Birla Science Museum

Known for transferring scientific knowledge among everyone, Birla Science Museum has been educating people for many years now. The best part about this science museum is the fact that this dissemination of information is done in an interactive way. Second phase of B.M. Birla Science Centre this museum was opened in 1990. Nothing less than a heaven for those with special interest in science, this museum makes learning a fun-filled process.

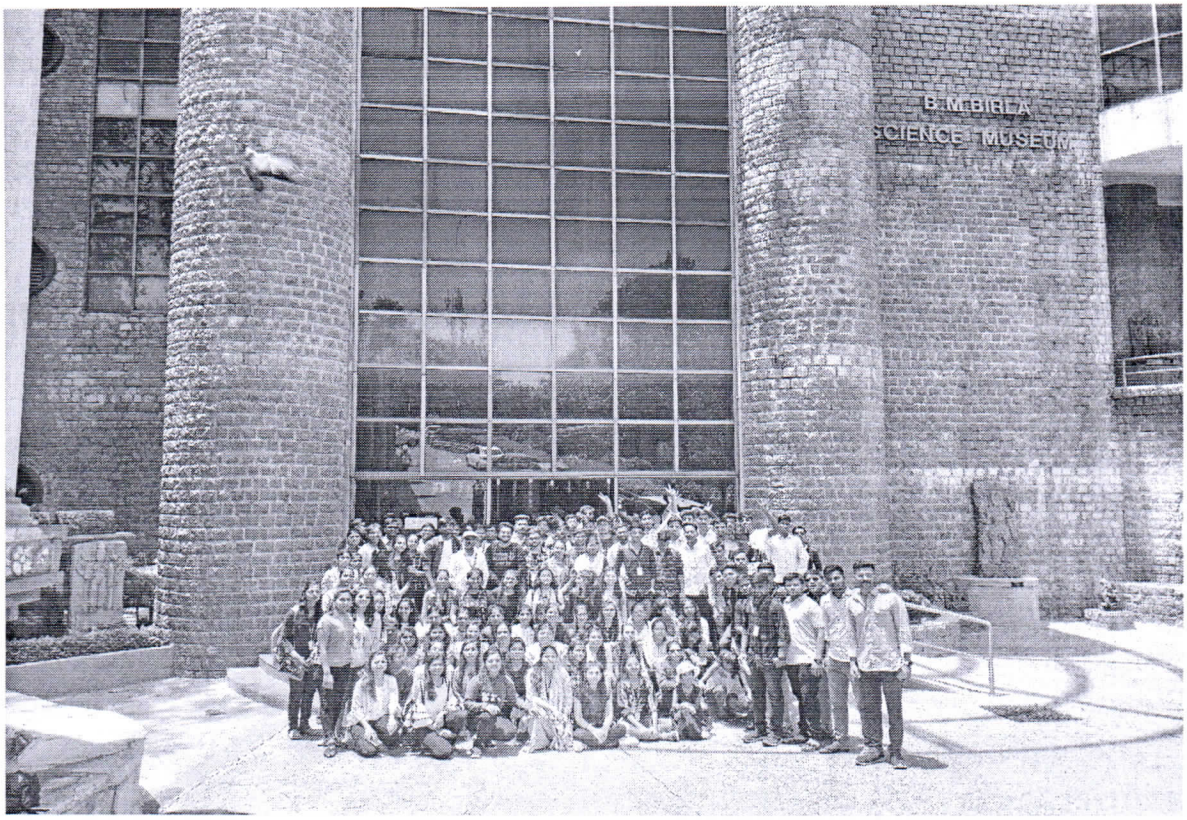
Birla Science Museum has various sections, each section presenting an amazing set of exhibits, each dedicated to a specialised field. These are Interactive Science Section, Archaeology and dolls museum, Nobel Gallery, Antarctica Diorama, NRSA, Dvaraka Diorama, IEEE and Dinosaurium.

Interactive Science Centre is one of the many sections where exhibits are designed on the basis of various Physics laws, mechanics, perception, vibration and sounds, energy and motors, electricity and magnetism and intriguing concepts of optical illusions and many other concepts. Mix Colors, Arch Bridge, Lift Yourself Up, Action-Reaction, The Magic Ball, Pedal Power and See Sounds are a few of the exhibits at the interaction Science section. If interested, you can also plan your visit to the Birla Planetarium Hyderabad. Many other sightseeing places are located near to this place, once such place is the Birla Mandir Hyderabad.

Another popular section of Birla science museum Hyderabad is the Archaeology and Dolls Museum, which displays a range of excavated materials from pre, early historic and Megalithic Periods along with various manuscripts including palm leaf manuscripts, carvings, paintings, temple wares, etc. All the materials are the result of three meticulously carried out excavations by the Birla Archaeological & Cultural Research Institute (BACRI).

Another Section, Dinosaurium, is something to look forward to too. It boasts of a rare collection including fossils of the Dinosaur, Kotasaurus, which dates back to almost 160 million years. These fossils were excavated from Yamanpalli in the Adilabad district.

For those interested in electronics, there is an electronic section which explores the fascinating world of scientific developments. Its most attractive feature is a harp which plays a note automatically as soon as a visitor puts his or her hand over it. It has sensors on strings. Holograms displaying varied images of plants, faces and drawings also captivate visitors at Birla Science Museum.



3)Ruchi Web Solutions Pvt. Ltd.

Ruchi web solutions is one of the fastest growing Website Designing and Web development Company providing e-commerce website design, shopping cart solutions, CMS websites development with Joomla, Drupal & Wordpress, Flash animation, Multimedia, Web hosting, Domain registration, SEO & website promotion for small to medium and medium to large businesses. We provide high quality, cost effective internet services to both private and corporate clients all over the world. Company has some of services provided as:

Web Design and Development Services :

Static Website Design and Development.

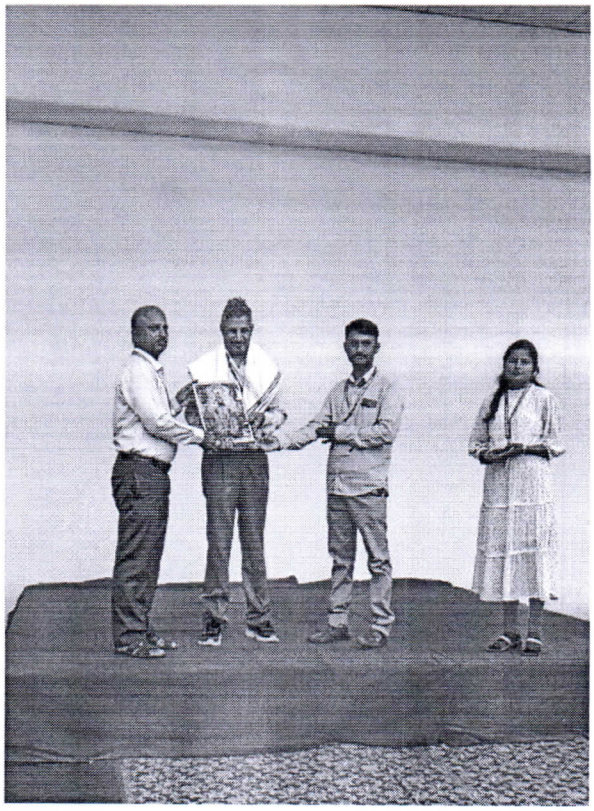
Dynamic Website Design and Development.

Mobile and responsive webiste in low cost.

Web design, Web development, digital marketing training

Custom E-commerce Shopping Website Design and Development.

Domain and hosting in low cost, free domain with hosting.



The students of T.E. Computer Science Engineering and all the four staff members have enjoyed the technical Endeavour at these companies a lot. The company persons also appreciated our students after the question answer sessions. Students were well mannered and disciplined throughout the Tour and no injury or anything bad happened during the industrial tour. All the Staff members and Students are highly thankful to you for providing such an opportunity for the visit.

Thanking You.

Staff Coordinator

Sr.No.	Name	Sign
1	Mr. V.M.Sale	
2	Mr. A.N. Shinde	
3	Ms. V.V.Rajmane	
4	Ms. T.D. Godase	

Student Feedback

We had the most amazing visits which gave us real technical and research insight. We got the knowledge about working of a software company. Also we learnt about research activities which have given exposure to different project ideas that will help us to decide final year projects. It helped us to explore our skills and was truly enlightening.

These visit gave exposure about opportunities in Software industry and how exactly these industries work. It also inspired the students to be an entrepreneur and be updated about the new technologies which will help them in preparing for starting their own start-ups. These types of visits should be carried out for the students regularly so that the students get exact exposure about the working and requirements of the industries which is expected from the students at the time of placement and after the session.

Summary For Expenditure of Industrial Visit
Academic Year: 2021-2022
Semester-VI

Class-T.E CSE A & B

Sr.No	Particular		No. of Students and faculties	Rate (Per Head Rs.)	Total Amount(Rs)
1	Travelling & Hotel Stay	SVERI's COE Pandharpur-Kurduwadi(MSRTC Bus)	107	130/-	13910/-
		Kurduwadi- to SVERI's Pandharpur(MSRTC-Bus)	107	130/-	13910/-
		Kurduwadi-Hyderabad -(Train)	107	250/-	26750/-
		Hyderabad Travelling(Bus) & Hyderabad Hault(2 Nights)	107	2350/-	251450/-
		Hyderabad-Kurduwadi(Train)	107	250/-	26750/-
2	Birla Museum				11100/-
Total					343870/-

(Per Student= 3,43,870/107=3214/-)

Rainbow Events & Tours
Transforming Moments into Memories

Invoice

Invoice Number: RET/2022-23/12 Date- 31/05/2022

Prepared for: **Principal,**
SVERI College of Engineering
Address: Gopalpur-Ranjani Road, Pandharpur- 413304

Description	Cost Per Pax	No. of Pax	Total
Industrial Visit Package 1. Bus from Pandharpur to Kurduwaadi Station and Return to Pandharpur 2. Kurduwadi to Hyderabad Train Tickets 3. Hyderabad to Kurduwadi Train Tickets 4. Hyderabad Local Travelling by Bus 5. Stay at AC Executive Room for 3 days 2 Nights	INR 2800/-	111	2,99,600.00
Discount less (4 Faculty Members complimentary and INR 1400/- as Company Discount)	INR 2800/-	04	-12600.00
Total			**INR 2,87,000.00** (INR Two Lac, Eighty Seven Thousand only)

*Company is registered under MSME

Rainbow Events & Tours Pune

31/05/2022
Rainbow Events & Tours
Pune-India.

Corporate Office- Flat No-304, Shreyas Clementine,
Deccan College Road, Pune-411006, India
Branch Office – Delhi, Bangalore, Hyderabad, Mumbai, Nagpur
rainbowtourspune@gmail.com

fb/rainbowgrpind
Contact No - +91 968 958 0 007

B M BIRLA SCIENCE MUSEUM
B M BIRLA SCIENCE CENTRE COMPLEX

Adarsh Nagar,Hyderabad.

Licensee:

B M BIRLA ASTRONOMICAL & CULTURAL TRUST

ENTRANCE FEE - STUDENTS

Group Name : **Query College MH**

Date : 29-May-2022

S.No : 834 to 944

Level 0	: Room Royale | Dolls & Archaeology Gallery
Level 1	: Inter Active Science Section
Level 2	: Dwarka | Antarctica | NRSA | IEEE
Level 3	: Space Museum | Dinosaurium

Qty : 111 @ ₹ 100.00

Sub Total : ₹ 11100.00

Note: Tickets once issued cannot be cancelled

We thank you for your visit. Please do visit again

	Qty	Price
1) Ondem 4	02	100
2) Noodays Plus	02	80
3) Paracetamol (500mg)	02	20
1) Cyclopam	02	100
5) Norflox-TZ	02	100
5) Pantab-40	02	100

total = 500

लक्ष्मी जेनेरीक मेडिकल
स्वस्त औषधी सेवा
समय कलेक्शन शेजारी, नवी पेठ, भोसले चौक,
पंढरपूर, जि. सोलापूर, मो.नं.9665868538

FIXSET
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DOPOX
FITMOX-CV
LEVOFIX
ZITHOR
MEDKUFF
FLAMSET
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CLINZOL-BN
COLDISET
MEDCOLIC
DERMIHIT
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LUZISET
PROVITOP FOLVITONE KENOT ITROSET VITCOSET-Z

Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P. B. No. 54, Gopalpur - Ranjani Road, Gopalpur, **Tal.:** Pandharpur - 413 304, **Dist.:** Solapur (MH)
Contact No.: 9545553888, 9545553737, **E-mail :** coe@sveri.ac.in, **Website :** www.sveri.ac.in
Approved by **A.I.C.T.E.**, New Delhi and affiliated to Punyashlok Ahilyadevi Holkar Solapur University, Solapur
NBA Accredited all eligible UG Programmes, **NAAC** Accredited Institute, ISO 9001 : 2015 Certified Institute.
Accredited by Institution of Engineers (India) & TCS.

Ref.:- COE/CSE/2021-22/232(6) Date:-

To,

General Manager,Outreach Facility

National Remote Sensing Centre

Hyderabad

Subject: Regarding Industrial Visit to Your Organisation.

Dear Sir/Madam,

Our Institute,SVERI's College of Engineering, affiliated to Punyashlok Ahilyadevi Holkar Solapur University, Solapur, Maharashtra, offers Degree courses in Computer Science and Engineering, Electronics and telecommunication, Mechanical Engineering, Civil Engineering and Electrical Engineering. As a part of curriculum the students of Third Year Computer Science Engineering are required to undertake an Industrial Visit.

We would like to send 108 students accompanied by 4 staff members to visit your esteemed organization on 30/05/2022.

We ensure that our students will follow the rules and regulations of your organisation.

Kindly give us permission so that we can go for train reservation and hotel booking.

Thanking You

Dr. S.B.Thigale
HOD,
Department of Computer Science & Engg
SVERI's C.O.E. Pandharpur

डी. एस. यादव
May 30, 2022
M. 8919092740

जनसंपर्क सुविधा NRSC जीडिमेल्ला

Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B.No.54, Gopalpur - Ranjani Road, Gopalpur, Pandharpur - 413304, **District**: Solapur (Maharashtra)
Tel.: (02186) 216063, 9503103757, **Toll Free No.**: 1800-3000-4131 **e-mail.**: coe@sveri.ac.in
Website.: www.sveri.ac.in (Approved by A.I.C.T.E., New Delhi and Affiliated to Solapur University, Solapur)
NBA Accredited all eligible UG Programmes, **NAAC** Accreditated Institute,ISO 9001:2015 Certified Institute.
Accredited by The Institution of Engineers (India), Kolkata and TCS, Pune.

Ref.:-COE/CSE/2021-22/232(3) Date:- 28/05/22

To,

General Manager,

Ruchi Web Solutions,

Hyderabad

Dear Sir/Madam,

This is us expressing our heartfelt gratitude towards you for giving us permission to visit your organisation.

It was very valuable and useful experience for our students. This visit has helped our students to get knowledge which they cannot gain in classrooms as well as helped them to make connections between the different aspects of educational experience.

Thank You for your cooperation.

Thanking You.

BGSBT

HOD,
Department of Computer Science & Engg
SVERI's C O E Pandharpur

Ranjan Jain
(Web Ruchi Solutions)
8074305620

Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B.No.54, Gopalpur - Ranjani Road, Gopalpur, Pandharpur - 413304, **District**: Solapur (Maharashtra)
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Accredited by The Institution of Engineers (India), Kolkata and TCS, Pune.

Ref.:- COE/CSE/2021-22/232(1) Date:- 28/5/2022

To,

General Manager,

Birla Science Museum,

Hyderabad

Dear Sir/Madam,

This is us expressing our heartfelt gratitude towards you for giving us permission to visit your organisation.

It was very valuable and useful experience for our students. This visit has helped our students to get knowledge which they cannot gain in classrooms as well as helped them to make connections between the different aspects of educational experience.

Thank You for your cooperation.

Thanking You.

HOD,
Department of Computer Science & Engg
SVERI's C.O.E. Pandharpur

Received on 29/5/22
(Y. Suresh)
9441675680

Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B.No.54, Gopalpur - Ranjani Road, Gopalpur, Pandharpur - 413304, **District**: Solapur (Maharashtra)
Tel.: (02186) 216063, 9503103757, **Toll Free No.**: 1800-3000-4131 **e-mail.**: coe@sveri.ac.in
Website.: www.sveri.ac.in (Approved by A.I.C.T.E., New Delhi and Affiliated to Solapur University, Solapur)
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Ref.:- COE/CSE/2021-22/232(8) Date:-

TYCSE. SIXTH SEMISTER 2021-2022 STUDENTS LIST

Sr.No	Name of Students	Sr.No	Name of Students
1	Shraddha Shashikant Dhage	31	Priti Uttam More
2	Vedangi Mangesh Bhujang	32	Sakshi Ganesh Bhosale
3	Vaishnavi Motilal More	33	Lajina Sadik Devale
4	Aarti Ashok Mali	34	Aishwarya Waman Kulkarni
5	Kiran Ravaaheb Aigale	35	Tejal Dipak Survase
6	Apurva Ajit Kadam	36	Amruta kamraj Dongare
7	Khushi Naresh kallur	37	Saloni Sujit Upase
8	Vaishnavi Gurupadappa Nanna	38	Prapti Pandurang Atkale
9	Tanvi Pravin Ghotage	39	Madhuri Vilas Dongare
10	Aparna Baliram Vasmale	40	Prerana Raju Limbole
11	Shruti Pandurang Adat	41	Vaishnavi Milind Abhangrao
12	Snehal Ravindra Naik	42	Swarupa Dattakumar Kolle
13	Sakshi Vikas Shivsharan	43	Mayuri Somnath Swami
14	Vibhuti Ananda Pawar	44	Shweta Anant Savant
15	vaibhavi vivekanand Patil	45	Pallavi Aba Jadhav
16	Trupti Sunil katkamwar	46	Siddhi suresh velapure
17	Suchitra Ramchandra Gavali	47	Shraddha Sandip Kavathekar
18	Unnati Anil Dhaygude	48	Kalyani Prasad Modak
19	Pratiksha vitthal pethe	49	Mayeshwari shrikrishna more
20	Charulata Prashant Nashte	50	Sanika Baliram Thakare
21	Sonal Dilip Pardeshi	51	Jyoti Chandrashekhar Ekad
22	Shaina Ismail Shaikh	52	Yogeshree Pandit Pawar
23	Vaishnavi Vikram Jathar	53	Prerana Bharat Shinde
24	Sakshi Santosh Rudrakanthwar	54	Shivani Nagnath Gaikwad
25	Divya Somnath Kshirsagar		
26	Aishwarya Mahesh Mohikar		
27	Ratan Giramalla Kore		
28	Vishakha Vijaykumar Savalkar		
29	Shweta Sanjay Jadhav		
30	Akanksha Ganesh Londhe		

HOD,
Department of Computer Science & Engg.
SVERI's C.O.E. Pandharpur

(Prof. G.S. Sirdeshmukh)
CC.- TY(CSE)

Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
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Ref.:- COE/CSE/2021-22/232(7) Date:-

TYBSE 6th SEMISTER 2021-2022 STUDENTS LIST

SRNO	NAME OF STUDENT	SRNO	NAME OF STUDENT
1	Omkar Ghansham Sathe	30	Rohit Dattatray Kavitake
2	Aniket Ganpat Bansode	31	Rahul Kisan Gapat
3	Omraje Rahul Wattamwar	32	Ganesh bandu yeole
4	Suyash Samir Diwan.	33	Rohit Madhukar More
5	Vikas Suresh Ingawale	34	Sanket Sambhaji Kondubhairy
6	Siddhesh Shivsingh pardeshi	35	Shubham Gulabrao Shende
7	Ankit Vishwas Patil	36	Viraj Vikas Patil
8	Shreyash Ramchandra Patil	37	Raviraj Dhondappa Kudal
9	Pranoj Prabhakar Gonjari	38	Pavanraj Balasaheb Jagdale
10	Umesh Vikas Sathe	39	Pranav Santoshkumar Dongare
11	Suraj Suryakant Nagtilak	40	Onkar Bhimrao Babar
12	Prathamesh Tukaram Jadhav	41	Arbaj Jalaluddin Mujawar
13	Umesh vijay Madane	42	Shubham Gorakh Shende
14	Sahil Santosh Kulkarni	43	Shubham Kiran Sakhare
15	Swapnil Kantilal Ubale	44	Shailesh Ravikant Bhosale
16	Ananda Rajendra Nagane	45	Sanket Vasant Ghogare
17	Mayur Vijaykumar Ghadage	46	Gorakshanath Balkrushna Shejal
18	Prasanna Santosh Thalpati	47	Harun Ilahi Shaikh
19	Chinmay Shripad Halsikar	48	Pratik Gorakh Mali
20	Vitthal Ashok Sirsale	49	Yashwant Siddheshwar Mali
21	Sushant Mukesh sulakhe	50	Vijaysinh Lingdev Nikam
22	Rahul Kisan Devkate	51	Bhushan Satish Deshmukh
23	Dnyaneshwar sanjivan lohar	52	Abhay Shivanand Ghante
24	Swapnil Bharat More	53	Pavan Pandurang Kakade
25	Girimalleshwar Balaji Nagelli	54	Aditya Keskar
26	~~Pranav Dongare~~ omkar kale		
27	Vishal Anil Lingade		
28	Akshay Mahavir Andhare		
29	Aniket Rajmahendra Mittha		

HOD,
Department of Computer Science & Engg
SVERI's C.O.E. Pandharpur

(Prof. Gr. S. Sirdeshmukh)
CC - TY(CSE)

Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
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Branch: Computer Science and Engineering

Year: Third Year

Semester: Sixth

Div: A & B

Sr.No	Name of Students	Contact No	27	28	29	30
1	Shraddha Shashikant Dhage	8080349520				
2	Vedangi Mangesh Bhujang	8806488450				
3	Vaishnavi Motilal More	8080341085				
4	Aarti Ashok Mali	8605438608				
5	Kiran Ravaaheb Aigale	7263053917				
6	Apurva Ajit Kadam	7262963521				
7	Khushi Naresh kallur	9922885244				
8	Vaishnavi Gurupadappa Nanna	7559449858				
9	Tanvi Pravin Ghotage	9763838169				
10	Aparna Baliram Vasmale	9373693189				
11	Shruti Pandurang Adat	8180890784				
12	Snehal Ravindra Naik	7796401030				
13	Sakshi Vikas Shivsharan	8888644483				
14	Vibhuti Ananda Pawar	9156256335				
15	vaibhavi vivekanand Patil	7058540070				
16	Trupti Sunil katkamwar	8668502594				
17	Suchitra Ramchandra Gavali	9322619670				
18	Unnati Anil Dhaygude	8767826362				
19	Pratiksha vitthal pethe	8317268809				
20	Charulata Prashant Nashte	9373907291				
21	Sonal Dilip Pardeshi	9021133191				
22	Shaina Ismail Shaikh	9356910095				
23	Vaishnavi Vikram Jathar	9665825180				
24	Sakshi Santosh Rudrakanthwar	9421387782				
25	Divya Somnath Kshirsagar	9673871097				
26	Aishwarya Mahesh Mohikar	7385189890				
27	Ratan Giramalla Kore	7822036299				
28	Vishakha Vijaykumar Savalkar	8805069340				
29	Shweta Sanjay Jadhav	9890510567				
30	Akanksha Ganesh Londhe	8080586853				
31	Priti Uttam More	9075595625				
32	Sakshi Ganesh Bhosale	9325075968				
33	Lajina Sadik Devale	7709954288				

HOD,
Department of Computer Science & Engg
SVERI's C.O.E. Pandharpur

34	Aishwarya Waman Kulkarni	8552803901				
35	Tejal Dipak Survase	8975665261				
36	Amruta kamraj Dongare	9307480500				
37	Saloni Sujit Upase	8408041289				
38	Prapti Pandurang Atkale	8767059524				
39	Madhuri Vilas Dongare	9067040590				
40	Prerana Raju Limbole	9307791788				
41	Vaishnavi Milind Abhangrao	9022276522				
42	Swarupa Dattakumar Kolle	9422628561				
43	Mayuri Somnath Swami	7588183531				
44	Shweta Anant Savant	9766980188				
45	Pallavi Aba Jadhav	8261091700				
46	Siddhi suresh velapure	7796743303				
47	Shraddha Sandip Kavathekar	9503138454				
48	Kalyani Prasad Modak	9011984828				
49	Mayeshwari shrikrishna more	8767992021				
50	Sanika Baliram Thakare	9022635563				
51	Jyoti Chandrashekhar Ekad	8605640528				
52	Yogeshree Pandit Pawar	9371410631				
53	Prerana Bharat Shinde	8080021936				
54	Shivani Nagnath Gaikwad	9921143420				

HOD,
Department of Computer Science & Engg
SVERI's C.O.E. Pandharpur

Shri Vithal Education & Research Institute's
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Branch: Computer Science and Engineering

Year: Third Year

Semester: Sixth

Div: A & B

SRNO	NAME OF STUDENT	MOBILE NO	27	28	29	30
55	Omkar Ghansham Sathe	8007169473				
56	Aniket Ganpat Bansode	9579033327				
57	Omraje Rahul Wattamwar	9764767999				
58	Suyash Samir Diwan.	9096601800				
59	Vikas Suresh Ingawale	7517346100				
60	Siddhesh Shivsingh pardeshi	8788282089				
61	Ankit Vishwas Patil	7448115526				
62	Shreyash Ramchandra Patil	7020426106				
63	Pranoj Prabhakar Gonjari	7756998436				
64	Umesh Vikas Sathe	7558795237				
65	Suraj Suryakant Nagtilak	9021213723				
66	Prathamesh Tukaram Jadhav	7798282109				
67	Umesh vijay Madane	8975116181				
68	Sahil Santosh Kulkarni	7517635660				
69	Swapnil Kantilal Ubale	9325222583				
70	Ananda Rajendra Nagane	9356247014				
71	Mayur Vijaykumar Ghadage	7887553116				
72	Prasanna Santosh Thalpati	9145678910				
73	Chinmay Shripad Halsikar	7559350237				
74	Vitthal Ashok Sirsale	9900859714				
75	Sushant Mukesh sulakhe	8956501926				
76	Rahul Kisan Devkate	8600941245				
77	Dnyaneshwar sanjivan lohar	9763798792				
78	Swapnil Bharat More	9414367699				
79	Girimalleshwar Balaji Nagelli	9764756521				
80	~~Pranav Dongare~~ Onkar Kale	8378882734				
81	Vishal Anil Lingade	8830333342				
82	Akshay Mahavir Andhare	9834796041				
83	Aniket Rajmahendra Mittha	9767253969				

HOD,
Department of Computer Science & Engg
SVERI's C.O.E. Pandharpur

84	Rohit Dattatray Kavitake	7385582758				
85	Rahul Kisan Gapat	7798122276				
86	Ganesh bandu yeole	9579858690				
87	Rohit Madhukar More	7038747978				
88	Sanket Sambhaji Kondubhairy	8459753697				
89	Shubham Gulabrao Shende	9588669119				
90	Viraj Vikas Patil	7767806564				
91	Raviraj Dhondappa Kudal	9175896494				
92	Pavanraj Balasaheb Jagdale	7972979721				
93	Pranav Santoshkumar Dongare	8378882734				
94	Onkar Bhimrao Babar	7071780707				
95	Arbaj Jalaluddin Mujawar	8999607197				
96	Shubham Gorakh Shende	8639030422				
97	Shubham Kiran Sakhare	8605692512				
98	Shailesh Ravikant Bhosale	8788903707				
99	Sanket Vasant Ghogare	7057505656				
100	Gorakshanath Balkrushna Shejal	9022542837				
101	Harun Ilahi Shaikh	8329320708				
102	Pratik Gorakh Mali	7083898610				
103	Yashwant Siddheshwar Mali	8625809075				
104	Vijaysinh Lingdev Nikam	8625809075				
105	Bhushan Satish Deshmukh	8421296860				
106	Abhay Shivanand Ghante	9890384664				
107	Pavan Pandurang Kakade	7387144272				
108	Aditya Keskar	9822366314				

(Head of Department)

Dr. Thigale S. B

CSE Department

HOD,
Department of Computer Science & Engg
SVERI's C.O.E. Pandharpur

Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
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To,
The Dean Students,
Sveri's College Engg,
Pandharpur.

Date: 27/05/2022

Subject: Seeking permission for three days Industrial Visit on 28th,29th, & 30th May 2022.

Dear Sir,

As per the PAHSU curriculum, our Computer Science & Engineering students **(TECSE)** are expected to visit prominent industries and companies for the practical exposure and insights to the real working environment. Requesting you to kindly accord permission to Visit for organization and do the needful. Your Positive Social response in this regard will be highly solicited.

Visit Details are as below:

Company Name 1: ISRO National Remote Sensing Centre (NRSC)
Address Dept. of Space, Govt. of India, Hyderabad-500037, Contact No.-94441411433
Email Id-gd_teog@nrsc.gov.in

Company Name 2: Ruchi Web Solutions
Address: Flat No:201, Apartment Datta Sai Complex Besides, Ikon Hospital.
Contact No.-9032803895, Email Id- ruchiwebsolutions@gmail.com

Company Name 3: Birla Science Museum
Address: Near Birla Mandir, Saifabad, Adarsh Nagar, Hyderabad, Telangana-500004
Contact No.-+91 40-23235081, Email Id-birlasc@gmail.com

Date: 28th, 29th & 30th May 2022

Strength: TECSE: -108 (Boys-54, Girls-54)

(I.V. Coordinator)
Ass.Prof. V.V.Rajmane
CSE Department

DOSBT 27/5/22
(Head of Department)
Dr. S.B.Thigale
CSE Department

HOD,
Department of Computer Science & Engg
SVERI's C.O.E. Pandharpur

Dean Students
Dr. Mathpati M. S

Annexure I

REQUST FOR STUDY TOUR / INDUSTRIAL VISIT

1. Branch and Semester: Computer Science and Engineering, 6th Semester

2. Nature of tour: Study tour/Industrial visit

3. Places or Industries planned to visit: Hyderabad

4. Proposed dates of tour or visit: 03

5. Mode of journey: Partially by bus and train

6. Total number of students in class: 160

7. Total number of attending students:106(Attach students list as per Annexure IV)

a. Number of Boys: 54

b. Number of Girls: 54

Total = 108

8. Details of accompanying Faculty members

Sr . No	Name	Designation	Department	Contact No.
1.	Rajmane . V . V	Assistant prof.	CSE	9067287767
2.	Godase . T . D	Assistant Prof.	Civil	7083359000
3.	Sale V . M .	Asst . Prof	CSE	9175799480
4.	Shinde A . N .	Lab Attd .	CSE	9970905081

10. Details of Industry from which permission obtained : (Attach copy of permission letter)

☐ **Industry 1: ISRO National Remote Sensing Centre (NRSC)**
Dept. of Space, Govt. of India, Hyderabad-500037
Contact No.-94441411433
Email Id-gd_teog@nrsc.gov.in

☐ **Industry 2: Ruchi Web Solutions**
Flat No:201, Apartment Datta Sai Complex Besides Ikon Hospital.
Contact No.-9032803895
Email Id- ruchiwebsolutions@gmail.com

☐ **Industry 3: Birla Science Museum**
Near Birla Mandir, Saifabad, Adarsh Nagar,
Hyderabad, Telangana-500004
Contact No.-+91 40-23235081
Email Id-birlasc@gmail.com

26/05/22

Computer Science & Engineering Department

Industry Visit Schedule

Sr. No	Place	Date	Time
1	Pandharpur to kurduwadi	27/05/2022	03.00 to 4.30PM
2	kurduwadi to Hyderabad (By Train)	27/05/2022	06.00 to 3.30AM
3	Hyderabad to Hotel (By Bus)	28/05/2022	03.30 to 09.00AM
4	Visit to Ruchi Web Solutions	28/05/2022	10.00 to 7.00PM
5	Visit to Birla Science Museum	29/05/2022	10.00 to 1.00 PM
6	Visit to Salarjung Museum	29/05/2022	02.00 to 06.00 PM
7	Visit to ISRO National Remote Sensing Centre (NRSC)	30/05/2022	10.00 to 5.00PM
8	Hyderabad to kurduwadi (By Train)	30/05/2022	08.30 to 7.00 AM
9	kurduwadi to Pandharpur (By Bus)	31/05/2022	7.00 to 8.30 AM

Summary For Expenditure of Industrial Visit

Academic Year: 2021-2022

Semester-VI

Class-T.E CSE A & B

Sr.No	Particular		No. of Students and faculties	Rate (Per Head Rs.)	Toatal Amount(Rs)
1	Travelling & Hotel Stay	SVERI's COE Pandharpur-Kurduwadi(MSRTC Bus)	108+4	155	16740/-
		Kurduwadi- to SVERI's Pandharpur(MSRTC-Bus)	108+4	155	16740/-
		Kurduwadi-Hyderabad -(Train)	108+4	275	29700/-
		Hyderabad Travelling(Bus) & Hyderabad Hault(2 Nights)	108+4	2600	280800/-
		Hyderabad-Kurduwadi(Train)	108+4	275	29700/-
2	Other Expenses				15120/-
Total					3,88,800/-

(Per Student= 3,88,800/108=3600/-)

Note:- This budget is temporary it may change according to the situation.

Total number of days: 3

a. Number of nights: 2

b. Number of days: 3

Signature of Class Representatives/Tour coordinators

1. Name: Vitthal Ashok Sirsale **Signature:** Sirsale

2. Name: Vedangi Mangesh Bhujang **Signature:** V.M.Bhujang.

Place: Pandharpur

Date: 17/05/2022

B_54_Pratik Mali <pratikgmali@coep.sveri.ac.in> Tue, May 17, 2022 at 3:45 PM
To: ganesh_vv@nrsc.gov.in

Hello Sir,
As we discussed on a phone call, we have fixed date of visit and we will visit NSRC on 30th May 2022. Please let me know, is this date available for visit or not?

Thanking You
[Quoted text hidden]

outreach@nrsc.gov.in <outreach@nrsc.gov.in> Tue, May 17, 2022 at 4:01 PM
To: pratikgmali@coep.sveri.ac.in

Dear Mr. Malik,

Thanks for your mail.

As discussed, we hereby confirm your college industrial visit to NSRC Outreach facility at Jeedimetla campus on 30th May 2022.

Kindly reach the place by 10AM and the full address is given below.

If any further clarification is required, pl feel free to contact us.

Best Regards,
V.v. Ganesh
Scientist, NRSC

कार्यालय, जनसम्पर्क Office of Outreach,
(जनसम्पर्क सुविधा Outreach Facility)

प्रशिक्षण, शिक्षण एवं जनसम्पर्क समूह Training, Education & Outreach Group
प्रबंधन प्रणाली क्षेत्र Management Systems Area (MSA)

राष्ट्रीय सुदूर संवेदन केंद्र, इसरो, National Remote Sensing Centre, ISRO,

जेएसआर कॉम्प्लेक्स / ऐश्वर्या ग्रांड के बगल में, Beside JSR Complex/Aishwarya Grand,
शाहपुर, जीदमेटला, हैदराबाद - ५०० ०५५ Shahpur, Jeedimetla, Hyderabad - 500 055

दूरभाष / Phone : 040-23884810, 23884816

From: "ganesh_vv" <ganesh_vv@nrsc.gov.in>
To: "outreach" <outreach@nrsc.gov.in>
Sent: Tuesday, May 17, 2022 3:56:14 PM
Subject: Fwd: Regarding getting permission for Industrial Visit

verified

Sent: Wednesday, May 11, 2022 3:37:37 PM
Subject: Regarding getting permission for Industrial Visit

[Quoted text hidden]

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समूह निदेशक Group Director
प्रशिक्षण, शिक्षण एवं जनसम्पर्क समूह Training, Education & Outreach Group
प्रबंधन प्रणाली क्षेत्र Management Systems Area (MSA)
एनआरएससी, हैदराबाद NRSC, HYDERABAD
040 2388 4590 (O)

A_76_vitthal Sirsale <vithalasirsale@coep.sveri.ac.in>
to me

12:19 (0 minutes ago)

---------- Forwarded message ---------
From: **A_76_vitthal Sirsale** <vithalasirsale@coep.sveri.ac.in>
Date: Wed, 18 May 2022, 12:15 pm
Subject: Fwd: Regarding getting permission for industrial visit.
To: <gbshejal3001@gmail.com>

---------- Forwarded message ---------
From: **Ruchiwebsolutions** <ruchiwebsolutions@gmail.com>
Date: Wed, 18 May 2022, 12:10 pm
Subject: Re: Regarding getting permission for industrial visit.
To: A_76_vitthal Sirsale <vithalasirsale@coep.sveri.ac.in>

Dear Participants,

Glad to inform you that you can visit to our organization Ruchiwebsolutions pvt Ltd. for purpose of industrial visit. I request you to come to my office any time between 10 am to 5 pm 24th may to 31st May 2022.

Activate Windows
Go to Settings to activate Windows.

Sr.No	Full Name	Roll No	Personal Contact No	Parents Contact No	Full Address
1	Suyash Samir Diwan	A56	9096601800	7020746614	Sahyadri nagar Isbavi, pandharpur
2	Aniket Ganpat Bansode	B38	9579033327	9579033327	At-Avhe Tal-Pandharpur
3	Ananda Rajendra Nagane	B73	9763060561	9356247014	At post Tambole Tel:- Mohol Dist-solapur
4	Kiran Ravsaheb Aigale	B35	9529794232	9823210017	At post- Tardal, kolhapur
5	UMESH VIJAY MADANE	A68	9049644073	8975116181	At post piliv (Zinjevasti)
6	Snehal Ravindra Naik	B17	7796401030	9421033868	Kunku Galli Karmala dist-Solapur
7	Aishwarya Mahesh Mohikar	A25	7385189890	9422069146	4643/2 Gatade plot, pandharpur
8	Akanksha Ganesh Londhe	A23	8080586853	9881771164	917, back arun tokij,govindpura pandharpur
9	Trupti Sunil Katkamwar	A19	8668502594	7020857037	Juni peth near police chowki, pandharpur
10	Aparna Baliram Vasmale	B30	9373693189	9373693189	Javala
11	Prathamesh Tukaram Jadhav	B49	8624002698	7798282109	At Post-malshiras
12	Omkar Ghansham Sathe	B67	8007169473	8007169473	Malshiras
13	Ratan Giramalla Kore	A42	7822036299	8668264929	Narendra Nagar Saiful Bijapur road solapur
14	Tanvi pravin Ghotage	B07	9763838169	9763037229	Kalika Devi road home no 3227, pandharpur
15	Shreyash Ramchandra Patil	B60	7020426106	8208698393	Ap.Bitle Tal.Mohol Dist.Solapur
16	Sakshi Vikas Shivsharan	B26	8888644483	9096424445	Shaskiya Vasahat, Shiv Ganga Niwas, Plot no.35, Behind KBP Clg Pandharpur.
17	Sonal Dilip Pardeshi	A31	9021133191	9028800300	H.no.397,Juni Peth, Pandharpur
18	Vaishnavi Gurupadappa Nanna	B18	7559449858	9923631920	A/p Wagdari,Housing society,Near bus stand,Tal -Akkalkot ,Dist-Solapur
19	Vedangi Mangesh Bhujang	A06	8806488450	9890940450	Swapnadeep,Opposite Takle Hospital,New Karad Naka,Pandharpur-413304
20	Kshirsagar Divya Somnath	B12	9673871097	7972163010	At post Ekurke, Tal-mohol,Dist-Solapur
21	Shruti Pandurang Adat	B01	8180890784	9284170449	At.Post.Malshiras Tal-Malshiras Dist-Solapur
22	Swapnil Kantilal Ubale	A51	9325222583	9665668239	Chinchgaon,T-Madha,D-Solapur ,413208
23	Ankit Vishwas Patil	B61	7448115526	7448115526	A/P - Angar, Tal-Mohol, Dist-solapur
24	Vibhuti Ananda Pawar	B62	9156256335	7387492973	A/P kharsoli, Tal Pandharpur, Dist Solapur
25	Vishakha Vijaykumar Savalkar	A35	8805069340	9850036746	Harinayan park, sabale Nagar, plot no:70 ,isabavi ,pandharpur
26	Vaishnavi Vikram Jathar	A15	9665825180	9373427731	Samata nagar plot no.10 link road near sharada building, Pandharpur
27	Unnati Anil Dhaygude	A09	8767826362	9922022218	At. Nematwadi, Pt. Karakamb, Tal. Pandharpur, 413302.
28	Suraj Suryakant Nagtilak	B80	9021213723	9325280600	A/p khairao tal: Madha Dist: Solapur
29	Vikas Suresh Ingawale	A80	7517346100	8459559084	Samata Nagar Link Road Suyash Bangalo plot Number:-51
30	Suchitra Ramchandra Gavali	A14	9322619670	9922020578	Solapure nagar ,takali road, near to majjid,plot no. 21, Pandharpur
31	Aarti Ashok Mali	B14	8605438608	8805332647	Rachana nagar ,Mohol
32	Vaishnavi Motilal More	A27	8080341085	9765998397	Plot no. - 06, gat no. - 80/1B/1B, Prashant Paricharak Nagar, Near Progress Highschool, Korti road, Pandharpur - 4

33	Aparna Baliram Vasmale	B30	9373693189	9373693189	At post : Javala ; Tal : Sangola ; Dist : Solapur
34	Sakshi Santosh Rudrakanthwar	A33	9421387782	9405117505	Mantri galli savarkar nagar manwath
35	Mayur Vijaykumar Ghadage	A58	7887553116	9422829045	Jawahar Navodaya Vidyalaya,Gadhi Tal-Georai Dist-Beed
36	Pranoj Prabhakar Gonjari	B46	7756998436	9561598727	At.post Dighanchi Tal.Atpadi Dist.Sangli
37	Shaina Ismail Shaikh	A37	9356910095	8149251053	Near Kaikadi Maharaj Math,Dale galli,Pandharpur
38	Lajina Sadik Devale	A07	7709954288	8600387247	In Front of Agraj hospital , new Karad Naka Pandharpur
39	Swapnil Bharat More	A69	7028310339	9414367699	AT POST KAROLI T
40	Umesh Vikas Sathe	A72	7558795237	9960040935	AP. Patkul Tal.Mohol Dist.Solapur
41	Tejal Dipak Survase	A39	8975665261	9665689061	Shiram Chauk,A/P. Javala ,Tal.Sangola ,Dist.Solapur
42	Siddhesh Shivsingh Pardeshi	A77	8788282089	9420878846	Pratibhatai paricharak nagar takli road Pandharpur
43	Sushant Mukesh sulakhe	B68	8956501926	9545247041	3891 balaji colony Solapur road Barshi
44	Khushi Naresh kallur	A17	9763326161	9922885244	Budhwar peth,akkalkot
45	Madhuri Vilas Dongare	A11	9067040590	9422700205	Kharavatwadi(Sangola), Tal-Sangola, Dist-Solapur
46	Aishwarya Waman Kulkarni	A21	8552803901	8806443093	At.Post:-Salgar BK TAL:-Mangalwedha
47	Mayuri somnath swami	A 40	7588183531	9421040431	Patel chowk, Kurduwadi
48	Apurva Ajit Kadam	A16	7262963521	9767065226	Plot no 12,13, flat no 7, Indira Residency, tamjainagar Satara
49	Swarupa Dattakumar Kolle	B11	9422768561	9422628561	Near Mangrule High School,Akkalkot
50	Charulata Prashant Nashte	B19	9373907291	9421223073	NEAR PANCHAYAT SUMMITI SHIVRATNA BANGLO ATPADI
51	Pratiksha Vitthal Pethe	B23	831726889	9552511722	Dilip Deshmukh nagar , osmanabad
52	Lingade Vishal Anil	B-53	8830333342	8830333342	At post -Jainwadi Tal -Pandharpur
53	Chinmay shripad halsikar	B78	7559350237	8999697643	Parimal niwas,pragati nagar,LIC colony,Near matoshree school,Latur
54	Shailesh Ravikant Bhosale	B76	8788903707	8788903707	Sant peth Pandharpur
55	Prapti Pandurang Atkale	A03	8767059524	9527110295	Shegaon Dumala,Taluka Pandharpur,Dist Solapur
56	Saloni Sujit Upase	B28	8408041289	9960075211	Near Vitthal Mandir Kurduwadi
57	Kale Omkar Ajitkumar	A61	9604033059	9922045707	Gavli wada, Osmanabad.
58	Priti Uttam More	A28	9075595625	9922525561	At post:Bavi, Tal:Madha, Dist:solapur
59	Shubham Kiran Sakhare	B65	9511721580	8605692512	254/4, Ravivar Peth, Solapur
60	Mayeshwari shrikrishna more	A29	8767992021	9511883437	Vrundvan Nagar mali vasti takli road ,pandharpur
61	Raviraj Dhondappa Kudal	A78	9175896494	9423334274	236,Om Nama Shivay Nager, Hatture vasti, Hotagi road,, Near Airport, North solapur
62	Kalyani Prasad Modak	A24	9011984828	9881515347	Killa bhag, Mangalwedha.
63	Vaishnavi Milind Abhangrao	A01	9022276522	9404266434	Shrimangal, 4747/2,Manisha Nagar, Pandharpur
64	Shubham Gulabrao Shende	A74	9588669119	9730823222	Shakuntala Nagar
65	Siddhi suresh velapure	A41	7796743303	9172581599	A/p - Javala, tal-sangola, dist-solapur

66	Sahil Santosh Kulkarni	A65	7517635660	8308426337	5-B Sanjivani Apartment Begumpura Aurangabad
67	Dnyaneshwar sanjivan lohar	A66	8010955314	9763798792	Flat no.3 Ashoka building
68	Rohit Madhukar More	B57	7038747978	9011647587	A/P Mundhewadi Tal. Pandharpur Dist. Solapur
69	Shubham Gorakh Shende	A75	8639030422	9985387636	At Ghoti Tal. Karmala solapur
70	Viraj Vikas Patil	A71	7767806564	8788596513	77/78 Row house, 2 nd Phase, Behind Medplus Medical Store, Avanti Nagar Solapur
71	Shraddha sandip kavathekr	B10	9503138454	9404315950	Saraf Galii mangalwedha
72	Omraje Rahul Wattamwar	B71	9764767999	9860727999	Chowbra road , shetkar gali , udgir, latur
73	Prerana Bharat Shinde	A38	8080021936	7875246367	Shivajinagar , Mangalwedha, Solapur.
74	Jyoti Chandrashekhar Ekad	A12	8530241458	8605640528	Santhpeth sangola road Pandharpur
75	Prasanna Santosh Thalpati	B70	9145678910	9822078823	4278, Somwar Peth, Barshi
76	Gorakshanath Balkrushna Shejal	A73	9022542837	8888687164	At Devade Po Shelve Tal Pandharpur Dist Solapur
77	Vitthal Ashok Sirsale	A76	9900859714	7259997296	A/P Alanga Tal. Aland Dist. Kalburgi.
78	Yogeshree Pandit Pawar	B22	9371410631	8805966989	House no. 180,Anil nagar hanuman mandir near, pandharpur
79	Shweta Sanjay Jadhav	B09	9022671166	8600200398	Natepute , Tal - Malshiras, Dist- pune
80	Rahul Kisan Gapat	A57	7798122276	8975884515	At post. Indapur, Tal. Washi, Dist. Osmanabad - 413525
81	Prerana Raju Limbole	A22	9307791788	9881093268	Bhairavnath nagar Padasthal Road Indapur Tal:Indapur Dist:Pune Pin: 413106
82	Sakshi Ganesh Bhosale	A05	9325075968	9270659028	Vithhal nagar ,plot no. 13, Pandharpur
83	Akshay Mahavir Andhare	A52	9834796041	9922973160	Dharmadhikari plot,Gadegoan road,Barshi.
84	Onkar Bhimrao Babar	B37	7071780707	9325537211	Shreepur Tal:Malshiras Dist: solapur
85	Rahul Kisan Devkate	A55	8600941245	9579161059	A-P Bhamburdi Tal-Malshiras Dist-Solapur
86	Shweta Anant Savant	A36	9766980188	9665551771	Dattanagar,Modnimb
87	Sanket Vasant Ghogare	B45	7057505656	7028351913	A/p_ Ganeshwadi Bavda tal -indapur Dist-pune
88	Girimalleshwar Balaji Nagelli	A70	9307494151	9764756521	73,Datta nagar, Daji peth, Solapur
89	Arbaj Jalaluddin Mujawar	B58	8999607197	8999607197	Gadegaon road Deshmukh plot Barshi.
90	Pallavi Aba Jadhav	B08	8261091700	8669010419	Barshi road Visava,bhatumbare Tal - Pandharpur, Dis - solapur
91	Pratik Gorakh Mali	B54	7083898610	9545663190	At Post Tulshi, Tal Madha, Dist Solapur, 413302
92	Dongare Amruta Kamraj	A02	9307480500	9881608311	AT/P Papari Tal. Mohol Dist. Solapur
93	Aniket Rajmahendra Mittha	B 56	9767253969	9890575773	180 A , Sakhar Peth Solapur
94	Ganesh bandu yeole	B72	9579858690	7218583606	Bandu ramrao yeole
95	Rohit Dattatray Kavitake	A63	7385582758	7385582758	D4, Abhishek nagar, murarji peth , solapur
96	Sanket Sambhaji Kondubhairy	A64	8459753697	9975255585	Kondubhairy galli mangalwedha
97	Pavanraj Balasaheb Jagdale	B50	7972979221	9405237701	Uplai Road Gondil plot Barshi dist. Solapur.
98	Sanika Baliram Thakare	B27	9022635563	9922180107	Samarth Nagar,Mohol

99	Vaibhavi vivekanand patil	B20	7058540070	9552007036	At post kharsoli
~~100~~	~~Aditya Bhagwat Keskar~~	~~B79~~	~~9822366314~~	~~9822366314~~	~~Khardi Tal Pandharpur Dist Solapur~~
101	Yashwant siddheshwar mali	B55	8625809075	8625809075	Samarth Nagar,isbavi
102	Vijay Lingdev Nikam	B59	7057079777	8308226151	A/p:Kurul,Tal:Mohol,Dist:solapur
103	Bhushan Satish Deshmukh	B40	8421296860	9764758317	At post jagji taluka district osmanabad 413509
104	Shivani Nagnath Gaikwad	B04	9921143420	9921143420	Pune highway,Mohol
105	Abhay Shivanand Ghante	B44	9890384664	8788015514	New Rto office Solapur
106	Pavan Pandurang Kakade	A60	7387144272	9881448366	At post sanja tq. Di. Osmanabad
107	Shraddha Shashikant Dhage	A08	8080349520	9975799818	Jawale Galli Mangalwedha
108	Harun Ilahi Shaikh	B75	8329320708	8329320708	Sant peth Pandharpur

Patil sv
Yashpati
Gaikwad
Kakade
S. S. Dhage

NRSC Outreach Facility

nrsc

Industrail visit on 30-May-2022

SVERI'S College of Engineering ,Pandharpur,Maharashtra

NRSC Outreach Facility

nrsc

Industrail visit on 30-May-2022

SVERI'S College of Engineering , Pandharpur,Maharashtra

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Bahirwade Pooja Rajendra

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

We wish him / her all the success in future endeavors.

APS MICROTECH PVT. LTD. NAGPUR

Date : 17/09/2021

Mr. ASHISH GADPAYLE
TRAINER,
APS MICROTECH

Mr. PRASHANT JHA
DIRECTOR,
APS MICROTECH

Certificate Number: apsmicrotech-1632762175252

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Birajdar Shraddha Siddharam

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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APS MICROTECH PVT. LTD. • NAGPUR •

Date : 17/09/2021

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TRAINER,
APS MICROTECH

Mr. PRASHANT JHA
DIRECTOR,
APS MICROTECH

Certificate Number: apsmicrotech-1632762175253

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Dalave Snehal Sanjay

of SVERI's College of Engineering, Pandharpur

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APS MICROTECH PVT. LTD. NAGPUR

Date : 17/09/2021

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TRAINER,
APS MICROTECH

Mr. PRASHANT JHA
DIRECTOR,
APS MICROTECH

Certificate Number: apsmicrotech-1632762175254

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Dhembare Monali Bandu

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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Date : 17/09/2021

Mr. ASHISH GADPAYLE
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APS MICROTECH

Mr. PRASHANT JHA
DIRECTOR,
APS MICROTECH

Certificate Number: apsmicrotech-1632762175255

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Dhotre Khushi Avinash

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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Date : 17/09/2021

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APS MICROTECH

Mr. PRASHANT JHA
DIRECTOR,
APS MICROTECH

Certificate Number: apsmicrotech-1632762175256

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Farad Vaishnavi Bapurao

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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APS MICROTECH PVT. LTD. NAGPUR

Date : 17/09/2021

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APS MICROTECH

Mr. PRASHANT JHA
DIRECTOR,
APS MICROTECH

Certificate Number: apsmicrotech-1632762175257

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Jadhav Sanskruti Rupchand

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

We wish him / her all the success in future endeavors.

APS MICROTECH PVT. LTD. NAGPUR

Date : 17/09/2021

Mr. ASHISH GADPAYLE
TRAINER,
APS MICROTECH

Mr. PRASHANT JHA
DIRECTOR,
APS MICROTECH

Certificate Number: apsmicrotech-1632762175258

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Kadam Sanskruti Sanjay

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

We wish him / her all the success in future endeavors.

APS MICROTECH PVT. LTD. NAGPUR

Date : 17/09/2021

Mr. ASHISH GADPAYLE
TRAINER,
APS MICROTECH

Mr. PRASHANT JHA
DIRECTOR,
APS MICROTECH

Certificate Number: apsmicrotech-1632762175259

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Kapase Priti Tukaram

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on _____

C Programming *for the duration of* 13/09/2021 *to*

17/09/2021 *working days.*

We wish him / her all the success in future endeavors.

APS MICROTECH PVT. LTD. NAGPUR

Date : 17/09/2021

Mr. ASHISH GADPAYLE
TRAINER,
APS MICROTECH

Mr. PRASHANT JHA
DIRECTOR,
APS MICROTECH

Certificate Number: apsmicrotech-1632762175260

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Kupade Rutuja Vaibhav

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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APS MICROTECH PVT. LTD. NAGPUR

Date : 17/09/2021

Mr. ASHISH GADPAYLE
TRAINER,
APS MICROTECH

Mr. PRASHANT JHA
DIRECTOR,
APS MICROTECH

Certificate Number: apsmicrotech-1632762175261

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Linge Sayali Laxman

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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Mr. ASHISH GADPAYLE
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Mr. PRASHANT JHA
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Mr. PRASHANT JHA
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APS MICROTECH

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Mr./Ms./Mrs. Thengal Rutuja Bramhadev

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APS MICROTECH

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APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Kaulwar Yash Shrinivas

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

We wish him / her all the success in future endeavors.

APS MICROTECH PVT. LTD. NAGPUR

Date : 17/09/2021

Mr. ASHISH GADPAYLE
TRAINER,
APS MICROTECH

Mr. PRASHANT JHA
DIRECTOR,
APS MICROTECH

Certificate Number: apsmicrotech-1632762175299

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Khatal Chetan Dipak

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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APS MICROTECH PVT. LTD. NAGPUR

Date : 17/09/2021

Mr. ASHISH GADPAYLE
TRAINER,
APS MICROTECH

Mr. PRASHANT JHA
DIRECTOR,
APS MICROTECH

Certificate Number: apsmicrotech-1632762175300

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CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

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for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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APS MICROTECH PVT. LTD. NAGPUR

Date : 17/09/2021

Mr. ASHISH GADPAYLE
TRAINER,
APS MICROTECH

Mr. PRASHANT JHA
DIRECTOR,
APS MICROTECH

Certificate Number: apsmicrotech-1632762175301

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CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Naiknavare Ganesh Shantilal

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APS MICROTECH PVT. LTD. NAGPUR

Date : 17/09/2021

Mr. ASHISH GADPAYLE
TRAINER,
APS MICROTECH

Mr. PRASHANT JHA
DIRECTOR,
APS MICROTECH

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CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Nargide Harsh Rajesh

of SVERI's College of Engineering, Pandharpur

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APS MICROTECH PVT. LTD. NAGPUR

Date : 17/09/2021

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TRAINER,
APS MICROTECH

Mr. PRASHANT JHA
DIRECTOR,
APS MICROTECH

Certificate Number: apsmicrotech-1632762175303

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CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Narute Prajwal Pandurang

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APS MICROTECH PVT. LTD. NAGPUR

Date : 17/09/2021

Mr. ASHISH GADPAYLE
TRAINER,
APS MICROTECH

Mr. PRASHANT JHA
DIRECTOR,
APS MICROTECH

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CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Patil Krishna Surendra

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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APS MICROTECH PVT. LTD. NAGPUR

Date : 17/09/2021

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TRAINER,
APS MICROTECH

Mr. PRASHANT JHA
DIRECTOR,
APS MICROTECH

Certificate Number: apsmicrotech-1632762175305

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CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Patil Mahesh Vikram

of SVERI's College of Engineering, Pandharpur

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APS MICROTECH PVT. LTD. NAGPUR

Date : 17/09/2021

Mr. ASHISH GADPAYLE
TRAINER,
APS MICROTECH

Mr. PRASHANT JHA
DIRECTOR,
APS MICROTECH

Certificate Number: apsmicrotech-1632762175306

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CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Patil Yashraj Shivling

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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APS MICROTECH PVT. LTD. NAGPUR

Date : 17/09/2021

Mr. ASHISH GADPAYLE
TRAINER,
APS MICROTECH

Mr. PRASHANT JHA
DIRECTOR,
APS MICROTECH

Certificate Number: apsmicrotech-1632762175307

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CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Pethe Shubham Somnath

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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APS MICROTECH PVT. LTD. NAGPUR

Date : 17/09/2021

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TRAINER,
APS MICROTECH

Mr. PRASHANT JHA
DIRECTOR,
APS MICROTECH

Certificate Number: apsmicrotech-1632762175308

APS Microtech Pvt. Ltd.

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TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Repal Yash Sunil

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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APS MICROTECH PVT. LTD. NAGPUR

Date : 17/09/2021

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TRAINER,
APS MICROTECH

Mr. PRASHANT JHA
DIRECTOR,
APS MICROTECH

Certificate Number: apsmicrotech-1632762175309

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Salgar Avinash Netaji

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

We wish him / her all the success in future endeavors.

APS MICROTECH PVT. LTD. NAGPUR

Date : 17/09/2021

Mr. ASHISH GADPAYLE
TRAINER,
APS MICROTECH

Mr. PRASHANT JHA
DIRECTOR,
APS MICROTECH

Certificate Number: apsmicrotech-1632762175310

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Shinde Digvijay Sambhaji

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

We wish him / her all the success in future endeavors.

APS MICROTECH PVT. LTD. NAGPUR

Date : 17/09/2021

Mr. ASHISH GADPAYLE
TRAINER,
APS MICROTECH

Mr. PRASHANT JHA
DIRECTOR,
APS MICROTECH

Certificate Number: apsmicrotech-1632762175311

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Shinde Somnath Suresh

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

We wish him / her all the success in future endeavors.

APS MICROTECH PVT. LTD. NAGPUR

Date : 17/09/2021

Mr. ASHISH GADPAYLE
TRAINER,
APS MICROTECH

Mr. PRASHANT JHA
DIRECTOR,
APS MICROTECH

Certificate Number: apsmicrotech-1632762175312

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Sonawane Sanket Nagesh

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

We wish him / her all the success in future endeavors.

APS MICROTECH PVT. LTD. NAGPUR

Date : 17/09/2021

Mr. ASHISH GADPAYLE
TRAINER,
APS MICROTECH

Mr. PRASHANT JHA
DIRECTOR,
APS MICROTECH

Certificate Number: apsmicrotech-1632762175313

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Surshetwar Abhijeet Balkrishna

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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APS MICROTECH PVT. LTD. NAGPUR

Date : 17/09/2021

Mr. ASHISH GADPAYLE
TRAINER,
APS MICROTECH

Mr. PRASHANT JHA
DIRECTOR,
APS MICROTECH

Certificate Number: apsmicrotech-1632762175314

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Surwase Shreyas Shankar

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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APS MICROTECH PVT. LTD. NAGPUR

Date : 17/09/2021

Mr. ASHISH GADPAYLE
TRAINER,
APS MICROTECH

Mr. PRASHANT JHA
DIRECTOR,
APS MICROTECH

Certificate Number: apsmicrotech-1632762175315

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Thorat Prasad Nanasaheb

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

We wish him / her all the success in future endeavors.

APS MICROTECH PVT. LTD. NAGPUR

Date : 17/09/2021

Mr. ASHISH GADPAYLE
TRAINER,
APS MICROTECH

Mr. PRASHANT JHA
DIRECTOR,
APS MICROTECH

Certificate Number: apsmicrotech-1632762175316

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Virdhe Amrut Yogesh

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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APS MICROTECH PVT. LTD. NAGPUR

Date : 17/09/2021

Mr. ASHISH GADPAYLE
TRAINER,
APS MICROTECH

Mr. PRASHANT JHA
DIRECTOR,
APS MICROTECH

Certificate Number: apsmicrotech-1632762175317

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Virkar Vikas Mansing

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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APS MICROTECH PVT. LTD. NAGPUR

Date : 17/09/2021

Mr. ASHISH GADPAYLE
TRAINER,
APS MICROTECH

Mr. PRASHANT JHA
DIRECTOR,
APS MICROTECH

Certificate Number: apsmicrotech-1632762175318

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Waghmare Aditya Ramchandra

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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APS MICROTECH PVT. LTD. NAGPUR

Date : 17/09/2021

Mr. ASHISH GADPAYLE
TRAINER,
APS MICROTECH

Mr. PRASHANT JHA
DIRECTOR,
APS MICROTECH

Certificate Number: apsmicrotech-1632762175319

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Waghmare Pranav Prashant

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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APS MICROTECH PVT. LTD. NAGPUR

Date : 17/09/2021

Mr. ASHISH GADPAYLE
TRAINER,
APS MICROTECH

Mr. PRASHANT JHA
DIRECTOR,
APS MICROTECH

Certificate Number: apsmicrotech-1632762175320

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TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Waghule Rushikesh Rajesh

of SVERI's College of Engineering, Pandharpur

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C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

We wish him / her all the success in future endeavors.

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Date : 17/09/2021

Mr. ASHISH GADPAYLE
TRAINER,
APS MICROTECH

Mr. PRASHANT JHA
DIRECTOR,
APS MICROTECH

Certificate Number: apsmicrotech-1632762175321

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Ambule Swati Saudagar

of SVERI's College of Engineering, Pandharpur

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TECHNICAL IT TRAINING PROGRAM

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Mr./Ms./Mrs. Betale Gayatri Pavankumar

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TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Bile Anuja Agatrao

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Certificate Number: apsmicrotech-1634556956403

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TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Birajdar Ashwini Gaudappa

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for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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Certificate Number: apsmicrotech-1634556956404

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TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Choudhari Sanyogita Baba

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Certificate Number: apsmicrotech-1634556956405

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TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Darade Snehal Santosh

of SVERI's College of Engineering, Pandharpur

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Certificate Number: apsmicrotech-1634556956406

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TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Galande Sneha Santosh

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for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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Certificate Number: apsmicrotech-1634556956407

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TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Gavali Sampada Sanjay

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on _____

C Programming *for the duration of* 13/09/2021 *to*

17/09/2021 *working days.*

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Certificate Number: apsmicrotech-1634556956408

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TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Ghugelawale Nikita Dhananjay

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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AUTHORIZED SIGNATURE

Certificate Number: apsmicrotech-1634556956409

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Gove Pragati Shankar

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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Certificate Number: apsmicrotech-16345569564l0

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Hilal Pranali Pandurang

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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AUTHORIZED SIGNATURE

Certificate Number: apsmicrotech-1634556956411

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Jagtap Neha Sudhakar

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

We wish him / her all the success in future endeavors.

APS MICROTECH PVT. LTD. • NAGPUR •

Date : 17/09/2021

TRAINER SIGNATURE

AUTHORIZED SIGNATURE

Certificate Number: apsmicrotech-1634556956412

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Jagtap Nikita Chandrahas

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

We wish him / her all the success in future endeavors.

APS MICROTECH PVT. LTD. • NAGPUR •

Date : 17/09/2021

TRAINER SIGNATURE

AUTHORIZED SIGNATURE

Certificate Number: apsmicrotech-1634556956413

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Jagtap Purva Chintamani

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on _____

C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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APS MICROTECH PVT. LTD. • NAGPUR •

Date : 17/09/2021

TRAINER SIGNATURE

AUTHORIZED SIGNATURE

Certificate Number: apsmicrotech-1634556956414

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Khude Sonali Ashok

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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APS MICROTECH PVT. LTD. • NAGPUR •

Date : 17/09/2021

TRAINER SIGNATURE

AUTHORIZED SIGNATURE

Certificate Number: apsmicrotech-1634556956415

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Kokare Aishwarya Mahadeo

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

We wish him / her all the success in future endeavors.

APS MICROTECH PVT. LTD. • NAGPUR •

Date : 17/09/2021

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Certificate Number: apsmicrotech-16345569564l6

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CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Kumbhar Namrata Vishnu

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on _____

C Programming *for the duration of* 13/09/2021 *to*

17/09/2021 *working days.*

We wish him / her all the success in future endeavors.

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Certificate Number: apsmicrotech-16345569564l7

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CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Landge Akanksha Namdev

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on _____

C Programming *for the duration of* 13/09/2021 *to*

17/09/2021 *working days.*

We wish him / her all the success in future endeavors.

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Certificate Number: apsmicrotech-1634556956418

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CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

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Mr./Ms./Mrs. Lokare Aparna Keraba

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for successfully completing Industrial Training / Workshop / Internship / Webinar on _____

C Programming *for the duration of* 13/09/2021 *to*

17/09/2021 *working days.*

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Certificate Number: apsmicrotech-1634556956419

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CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Lokhande Kiran Anandrao

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C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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Certificate Number: apsmicrotech-1634556956420

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TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Nikam Sakshi Chintamani

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C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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Certificate Number: apsmicrotech-1634556956421

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TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Nishita Patil

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Certificate Number: apsmicrotech-1634556956422

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TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Patil Sanika Mukund

of SVERI's College of Engineering, Pandharpur

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Certificate Number: apsmicrotech-1634556956423

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CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Patole Poonam Vilas

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for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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Certificate Number: apsmicrotech-1634556956424

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TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Raut Sonali Gokul

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Date : 17/09/2021

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AUTHORIZED SIGNATURE

Certificate Number: apsmicrotech-1634556956425

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Rohite Aishwarya Balkrushna

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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APS MICROTECH PVT. LTD. • NAGPUR •

Date : 17/09/2021

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AUTHORIZED SIGNATURE

Certificate Number: apsmicrotech-1634556956426

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Sawant Aishwarya Maruti

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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Date : 17/09/2021

TRAINER SIGNATURE

AUTHORIZED SIGNATURE

Certificate Number: apsmicrotech-1634556956427

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Kanade Shreya Ramesh

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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Date : 17/09/2021

TRAINER SIGNATURE

AUTHORIZED SIGNATURE

Certificate Number: apsmicrotech-1634556956428

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CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Sudke Gaytri Bibhishan

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on _____

C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

We wish him / her all the success in future endeavors.

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TRAINER SIGNATURE

AUTHORIZED SIGNATURE

Certificate Number: apsmicrotech-1634556956429

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Aiwale Dipak Eknath

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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Date : 17/09/2021

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Certificate Number: apsmicrotech-1634556956430

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TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Aware Rushikesh Fulchand

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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AUTHORIZED SIGNATURE

Certificate Number: apsmicrotech-1634556956431

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Badave Shriprasad Achyut

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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Date : 17/09/2021

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AUTHORIZED SIGNATURE

Certificate Number: apsmicrotech-1634556956432

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Bandgar Shubham Daryaba

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on _____

C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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Date : 17/09/2021

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Certificate Number: apsmicrotech-1634556956433

APS Microtech Pvt. Ltd.

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TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Bansode Harshad Abhiman

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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Certificate Number: apsmicrotech-1634556956434

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CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Baraskar Mustkeem Mahamadhanif

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on _____

C Programming *for the duration of* 13/09/2021 *to*

17/09/2021 *working days.*

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AUTHORIZED SIGNATURE

Certificate Number: apsmicrotech-1634556956435

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CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Bhosale Sudarshan Gopichand

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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Date : 17/09/2021

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Certificate Number: apsmicrotech-1634556956436

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Birajdar Gaurav Rajendra

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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Date : 17/09/2021

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Certificate Number: apsmicrotech-1634556956437

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Bulbule Kaivalya Santosh

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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Date : 17/09/2021

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AUTHORIZED SIGNATURE

Certificate Number: apsmicrotech-1634556956438

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Deshmukh Shambhuraje Ramraje

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on _____

C Programming *for the duration of* 13/09/2021 *to*

17/09/2021 *working days.*

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APS MICROTECH PVT. LTD. NAGPUR

Date : 17/09/2021

TRAINER SIGNATURE

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Certificate Number: apsmicrotech-1634556956439

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CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Dhularao Shreyash Chandrakant

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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Certificate Number: apsmicrotech-1634556956440

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TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Dixit Om Ramesh

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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Certificate Number: apsmicrotech-1634556956441

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CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Gaikwad Sudarshan Shankar

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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Certificate Number: apsmicrotech-1634556956442

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TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Gaikwad Sujay Subhash

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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Certificate Number: apsmicrotech-1634556956443

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TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Gangthade Ritesh Ananda

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for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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Certificate Number: apsmicrotech-1634556956444

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TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Gokhale Aditya Maruti

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C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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Certificate Number: apsmicrotech-1634556956445

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TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Gosavi Pratik Dinesh

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for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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Certificate Number: apsmicrotech-1634556956446

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TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Gulamkar Saurabh Kalidas

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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Certificate Number: apsmicrotech-1634556956447

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TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Hingmire Atharv Milind

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for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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Certificate Number: apsmicrotech-1634556956448

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TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Huke Tejas Ramrao

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for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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Certificate Number: apsmicrotech-1634556956449

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CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Jadhav Dinesh Datta

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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Date : 17/09/2021

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AUTHORIZED SIGNATURE

Certificate Number: apsmicrotech-1634556956450

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Jadhav Mayur Rajkumar

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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Date : 17/09/2021

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Certificate Number: apsmicrotech-1634556956451

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Jagtap Rohit Mahadeo

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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Certificate Number: apsmicrotech-16345569564 52

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Kadganchi Om Balasaheb

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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Certificate Number: apsmicrotech-1634556956453

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Kagane Vitthal Pandit

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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Date : 17/09/2021

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Certificate Number: apsmicrotech-1634556956454

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Koli Khandu Chandrakant

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on _____

C Programming *for the duration of* 13/09/2021 *to*

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Date : 17/09/2021

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Certificate Number: apsmicrotech-1634556956455

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Koli Viraj Vijay

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

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Certificate Number: apsmicrotech-1634556956456

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Kurnawal Chinmay Kailas

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on _____

C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

We wish him / her all the success in future endeavors.

APS MICROTECH PVT. LTD. • NAGPUR •

Date : 17/09/2021

TRAINER SIGNATURE

AUTHORIZED SIGNATURE

Certificate Number: apsmicrotech-1634556956457

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Lamkane Ganesh Shankar

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

We wish him / her all the success in future endeavors.

APS MICROTECH PVT. LTD. NAGPUR

Date : 17/09/2021

TRAINER SIGNATURE

AUTHORIZED SIGNATURE

Certificate Number: apsmicrotech-1634556956458

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Lavate Nilesh Narayan

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

We wish him / her all the success in future endeavors.

APS MICROTECH PVT. LTD. • NAGPUR •

Date : 17/09/2021

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AUTHORIZED SIGNATURE

Certificate Number: apsmicrotech-1634556956459

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Nagane Prashant Samadhan

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on _____

C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

We wish him / her all the success in future endeavors.

APS MICROTECH PVT. LTD. • NAGPUR •

Date : 17/09/2021

TRAINER SIGNATURE

AUTHORIZED SIGNATURE

Certificate Number: apsmicrotech-1634556956461

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Parit Rohit Madolappa

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on _____

C Programming *for the duration of* 13/09/2021 *to*

17/09/2021 *working days.*

We wish him / her all the success in future endeavors.

APS MICROTECH PVT. LTD. • NAGPUR •

Date : 17/09/2021

TRAINER SIGNATURE

AUTHORIZED SIGNATURE

Certificate Number: apsmicrotech-1634556956462

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Patil Akshay Mayappa

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

We wish him / her all the success in future endeavors.

APS MICROTECH PVT. LTD. • NAGPUR •

Date : 17/09/2021

TRAINER SIGNATURE

AUTHORIZED SIGNATURE

Certificate Number: apsmicrotech-1634556956463

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Patwari Tukaram Kamlakar

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on _____

C Programming *for the duration of* 13/09/2021 *to*

17/09/2021 *working days.*

We wish him / her all the success in future endeavors.

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Date : 17/09/2021

TRAINER SIGNATURE

AUTHORIZED SIGNATURE

Certificate Number: apsmicrotech-1634556956464

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Sahil Pradeep Ambhure

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

We wish him / her all the success in future endeavors.

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Date : 17/09/2021

TRAINER SIGNATURE

AUTHORIZED SIGNATURE

Certificate Number: apsmicrotech-1634556956465

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Saqib Amin Najar

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

We wish him / her all the success in future endeavors.

APS MICROTECH PVT. LTD. • NAGPUR •

Date : 17/09/2021

TRAINER SIGNATURE

AUTHORIZED SIGNATURE

Certificate Number: apsmicrotech-1634556956466

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Sathe Pruthviraj Appasaheb

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

We wish him / her all the success in future endeavors.

APS MICROTECH PVT. LTD. • NAGPUR •

Date : 17/09/2021

TRAINER SIGNATURE

AUTHORIZED SIGNATURE

Certificate Number: apsmicrotech-1634556956467

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Vanave Mihir Bapu

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

We wish him / her all the success in future endeavors.

APS MICROTECH PVT. LTD. • NAGPUR •

Date : 17/09/2021

TRAINER SIGNATURE

AUTHORIZED SIGNATURE

Certificate Number: apsmicrotech-1634556956468

APS Microtech Pvt. Ltd.

CIN - U72900MH2016PTC287986

TECHNICAL IT TRAINING PROGRAM

This is to certify that

Mr./Ms./Mrs. Vishwamantri Mahesh Shrimant

of SVERI's College of Engineering, Pandharpur

for successfully completing Industrial Training / Workshop / Internship / Webinar on C Programming *for the duration of* 13/09/2021 *to* 17/09/2021 *working days.*

We wish him / her all the success in future endeavors.

APS MICROTECH PVT. LTD. • NAGPUR •

Date : 17/09/2021

TRAINER SIGNATURE

AUTHORIZED SIGNATURE

Certificate Number: apsmicrotech-1634556956469

SHRI VITHAL EDUCATION & RESEARCH INSTITUTE's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Tal.- Pandharpur- 413 304,Dist.- Solapur (Maharashtra)
Tel.: 02186-216063, 9503103757, E-mail : coe@sveri.ac.in, Website: www.sveri.ac.in
(Approved by A.I.C.T.E., New Delhi and affiliated to P. A. H. Solapur University, Solapur)
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Date-28/06/2022

Notice

All the students and teachers of ENTC department are here by informed to note that consider the following points at the time of industrial visits.

1. Industrial visit is compulsory to all the students
2. Industrial visit record will be considered at the time of submission and each student has to take remark of industrial visit coordinator on submission form.
3. Those who are fail to do the industrial visit at college level, those students has to visit two companies personally and submit the certificate to your respective class coordinators, defaulter's submission will not be considered.
4. Those who are not going to industrial visit with all students; these students have to report to college according to regular time table.

Mr. R.B Pawar
Industrial Visit Coordinator

Mr.S.A Inamdar
H. O. D

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COLLEGE OF ENGINEERING, PANDH
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Tal.- Pandharpur- 413 304,Dist.- Solapur (Maharashtra
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Ref: COEPR/ENTC/2021-22/426

Date: 22/06/2022

To:-
Mr. R .V. Dhekale
CEO, Perfect Electronics Wai

Dear sir/madam,

Hope you find this mail in good mood!!!!!

With reference to above subject I undersigned Mr.S.A Inamdar Head of Electronics and Telecommunication Engineering department SVERI's COE Pandharpur would like to have permission for industrial visit on 01/07/2022.

Details are tabulated below table-

Date	Class	Approximate strength of students	No. of faculty of accompanying
01/07/2022	S.E. (ENTC)	100	04

Please give us concent for the same as early as possible.

Thank you!!!

Your's sincerely,

(Mr.R.B Pawar)
I.V .Co-ordinator
ENTC Department

(SAI)
HOD
ENTC Department

Head
Dept. of Electronics & Telecomm
Engg. SVERI'S C.O.E. P

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Ref: COEPR/ENTC/2021-22/425

Date: 22/06/2022

To:-
Mr. Pravin Mohite
APTRON Tech Pvt. Ltd Satara

Dear sir/madam,

Hope you find this mail in good mood!!!!!

With reference to above subject I undersigned Mr.S.A Inamdar Head of Electronics and Telecommunication Engineering department SVERI's COE Pandharpur would like to have permission for industrial visit on 02/07/2022.

Details are tabulated below table-

Date	Class	Approximate strength of students	No. of faculty of accompanying
02/07/2022	S.E. (ENTC)	100	04

Please give us concent for the same as early as possible.

Thank you!!!

Your's sincerely,

(Mr.R.B Pawar)
I.V .Co-ordinator
ENTC Department

(SAI)
HOD
ENTC Department
Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. P...

Gmail

Search all conversations

Compose

Mail

Scheduled

All Mail

Spam 22

Trash

Categories

Chat

No conversations
Start a chat

Spaces

No spaces yet

About Permission to conduct industrial visit at your Company. Exter

Rahul Pawar
Dear Sir, On behalf of Department of E&TC Engineering SVERI's COE,Pandharpur where I serve as the Indus

Pravin Mohite
to me

Received your mail.

we give permission to you for 1 day only.

thank you

regard's
pravin mohite
aptron technology, satara

Thank you for your response. | Thanks a lot. | Thank you for your mail.

Reply | Forward

1/1

https://mail.google.com/mail/u/0/#all/QgrcJHsNqMKKfRdhtSSGsZzZdNRKDWlwZBB

Gmail in:sent

Compose

Mail

Inbox 1,164
Starred
Snoozed
Sent
Drafts 22
More

Chat

No conversations
Start a chat

Spaces

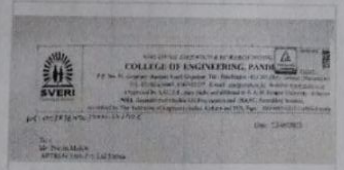
No spaces yet

About Permission to conduct industrial visit at your Company.

Rahul Pawar
Dear Sir, On behalf of Department of E&TC Engineering SVERI's COE,Pandharpur where I serve as the Indus

Rahul Pawar <rbpawar@coe.sveri.ac.in>
to pravinmohite

Thanks and Regards
Mr. Rahul B Pawar
Assistant Professor
Department of Electronics and Telecommunication Engineering
SVERI's College of Engineering, Pandharpur 413304
Contact No. 9665227585



PDF Permission for co...

Reply Forward

Date: - 29/06/2022

To,
The principal,
SVERI's C.O.E. Pandharpur.

Subject: - Regarding permission for 2 days industrial visit at Satara on 01/07/2022 and 02/07/2022.

Respected sir,

We the student of S.Y. (ENTC) would like to have permission for 2 days industrial visit at Satara on 01/07/2022 and 02/07/2022. We have enclosed herewith tentative budget, schedule and route for two days with permission received from industries.

Plase permit us to visit said industries on above mentioned dates we will assure you that, we will follow all instruction given by our faculty during industrial visit and we will be in utmost discipline throughout industrial visit.

Thanking you!

Yours faithfully
Students of S.E (ENTC)-A&B

Industrial Visit Student Coordinator	Class and Division	Sign
Ruturaj Tarapurkar	SY BTECH-A	
Mrunal Choundawar	SY BTECH-A	
Shivraj Magar	SY BTECH-B	
Disha Bhattad	SY BTECH-B	

Class Co-ordinator:-	Remark	Sign
Ms.S.A Atole (SY-A)	—	
Mr.S.P Swami(SY-B)	—	
Industrial Visit Coordinator		
Mr.R.B Pawar	Planning has done by me	
Head of Department		
Mr.S.A Inamdar	I.V. Planned for 2 days 1 sunday compensation	
Dean Student		
Dr.M.S Mathpati	Permitted for Visit as per the plans attached on 01/07/22 to 02/07/22.	

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COLLEGE OF ENGINEERING, PANDHARPUR
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Tal.- Pandharpur- 413 304,Dist.- Solapur (Maharashtra)
Tel.: 02186-216063, 9503103757, E-mail : coe@sveri.ac.in, Website: www.sveri.ac.in
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Department of Electronics and Telecommunication Engineering

A.Y.-2021-22 Class SY A

Sr.NO	Name of student	Sign	Sr.NO	Name of student	Sign
1	Annadate Disha Sham		31	Ranadive Vanita Manohar	
2	Atkale Shivani Ramchandra		32	Sakhare Samruddhi Santosh	
3	Barale Kajal Satyavan		33	Sayyad Ayesha Faiyyaj	
4	Bhingare Sayali Dhanaji		34	Tamboli Asma Javed	
5	Bhosale Aishwarya Mohan		35	Tamboli Ayesha Jabbar	
6	Bhusnar Shilpa Bhau		36	Bagal Yash Deepak	
7	Chaugule Jyoti Ramchandra		37	Barate Aniket Shahu	
8	Chavan Ashwini Kiran		38	Chormale Yuvraj Madhukar	
9	Chavan Ashwini Sudhir		39	Chougule Rohan Kakasaheb	
10	Chougule Sakhare Srushti Dattatray		40	Dakavale Ranjit Revan	
11	Choundawar Mrunal Vivek		41	Dalavi Shreyas Kishore	
12	Deshmukh Sangita Shivaji		42	Dukare Dnyaneshwar Bharat	
13	Deshmukh Shubhada Raju		43	Gaikwad Nikhil Nagnath	
14	Dhole Pranali Mahadev		44	Goykar Tukaram Anna	
15	Doifode Amruta Ashok		45	Jadhav Harsh Prashant	
16	Kadam Aishwarya Dattatray		46	Kamble Ritesh Gundiba	
17	Kamble Snehal Navnath		47	Kudage Onkar Atmaram	
18	Kangale Anuradha Ramdas		48	Kulkarni Adesh Atmaram	
19	Kavade Vrushali Dilip		49	Linge Aniket Nagesh	
20	Koli Prerana Anil		50	Mane Shriniwas Sukhadev	
21	Koli Surekha Sidraya		51	Mhetre Dnyaneshwar Narayan	
22	Kore Snehal Sanjay		52	Patil Satnappa Shivaji	
23	Lokhande Vaishnavi Nitin		53	Patole Shubham Dhanagi	
24	Maske Sandhyarani Khandu		54	Pawar Sanket Kusharam	
25	Misal Pranali Ravindra		55	Sayyad Sohel Mansub	
26	Mohite Megha Maruti		56	Shinde Aniket Ankush	
27	More Rutuja Rajendra		57	Sonar Ganesh Gautam	
28	Patole Sakshi Navnath		58	Swami Shivraj Mallikarjun	
29	Pawar Dipti Dattatray		59	Tarapurkar Ruturaj Suresh	
30	Pawar Priyanka Shivaji		60	Yadav Abhishek Mohan	

(Mr.R.B.Pawar)
Iindustrial Co-ordinatr

(Mrs.Dr.M.M.Pawar)
HoD E&TC

Students went to

SHRI VITHAL EDUCATION & RESEARCH INSTITUTE's
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Department of Electronics and Telecommunication Engineering
A.Y.2021-22 **Class SY B**

Sr.NO	Name of student	Sign	Sr.NO	Name of student	Sign
1	Babar Pragati Digambar		33	Tawashe Priti Yashwant	
2	Bhattad Disha Dineshkumar		34	Utpat Pranjali Milind	
3	Birajdar Shraddha Appasaheb		35	Vyavahare Kanchan Rajkumar	
4	Deshmukh Shivbhakti Sunil		36	Adsul Abhishek Shrikant	
5	Garad Sharayu Shekhar		37	Atar Sahil Nasir	
6	Ingale Kajal Vijaykumar		38	Bagewadikar Yash Rajesh	
7	Janagawali Vrushali Kishor		39	Badave Vinayak Uday	
8	Joshi Swarali Shrirang		40	Bulbule Jay Santosh	
9	Kadam Snehal Shivaji		41	Chavan Prathmesh Santosh	
10	Kadam Rutuja Arun		42	Chavan Ritesh Ganesh	
11	Kadlaskar Shruti Vitthal		43	Chavan Shubham Laxman	
12	Kala Shruti Mukesh		44	Diwane Saurabh Dagdu	
13	Santani Kenny Deepak		45	Lawate Shivaji Chintamani	
14	Kulkarni Vaibhavi Mahesh		46	Ghavate Aditya Abasaheb	
15	Kulkarni Vaishnavi Avinash		47	Ghongade Prathamesh Rajesh	
16	Manakoji Anjali Mallinath		48	Jadhav Ganesh Sambhaji	
17	Misal Pranali Kalyan		49	Shreyash Pramod Kamble	
18	Misal Sonali Ramesh		50	Kasabe Anmol Ashok	
19	More Dipti Dilip		51	Khatake Sandip Hanumant	
20	Muchlambe Vaishnavi Sharanappa		52	Khule Abhijeet Vikas	
21	Mulani Heena Tayyab		53	Korade Kunal Kakasaheb	
22	Naiknaware Pranoti Ganesh		54	Gawali Om Anil	
23	Patil Harshada Sanjay		55	Magar Shivraj Tanaji	
24	Patil Kanchan Kishor		56	Mali Tanmay Shivaji	
25	Patil Pratiksha Tukaram		57	Misal Rohit Pandurang	
26	Rananavare Sakshi Sandip		58	More Aniket Govardhan	
27	Shinde Aishwarya Raghu		59	More Shubham Balasaheb	
28	Shinde Anisha Anil		60	More Tushar Dhananjay	
29	Shinde Ankita Shankar		61	Patil Arjun Vijaykumar	
30	Shinde Siddhi Dattatraya		62	Patil Deepak Rajkumar	
31	Shinde Vaishnavi Bandu		63	Ubale Avishkar Gorakh	
32	Shirkande Sakshi Balasaheb		64	Vadaje Mahadev Bhimashankar	
			65	Yadav Pratik Anil	

(Mr.R.B.Pawar)
Iindustrial Co-ordinatr

(Mrs.Dr.M.M.Pawar)
HoD E&TC

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P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Tal.- Pandharpur- 413 304,Dist.- Solapur (Maharashtra)
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Date: 28/ 6 /2022

Undertaking

To,
Principal,
SVERI's COE, Pandharpur.

Sub: Undertaking about industrial visit.

Respected sir,

I am undersigned student Yash Rajesh Bagewadikar of Class S.Y. Division: B having Roll No. 44 giving the undertaking about the industrial visit.

Sir, in industrial visit I will not do any misbehavior. During industrial visit I will follow our rules and regulation very strictly. While visiting in company I will not wondering here and there and also I will not make noise in company. I will behave such like our behavior will not become their problematic.

During industrial visit whatever days are required that will be covered by co-ordination of our staff members have already given assured about that. Our syllabus will cover within desired time. I will give assured that our result will be 100% Think on it.

Thanking You!!

Y. R. Bagewadikar.

Yours Faithfully

Name:- Yash Rajesh Bagewadikar

Parent contact:- 7499099194

UNDERTAKING BY THE STUDE
VISIT/ MENTOR TOUR/EX]

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COLLEGE OF ENGINEERING, PANDHARPUR
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Date: 29/6/2022

Undertaking

To,
Principal,
SVERI's COE, Pandharpur.

Sub: Undertaking about industrial visit.

Respected sir,

I am undersigned student Badave Vinayak Vday. of Class SY Division: B having Roll No. 45 giving the undertaking about the industrial visit.

Sir, in industrial visit I will not do any misbehavior. During industrial visit I will follow our rules and regulation very strictly. While visiting in company I will not wondering here and there and also I will not make noise in company. I will behave such like our behavior will not become their problematic.

During industrial visit whatever days are required that will be covered by co-ordination of our staff members have already given assured about that. Our syllabus will cover within desired time. I will give assured that our result will be 100% Think on it.

Thanking You!!

Viny

Yours Faithfully

Name:- Badave Vinayak Vday

Parent contact:- 9075021951.

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Date: 28/ 6/2022

Undertaking

To,
Principal,
SVERI's COE, Pandharpur.

Sub: Undertaking about industrial visit.

Respected sir,

I am undersigned student Jay Santosh Bulbule of Class SY Division: B having Roll No. 46 giving the undertaking about the industrial visit.

Sir, in industrial visit I will not do any misbehavior. During industrial visit I will follow our rules and regulation very strictly. While visiting in company I will not wondering here and there and also I will not make noise in company. I will behave such like our behavior will not become their problematic.

During industrial visit whatever days are required that will be covered by co-ordination of our staff members have already given assured about that. Our syllabus will cover within desired time. I will give assured that our result will be 100% Think on it.

Thanking You!!

Yours Faithfully

Name:- Jay Santosh Bulbule

Parent contact:- 9552125501

Perfect Electronics

PERFECT

OFFICE : Datta nagar, Behind S.T.Stand, Wai, Dist.Satara. Maharashtra Phone: 02167-220606, Fax:02167-220606,
Mobile : 09822241255 Email:perfectelectronics@usa.com. Support@iperfect.net, Website: www.perfectelectronics.net
FACTORY : Plot No. B-115, M.I.D.C., Wai, Dist.- Satara, (Maharashtra)

Ref: PE/107

Date: 01-07-2022

CERTIFICATE

This is to certify that 120 numbers of students (S.E.) of Electronics & Telecommunication department with trip co-ordinator Prof. Mr. R. B. Pawar & 3 faculties from **College Of Engineering, Pandharpur Dist- Solapur** visited our company on **1-07-2022**.

We have explained them our following products.

1) Details of Electronics Training Programme.
2) Automatic National Anthem Player.
3) Single Phase Programmable Load Driver.
4) Three Phase Programmable Load Driver Motor.
5) Bell Cum Rashtrageet Player.(IOT Based)
6) Temp. Controlled Soldering & De-soldering Machine.
7) Demo of Alexa.
8) Demo of Digital Storage Oscilloscope.
9) Demo of Dip Soldering Machine.
10) Demo of Express PCB Software.
11) Demo of Circuit Diagram Software.
12) Demo of Motion Sensor with Flud Lamp.
13) Demo of Motion Sensor with Siren.
14) Demo of Automatic Lecture Bell System for College.
15) Demo of Automatic Lecture Bell System for School.
16) Demo of Transformer Winding Machine.
17) IOT Based Product 4 channel Remote Control.
18) IOT Based Wi-Fi Camera

CEO

Dr. R. V. Dhekale

PERFECT ELECTRONICS
Behind S. T. Stand, Dattanagar,
Plot No. 77, Galli No. 4,
Wai - 412 803. Dist. Satara.
Mobile : 9822241255

Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Pandharpur- 413 304, District: Solapur (Maharashtra)Tel.: 02186-16063, 9503103757, Toll Free No.: 1800-3000-4131, E-mail: coe@sveri.ac.in,Web: www.sveri.ac.in (Approved by .I.C.T.E., New Delhi and Affiliated to PAH Solapur University, Solapur **NBA** Accredited all eligible UG Programmes, **AAC** Accredited Institute, Accredited by The Institution of Engineers (India), Kolkata and TCS, Pune. ISO 9001-2015 ertified Institute

Summary of Industrial Visit

Sr. No.	Event : Industrial Visit	
1.	**SY BTECH ENTC**	
2.	**Industry Visit dates:** 01/07/2022 & 02/07/2022	
3.	**Industry details:-**	
	APTRON Tech Pvt. Ltd Satara **Address:** P-6,near DIC Office, Old MIDC, Satara, Maharashtra 415004, Maharashtra, India **Contact Person: Mr.** Pravin Mohite **Email Id: pravinmohite@gmail.com**	Perfect Electronics, Wai Satara **Address:** Survey No. 7/10E, Near Naikwadi Classes, Near Naikwadi Classes, Wai, Satara-412803, Maharashtra, India **Contact Person: Dr. R V Dhekale** Email id: rvdhekale@gmail.com

4) Visit Report:

a) On 1st July 2022: Perfect Electronics, Wai Satara

Perfect Electronics has been established in 1985. It is well-known for educational electronics kits like FM transmitter, Power line Transmitter and receiver, IR transmitter and receiver, Video signal Transmitter, Remote control circuits Inverter, UPS etc. Presently there are 5 workers. They are always trying introduced new products which are not available in the market. This website has been developed to provide details of our product instant to visitor. This website contents all products which are first in world like Auto Lecture Bell system, Electronics Experimental Boards using double sided PTH boards, electronics projects for engineering students. Perfect Electronics is also undertaken the development of website of college.

b) On 2nd July 2022: APTRON Tech Pvt. Ltd Satara

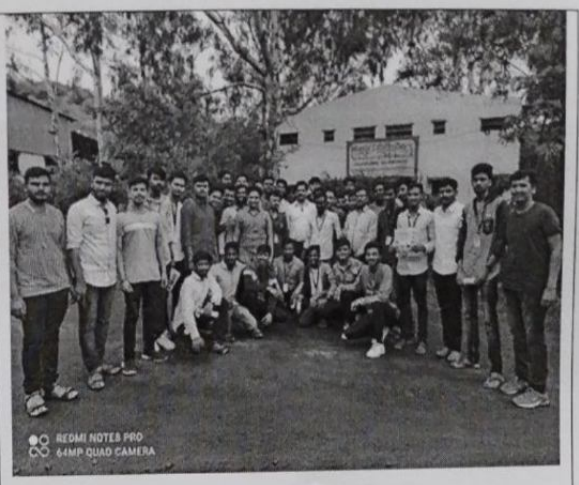
Since our commencement in the year 2013, we, Aptron Tech, are acknowledged in the industry as one of the eminent organizations, engaged in manufacturing a comprehensive range of Electronic Laboratory Trainer, DC Tubelight, Integrated Circuit and much more. High strength, fine finish, lightweight, easy installation and low maintenance are some of the highlighting features of our offered range of products. To suit the demands of customers, we are offering these products in different specifications at market leading prices. Under the guidance of our mentor Mr. Pravin Mohite (Proprietor), our organization is moving ahead in this cutting-edge competition.

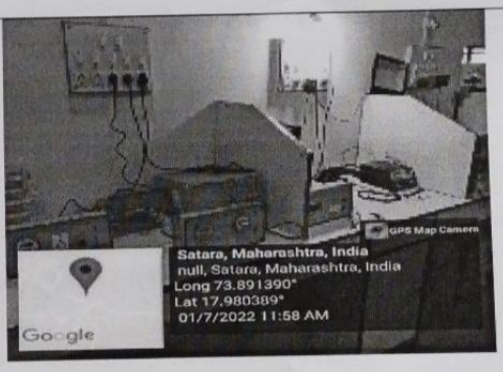
5)	**Outcome :**	**Mapping of POs**
	1. Students acquired the knowledge about PCB Design	1,2,34,5
	2. Students acquired the knowledge about manufacturing processes involved for manufacturing of electronic products such as electronic bell, LED Lamp	1,2,3,4,5

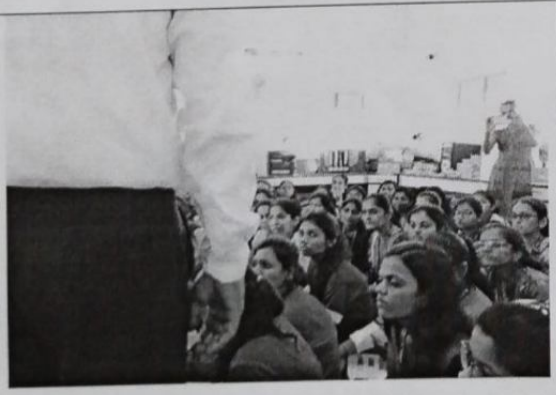
Name of Faculty

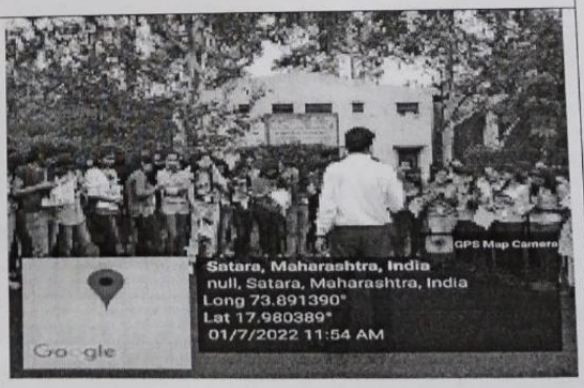
1) **Mr.S.P Swami**
2) **Mr.R.B Pawar**
3) **Ms.S.A Atole**
4) **Ms.S.S Gawade**

Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Pandharpur- 413 304, District: Solapur (Maharashtra)Tel.: 02186-16063, 9503103757, Toll Free No.: 1800-3000-4131, E-mail: coe@sveri.ac.in,Web: www.sveri.ac.in (Approved by .I.C.T.E., New Delhi and Affiliated to PAH Solapur University, Solapur **NBA** Accredited all eligible UG Programmes, **AAC** Accredited Institute, Accredited by The Institution of Engineers (India), Kolkata and TCS, Pune. ISO 9001-2015 ertified Institute









(Mr.R.B.Pawar)
Industrial Visit Co-ordinator

(Dr. Mrs.M.M.Pawar)
HoD E&TC

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

Industrial Visit Report

Date: 28/06/2022

To,

The Principal,

SVERI's College of Engineering,

Pandharpur.

Subject: Report of Industrial Visit.

Name of Industry with address: 1) Top Gear Transmission, M-71, Additional MIDC, Satara
2) Transcend Drive Technology, LU/M-8, Additional MIDC, Satara
3) Suzlon Wind Power Plant, Chalkewadi, Dist- Satara

Date of visit: 23rd June & 24th June 2022.

Respected sir,

As per the curriculum laid by Punyashlok Ahilyadevi Holkar Solapur University, Solapur for S. Y. B. Tech. Mechanical Engineering semester-II, Manufacturing Technology And Power Plant & Energy Engineering Subject include industrial visit in this regard 93 students along with 06 faculty member visited, Top Gear Transmission, M-71, Additional MIDC, Satara, Transcend Drive Technology, LU/M-8, Additional MIDC, Satara & Suzlon Wind Power Plant, Chalkewadi, Dist- Satara on 23rd June & 24th June 2022.

During visit we had seen Various Machines & Machine Tool Proesses, Construction, Working of Power Generation Process using Wind power Plant. From this industrial visit student got practical knowledge about various operations performed during Gear Manufacturing processes such as Gear Shaping, Gear Hobbing etc. and Power Generation, Transmission & Distribution System and they got satisfied with the visit.

This is for your kind information and needful action.

Thanking you.

(Mr. A. K. Parkhe)	(Ms. P. K. Bhuse)	(Mr. P. B. Asabe)	(Dr. S. B. Bhosale)	(Dr. S. S. Wangikar)
PPEE Subject Teacher	PPEE Subject Teacher	MT Subject Teacher	MT Subject Teacher	HOD

HEAD.
Dept of Mechanical Engg
C O E Pandharpur

Date: 22/06/2022

To

The Principal /Dean Students,

SVERI's College of Engineering,

Pandharpur.

Subject: Permission for industrial visit of S.Y. B.Tech. (Mechanical)

Respected Sir,

As per the curriculum laid down by PAH, Solapur University, Solapur for S.Y. B.Tech.. (Mechanical) (Part-I), the subject of 'Manufacturing Technology and Power Plant and Energy Engineering' includes industrial visits. In the processing of same, we have sent letters related to Top Gear Transmissions, Satara, Transcend Drive Technology, Satara, Suzlon Wind Power Plant, Chalakewadi Satara asking permission to visit their organizations. In response, they granted permissions on 23/06/2022 & 24/06/2022.

In view of this, we request you to grant us the permission to arrange visit of S.Y. B.Tech. Mechanical on 23rd & 24th June, 2022.

Thanking you.

Yours Sincerely,

(Prof. S. M. Kale)
CC- SY (A)

(Prof. P. B. Asabe)
CC- SY (B)

(Prof. A. K. Parkhe)
Subject Teacher-PP&EE

(Prof. P. K. Patil)
Subject Teacher-PP&EE

(Prof. P. B. Asabe)
Subject Teacher-MT

(Prof. S. B. Bhosale)
Subject Teacher-MT

Enclosures:

1. Copy of syllabus
2. Permission letters from industries
3. Schedule of visit
4. List of staff accompanying the visit

Forwarded to Dean student
22/6/22

Permitted
22/06/22

Punyashlok Ahilyadevi Holkar Solapur University

Second Year B.TECH. (Mechanical Engineering)

Semester-IV

ME222 : Manufacturing Technology

Teaching Scheme

Lectures : 03 Hours/week, 03 Credits

Practical : 02Hours/week, 01 Credit

Examination Scheme

ESE : 70 Marks

ISE : 30 Marks

ICA : 25 Marks

Section I

Unit-1: Conventional Lathe Machine **No. of lectures - 06**

Introduction to Centre Lathe, parts and functions, specifications, accessories and attachments. Lathe operations, Taper turning methods, simple Numerical on Thread cutting. Introduction to CNC machine tools, Classification of CNC, advantages, limitations and application.

Unit-2: Hole making machine tools **No. of lectures - 08**

Classification, construction and working of Pillar type and radial drilling machines, Job & Tool holding devices and accessories, various operations. Horizontal and vertical boring machines, construction and working, Boring tools and bars, Jig boring machines. Broaching, principal, classification, pull and push type broach, advantages, limitations and application.

Unit-3: Reciprocating motion machine tools **No. of lectures - 06**

Principle, types, specifications, operations on shaper, Types of shapers, Types of planers, standard double housing plainer, construction, and operations. Introduction to construction and working of slotting machine.

Section II

Unit-4: Milling & gear manufacturing **No. of lectures- 09**

Classification of Milling Machines, construction and working of column and knee type milling Machines, Milling methods – Up milling and down milling, milling operations, Gear cutting on milling machines, Gear Hobbing, gear shaving, gear burnishing, indexing methods, Numerical on Indexing Methods.

Unit-5: Finishing Processes **No. of lectures- 05**

Classifications – Cylindrical, Center less, Surface grinder etc. Selection mounting, glazing, loading, truing, balancing, Surface finishing process, Honing, Lapping, super finishing.

Unit-6: Non-conventional Machining **No. of lectures- 06**

Introduction, classification, significance of Unconventional machining, Electrical discharge machining (EDM), Electrochemical Machining (ECM), Ultrasonic machining (USM), Abrasive Water Jet Machining (AWJM), Principle, working, applications, advantages, limitations.

Internal Continuous Assessment (ICA):

1. Setting the lathe machine for taper turning by swiveling compound rest and set over of tail stock method.
2. Setting the lathe machine for thread cutting operation.
3. Study and demonstration of attachments on milling machine.
4. Study and demonstration of various types of milling cutters.
5. Setting the milling machine for gear cutting operation.
6. Study and demonstration of various types of grinding wheels and their specifications.
7. Study of non-conventional machining processes (ECM, EDM).
8. Visit to at least one machine shop and one CNC shop.

Text Books:

1. Workshop Technology (Volume II) by Hajra Chowdhary.
2. Workshop Technology (Volume II) by Raghuvanshi.
3. Production Technology (Volume II) by Gupte-Patel.
4. Workshop Technology (Volume II) by W. A. J. Chapman.
5. Manufacturing Technology-P. N. Rao Vol. II.

Punyashlok Ahilyadevi Holkar Solapur University

Second Year B.TECH. (Mechanical Engineering)

Semester-IV

ME2252 :Power Plant and Energy Engineering

Teaching Scheme

Lectures:03Hours/week, 03Credits

Practical :02Hours/week, 01Credit

Examination Scheme

ESE:70Marks

ISE: 30Marks

ICA: 25Marks

Course Introduction:

Availability of power is the one key area where most of the Indian industry is facing problems. In India, even today, short fall of power generation is about 30 percent. Fuel supply and distribution is also an area where country is still developing smooth lines of supply. Since power and energy is required by every sector of economy, the growth in this sector is must if Indian economy grows in any sector. Many of the job opportunity in private as well as public sector are therefore waiting for students in this field. Hence, this course attempts to provide them basic knowledge of the technologies available at plant level and would also acquaint them with the latest technological advances taking place in this sector.

Course Objectives: During this course, student is expected to:

1. Study of Power Station performance evaluation & economic analysis.
2. Study of various non-conventional energy sources & principles of energy
3. Explain various loads on power plant.
4. Illustrate Significance of different load curves and load factors on power plant.
5. Explain variable load on power plant.
6. Study & explain economics of power plant.

Course Outcomes:

At the end of this course, student will be able to:

1. Describe forms of energy source and their impact on environment.
2. Calculate performance parameters related to power plant.
3. Explain the economics of power plant & categorize power plant as base load & peak load plant.
4. Compare various renewable energy sources with their features.
5. Recognize energy conservation opportunities and explain energy audit concept.

Unit-6:Energy conservation and Energy Audit **No. of lectures- 5**

Energy Conservation- Introduction, energy conservation act 2001 & its feature, energy conservation in industries

Energy Audit- Introduction, need of energy audit, Types of energy audit,Energy management (audit) approach-understanding energy costs, Bench marking, Role of Bureau of Energy Efficiency (BEE)

Internal Continuous Assessment (ICA):

Group - I: Any two Experiment from Expt. No. 1 to 5

14. Solar radiation & its measurement
15. Efficiency measurement of standalone solar P-V system
16. Test on solar water heater
17. Study of components of windmill
18. Trial on Diesel Power Plant.

Group - II: Minimum Six Assignments based on following topics

1. Study of typical load curve (Residential/Commercial/Industrial)
2. Economic Analysis of power plants (Numerical Treatment)
3. Study of Biogas plants
4. Study of Nuclear Power Plants.
5. Study of solar collectors
6. Study of solar thermal applications- solar water heating, space heating, power
7. Study of solar pond / solar photovoltaic
8. Study of various Energy storage devices.
9. Study of instruments of a power plant water purity, PH meter, Gas analysis, Measurement of smoke & dust.
10. **Industrial Visit:** The report based on any Industrial Visit to renewable energy appliances or power generation transmission station

Text Books:

5. A course in Power Plant Engineering – Arora Domkundwar, Dhanpat Rai & Co.
6. Solar Energy – S. P. Sukhatme, Tata McGraw Hill Co.
7. Solar Energy – G. D. Rai, Khanna Publisher.
8. Energy Technology – S. Rao & Dr. B. B. Purulekar, Khanna Publishers.
9. Power Plant Engineering – P. K. Nag, Tata McGraw Hill Publishing Co.

SHRI VITHAL EDUCATION & RESEARCH INSTITUTE's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Tal.- Pandharpur- 413 304,Dist.- Solapur (Maharashtra)
Tel.: 02186-216063, 9503103757, E-mail : coe@sveri.ac.in, Website: www.sveri.ac.in
(Approved by A.I.C.T.E., New Delhi and affiliated to Solapur University, Solapur)
NBA Accredited all Eligible UG Programmes and , **NAAC**, Accredited Institute,
Accredited by the Institute of Engineers (India), Kolkata and TCS, Pune ISO 9001-2015 Certified Institute

Ref. No.:- COEPR/MECH/21-22/ 256

Date: 21/06/2022

To,

Top Gear Transmissions,

M-71, Additional MIDC,

Dist. – Satara – 415004.

Sub: -About Industrial Visit

Dear Sir,

Hope this letter finds you in good health and pleasant mood.

First of all, we wish to put forth a few words regarding our College SVERI's College of Engineering, Pandharpur. Ours is a NBA, NAAC accredited and an ISO 9001:2015 certified Engineering College located in Pandharpur, the "South Kashi" of India and "Spiritual capital" of Maharashtra. "Shri Vitthal Education & Research Institute ", Pandharpur, the trust established by a group of qualified and experienced Technocrats.

As per our S.Y. B.Tech. Mechanical Engineering syllabus of subject: Manufacturing Technology, we want to organize a visit to your well reputed Top Gear Transmissions, Satara for getting knowledge about various Machine Tool Processes. Our S.Y. B.Tech. Mechanical Engineering students are nearly 140, who are willing to visit your esteemed industry. So you are requested to permit our S.Y. B.Tech. Mechanical Engineering students along with a few Staff members, on your convenient date.

Yours faithfully,

SAR
Head, Mech. Engg. Dept.

HEAD,
Dept. of Mechanical Engg
C.O.E. Pandharpur.

90 students along with 6 faculties has visited on 23rd June 2022.

TOP GEAR TRANSMISS... SATARA
23.06.2022

SHRI VITHAL EDUCATION & RESEARCH INSTITUTE's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Tal.- Pandharpur- 413 304,Dist.- Solapur (Maharashtra)
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Accredited by the Institute of Engineers (India), Kolkata and TCS, Pune ISO 9001-2015 Certified Institute

Ref. No.:- COEPR/MECH/21-22/ 255 Date: 21/06/2022

To,

Transcend Drive Technology,

LU/M-8, Additional MIDC,

Dist. - Satara – 415004.

Sub: -About About Industrial Visit

Dear Sir,

Hope this letter finds you in good health and pleasant mood.

First of all, we wish to put forth a few words regarding our College SVERI's College of Engineering, Pandharpur. Ours is a NBA, NAAC accredited and an ISO 9001:2015 certified Engineering College located in Pandharpur, the "South Kashi" of India and "Spiritual capital" of Maharashtra. "Shri Vitthal Education & Research Institute ", Pandharpur, the trust established by a group of qualified and experienced Technocrats.

As per our S.Y. B.Tech. Mechanical Engineering syllabus of subject: Manufacturing Technology, we want to organize a visit to your well reputed Transcend Drive Technology, Satara for getting knowledge about various Machine Tool Processes. Our S.Y. B.Tech. Mechanical Engineering students are nearly 140, who are willing to visit your esteemed industry. So you are requested to permit our S.Y. B.Tech. Mechanical Engineering students along with a few Staff members, on your convenient date.

Yours faithfully,

90 students along with 6 faculties visited on 23rd June 2022

Head, Mech. Engg. Dept.

HEAD.
Dept. of Mechanical Engg
C.O.E. Pandharpur.

TRANSCEND DRIVE TECHNOLOGY SATARA 23.6.2022

SHRI VITHAL EDUCATION & RESEARCH INSTITUTE's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Tal.- Pandharpur- 413 304,Dist.- Solapur (Maharashtra)
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Accredited by the Institute of Engineers (India), Kolkata and TCS, Pune ISO 9001-2015 Certified Institute

Ref. No.:- COEPR/MECH/21-22/ 257 Date: 21/06/2022

To,

Suzlon Wind Power Plant,

Chalkewadi,

Dist. – Satara.

Sub: -About Visit to Wind Power Plant

Dear Sir,

Hope this letter finds you in good health and pleasant mood.

First of all, we wish to put forth a few words regarding our College SVERI's College of Engineering, Pandharpur. Ours is a NBA, NAAC accredited and an ISO 9001:2015 certified Engineering College located in Pandharpur, the "South Kashi" of India and "Spiritual capital" of Maharashtra. "Shri Vitthal Education & Research Institute ", Pandharpur, the trust established by a group of qualified and experienced Technocrats.

As per our S.Y. B.Tech. Mechanical Engineering syllabus of subject: Power Plant and Energy Engineering, we want to organize a visit to your well reputed Wind Power Plant, Chalkewadi Dist: Satara for getting knowledge about electrical power generation process.. Our S.Y. B.Tech. Mechanical Engineering students are nearly 140, who are willing to visit your esteemed power plant. So you are requested to permit our S.Y. B.Tech. Mechanical Engineering students along with a few Staff members, on your convenient date.

Yours faithfully,

go students along with 6 Faculty members visited on 24/06/2022.

SAS
Head, Mech. Engg. Dept.

HEAD,
Dept of Mechanical Engg
C.O.E. Pandharpur.

24.06.22
(SGSL Suzlon - satara)

/ith a few Staff members, on your convenient date.
Ours probable date of visit is 24/06/2022.
Pl consider our request.

–
Dr. Sachin A. Sonawane
Associate Professor
Department of Mechanical Engineering,
SVERI's College of Engineering, Pandharpur 413304
Mobile: 9650959663

Permission letter SUZLON.pdf
297K

Mukesh Raut <rmukesh@suzlon.com> Wed, Jun 22, 2022 at 11:17 AM
To: Sachin Sonawane <sasonawane@coe.sveri.ac.in>, "vilas.salunkhe@suzlon.com" <vilas.salunkhe@suzlon.com>, Prakash Kadam <prakash.kadam@suzlon.com>, "Pravin Pawar (SISL-India Business-O&M)" <pawarp@suzlon.com>

OK. Discuss with our Site In charge Mr. Prakash Kadam Contact number +91 8605019961. Understand and Follow the rules during site visit.

Warm Regards,

As per telephonic discussion with mr. Prakash kadam sir, he permitted to visito chalkewadi wind power plant on 24/06/2022.

Mukesh Raut

+91-9881373759

From: Sachin Sonawane [mailto:sasonawane@coe.sveri.ac.in]
Sent: 22 June 2022 11:02 AM
To: Mukesh Raut <rmukesh@suzlon.com>; vilas.salunkhe@suzlon.com; Prakash Kadam <prakash.kadam@suzlon.com>; Pravin Pawar (SISL-India Business-O&M) <pawarp@suzlon.com>
Subject: About getting permission to visit Chalkewadi Dist: Satara Wind Power Plant on 24/06/2022

CAUTION: ***External email****. Do not click links or open attachments unless you recognize the sender and know the content is safe.*

[Quoted text hidden]

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------CONFIDENTIALITY NOTICE-------

Department of Mechanical Engineering

Schedule of Industrial Visit

S.Y. B.Tech (Mechanical)

Date: 23rd & 24th June 2022

Sr. No.	Date	Activity	Time
1.	23/06/2022	Departure from Pandharpur	5:00 am
		Arrival at Satara	10:00 am
		Visit of SY- A & B Students to Top Gear Transmission and Transcend Drive Technology, Satara	10:30 am to 2.00 pm
		Visit of SY- A & B Students to Top Gear Transmission and Transcend Drive Technology, Satara	
		Lunch	2:00 to 3.00 pm
		Hault at Sajjangad, Satara	4:00 pm onwards
2.	24/06/2022	Break Fast	8:00 am to 9:00 am
		Visit of SY- A & B Students to Suzlon Wind Power Plant, Chalkewadi, Satara	10:00 am to 2:00pm
		Lunch	2:00 pm to 3:00 pm
		Journey towards Pandharpur	3:00 pm
		Arrival at Pandharpur	08:30 pm

(Prof. S. M. Kale)
CC- SY (A)

(Prof. P. B. Asabe)
CC- SY (B)

Department of Mechanical Engineering

List of Faculty Members accompanying Industrial Visit

S. Y. B. Tech. Mechanical

Date: 23rd & 24th June, 2022

Date: 22/06/2022

Sr. No.	Name of Faculty	Signature
1.	Prof. S. M. Kale	
2.	Prof. P. B. Asabe	
3.	Dr. S. V. Jadhav	
4.	/Prof. P. K. Patil	
5.	Prof. A. K. Parakhe	
6.	Prof. K. S. Pukale	

Head,
Dept. of Mech. Engg.

HEAD,
Dept. of Mechanical Engg
C.O.E. Pandharpur

Principal/ Dean Administration

SVERI's COLLEGE OF ENGINEERING PANDHARPUR
DEPARTMENT OF MECHANICAL ENGINEERING
A.Y.: 2021-22 SEM: II

Attendance Sheet

Class: S.Y. B.Tech. Div-A

Industrial Visit at Top Gear Transmission, Satara on 23/06/2022

Roll No.	Name of Student	Sign.	Roll No.	Name of Student	Sign.
SA01	/Abhangarao Mayuri Balbhim	AB	SA38	Jadhav Aryash Sanjay	AB
SA02	/Ashwini Ananda Vasekar		SA39	Jadhav Vedant Dipak	
SA03	/Bhosale Asavari Anil		SA40	Jadhav Yashraj Sharad	
SA04	/Burungale Megha Appaso		SA41	Jahagirdar Shadab Irfan	
SA05	/Chavan Manasi Nitin		SA42	Jankar Dnyanesh Anil	
SA06	/Gore Dipali Anilkumar		SA43	Waghmode Abhijit	
SA07	/Jankar Priyanka Hanumant		SA44	Kadam Shreyash Santosh	AB
SA08	/Kalel Rutuja Shivaji		SA45	Vibhute Mahesh Pandit	
SA09	/Khilare Komal Dattatray		SA46	Kambale Akash Hanumant	AB
SA10	/Pawar Pancharatna		SA47	Kamble Abhishek Shivaji	AB
SA11	/Saravade Asmita Dhanaji	AB	SA48	Karande Shivprasad	
SA12	/Wankhede Prerna Bhagwan		SA49	Varma Ronak Kamlesh	
SA13	Abhishek Jadhav		SA50	Kole Yogesh Digambar	AB
SA14	Aniket Anil Sank	AB	SA51	Vaibhav Gourishankar	AB
SA15	Atkale Pratik Pandurang		SA52	Udaysagar Adam Kamalapure	AB
SA16	Autade Jagannath Parshuram		SA53	Kulkarni Samarth Narayan	
SA17	Babar Abhijeet Madhukar		SA54	Kulkarni Sangram Raghunath	AB
SA18	Yallatikar Ravi Dilip		SA55	Lavate Avinash Kashinath	
SA19	Bhad Vijay Dattatray		SA56	Mahamuni Shridhar Ganesh	
SA20	Bhosale Sangram Bandu	AB	SA57	Mahanavar Charan Ramesh	AB
SA21	Bugade Preetam Girmal	AB	SA58	Metkari Tushar Mohan	AB
SA22	Chandanshive Sujal Balu		SA59	Metkari Vishal Rajaram	AB
SA23	Dake Bhargav Ramdeep	ABB	SA60	Tiwari Siyash Yashwant	
SA24	Dange Vishal Pampu	D.V.P	SA61	More Amit Dattatray	
SA25	Devkar Onkar Annasaheb	AB	SA62	Narayankar Adarsh Shivdas	
SA26	Dhumal Pradip Baban	AB	SA63	Pangle Dattatriya Laxman	AB
SA27	Dubal Aniket Arun		SA64	Patekar Shivraj Ramchandra	S.P.P
SA28	Gajare Nagesh Bhaskar		SA65	Patil Ruthwick Anil	
SA29	Gavali Abhijit Tanaji		SA66	Shinde Pavan Rajendra	
SA30	Gavali Ganesh Chandrakant	AB	SA67	Shaikh Arbaz Alim	
SA31	Gavali Shubham Shashikant		SA68	Rode Rohit Nanasaheb	AB
SA32	Ghadage Saurabh Dhanaji		SA69	Salagare Rahul Bhauso	
SA33	Ghadage Sumit Anant	AB	SA70	Salunkhe Pranav Parshuram	AB
SA34	Ghutukade Sachin Somaji	AB	SA71	Salunkhe Prathamesh Nagesh	AB
SA35	Gujare Sairaj Chandrakant		SA72	Saravade Shubham Shahir	AB
SA36	Ingale Arjun Rajendra		SA73	Saravade Tushar Sunil	
SA37	Irkal Prasad Pandurang	AB	SA74	Sargar Tanaji Hariram	

(Prof. S. K. Kale)
Class Co-ordinator

SVERI's COLLEGE OF ENGINEERING PANDHARPUR
DEPARTMENT OF MECHANICAL ENGINEERING
A.Y.: 2021-22 SEM: II

Attendance Sheet

Class: S.Y. B.Tech. Div-A

Industrial Visit at Transcend Drive Technology, Satara on 23/06/2022

Roll No.	Name of Student	Sign.	Roll No.	Name of Student	Sign.
SA01	/Abhangarao Mayuri Balbhim	AB	SA38	Jadhav Aryash Sanjay	AB
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SA03	/Bhosale Asavari Anil		SA40	Jadhav Yashraj Sharad	
SA04	/Burungale Megha Appaso		SA41	Jahagirdar Shadab Irfan	
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SA06	/Gore Dipali Anilkumar		SA43	Waghmode Abhijit	
SA07	/Jankar Priyanka Hanumant		SA44	Kadam Shreyash Santosh	AB
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SA09	/Khilare Komal Dattatray		SA46	Kambale Akash Hanumant	AB
SA10	/Pawar Pancharatna		SA47	Kamble Abhishek Shivaji	AB
SA11	/Saravade Asmita Dhanaji	AB	SA48	Karande Shivprasad	
SA12	/Wankhede Prerna Bhagwan		SA49	Varma Ronak Kamlesh	
SA13	Abhishek Jadhav		SA50	Kole Yogesh Digambar	AB
SA14	Aniket Anil Sank	AB	SA51	Vaibhav Gourishankar	AB
SA15	Atkale Pratik Pandurang		SA52	Udaysagar Adam Kamalapure	AB
SA16	Autade Jagannath Parshuram		SA53	Kulkarni Samarth Narayan	
SA17	Babar Abhijeet Madhukar		SA54	Kulkarni Sangram Raghunath	AB
SA18	Yallatikar Ravi Dilip		SA55	Lavate Avinash Kashinath	
SA19	Bhad Vijay Dattatray		SA56	Mahamuni Shridhar Ganesh	
SA20	Bhosale Sangram Bandu	AB	SA57	Mahanavar Charan Ramesh	AB
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SA22	Chandanshive Sujal Balu		SA59	Metkari Vishal Rajaram	AB
SA23	Dake Bhargav Ramdeep	AB	SA60	Tiwari Siyash Yashwant	
SA24	Dange Vishal Pampu	DVP	SA61	More Amit Dattatray	
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SA30	Gavali Ganesh Chandrakant	AB	SA67	Shaikh Arbaz Alim	
SA31	Gavali Shubham Shashikant		SA68	Rode Rohit Nanasaheb	AB
SA32	Ghadage Saurabh Dhanaji		SA69	Salagare Rahul Bhauso	
SA33	Ghadage Sumit Anant	AB	SA70	Salunkhe Pranav Parshuram	AB
SA34	Ghutukade Sachin Somaji	AB	SA71	Salunkhe Prathamesh Nagesh	AB
SA35	Gujare Sairaj Chandrakant		SA72	Saravade Shubham Shahir	AB
SA36	Ingale Arjun Rajendra		SA73	Saravade Tushar Sunil	
SA37	Irkal Prasad Pandurang	AB	SA74	Sargar Tanaji Hariram	

(Prof. S. K. Kale)
Class Co-ordinator

SVERI's COLLEGE OF ENGINEERING PANDHARPUR
DEPARTMENT OF MECHANICAL ENGINEERING
A.Y.: 2021-22 SEM: II

Attendance Sheet

Class: S.Y. B.Tech. Div-A

Industrial Visit at Suzlon Wind Power Plant, Chalkewadi, Satara on 24/06/2022

Roll No.	Name of Student	Sign.	Roll No.	Name of Student	Sign.
SA01	/Abhangarao Mayuri Balbhim	-AB-	SA38	Jadhav Aryash Sanjay	-AB-
SA02	/Ashwini Ananda Vasekar		SA39	Jadhav Vedant Dipak	
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SA08	/Kalel Rutuja Shivaji		SA45	Vibhute Mahesh Pandit	
SA09	/Khilare Komal Dattatray		SA46	Kambale Akash Hanumant	-AB-
SA10	/Pawar Pancharatna		SA47	Kamble Abhishek Shivaji	-AB-
SA11	/Saravade Asmita Dhanaji	-AB-	SA48	Karande Shivprasad	
SA12	/Wankhede Prerna Bhagwan		SA49	Varma Ronak Kamlesh	
SA13	Abhishek Jadhav		SA50	Kole Yogesh Digambar	-AB-
SA14	Aniket Anil Sank	-AB-	SA51	Vaibhav Gourishankar	AB
SA15	Atkale Pratik Pandurang		SA52	Udaysagar Adam Kamalapure	-AB-
SA16	Autade Jagannath Parshuram		SA53	Kulkarni Samarth Narayan	
SA17	Babar Abhijeet Madhukar		SA54	Kulkarni Sangram Raghunath	-AB-
SA18	Yallatikar Ravi Dilip		SA55	Lavate Avinash Kashinath	
SA19	Bhad Vijay Dattatray		SA56	Mahamuni Shridhar Ganesh	
SA20	Bhosale Sangram Bandu	-AB-	SA57	Mahanavar Charan Ramesh	-AB-
SA21	Bugade Preetam Girmal	-AB-	SA58	Metkari Tushar Mohan	-AB-
SA22	Chandanshive Sujal Balu		SA59	Metkari Vishal Rajaram	-AB-
SA23	Dake Bhargav Ramdeep	-AB-	SA60	Tiwari Siyash Yashwant	
SA24	Dange Vishal Pampu	D.V.P	SA61	More Amit Dattatray	
SA25	Devkar Onkar Annasaheb	-AB-	SA62	Narayankar Adarsh Shivdas	
SA26	Dhumal Pradip Baban	-AB-	SA63	Pangle Dattatriya Laxman	-AB-
SA27	Dubal Aniket Arun		SA64	Patekar Shivraj Ramchandra	S.R.P
SA28	Gajare Nagesh Bhaskar		SA65	Patil Ruthwick Anil	
SA29	Gavali Abhijit Tanaji		SA66	Shinde Pavan Rajendra	
SA30	Gavali Ganesh Chandrakant	-AB-	SA67	Shaikh Arbaz Alim	
SA31	Gavali Shubham Shashikant		SA68	Rode Rohit Nanasaheb	-AB-
SA32	Ghadage Saurabh Dhanaji		SA69	Salagare Rahul Bhauso	
SA33	Ghadage Sumit Anant	-AB-	SA70	Salunkhe Pranav Parshuram	-AB-
SA34	Ghutukade Sachin Somaji	-AB-	SA71	Salunkhe Prathamesh Nagesh	-AB-
SA35	Gujare Sairaj Chandrakant		SA72	Saravade Shubham Shahir	-AB-
SA36	Ingale Arjun Rajendra		SA73	Saravade Tushar Sunil	
SA37	Irkal Prasad Pandurang	-AB-	SA74	Sargar Tanaji Hariram	

((Prof. S. K. Kale)
Class Co-ordinator

SVERI's COLLEGE OF ENGINEERING PANDHARPUR
DEPARTMENT OF MECHANICAL ENGINEERING
A.Y.: 2021-22 SEM: II

Attendance Sheet

Class: S.Y. B.Tech. Div-B

Industrial Visit at Top Gear Transmission, Satara on 23/06/2022

Roll No.	Name of Student	Sign.	Roll No.	Name of Student	Sign.
SB 01	/Asabe Avantika Mahesh		SB 36	Kore Ajay Angad	
SB 02	/Bodake Ashwini Sanjay		SB 37	Kumbhar Bhushan Bhalchandra	
SB 03	/Bhosale Kalyani Kisan	AB	SB 38	Lamkane Swapnil Devidas	
SB 04	/Chavan Asawari Bhimrao		SB 39	Mane Rohit Prakash	AB
SB 05	/Dakshata Dinesh Khare		SB 40	Mohite Raj Shrikant	AB
SB 06	/Dange Pramila Dhanaji	AB	SB 41	Nagtilak Aviraj Vijaykumar	
SB 07	/Dharmadhikari Shital		SB 42	Nakate Aditya Kantilal	
SB 08	/Gaikwad Kajal Sanjay	AB	SB 43	Patil Satyajit Patangrao	
SB 09	/Gaikwad Pranali Lakshman		SB 44	Pawar Akshay Baban	
SB 10	/Jadhav Akanksha Saudagar		SB 45	Pawar Ashok Vijay	
SB 11	/Jadhav Asavari Dhananjay	AB	SB 46	Pawar Tejas Vikram	AB
SB 12	/Jagtap Aakanksha Umesh		SB 47	Policepatil Shivarajgoud	
SB 13	/Kadam Aditi Arun		SB 48	Randive Gopal Madhu	AB
SB 14	/Kasbe Manisha Vilas	AB	SB 49	Raut Sudhir Rajkumar	
SB 15	/Kasbe Tejal Vilas		SB 50	Rayban Vishal Tukaram	AB
SB 16	/More Sakshi Rajendra		SB 51	Relekar Diptesh Vishal	
SB 17	/Salunkhe Pragati Suresh		SB 52	Ronge Abhay Dhanaji	
SB 18	/Shelke Akanksha Bibhishan		SB 53	Ronge Raviraj Madhukar	
SB 19	/Sutar Nilam Satish	AB	SB 54	Shinde Ganesh Dhananjay	
SB 20	/Deshmukh Swaranjali Dattatray		SB 55	Sondage Akash Madhukar	
SB 21	Ambad Tukaram Manohar	AB	SB 56	Tamtam Chetan Pramod	
SB 22	Aywale Alpesh Arun	AB	SB 57	Tate Sagar Dadasaheb	AB
SB 23	Bhise Prasad Ramesh	AB	SB 58	Thigale Yash Vishvas	
SB 24	Bhoyate Ramdas Gautam		SB 59	Vairagkar Sanket Narayan	
SB 25	Bhumkar Parth Vaibhav		SB 60	Wale Ayush Ganesh	
SB 26	Chavan Shreehari Somnath		SB 61	Yamgar Shhubham Uttam	
SB 27	Dange Yash Bhaurao		SB 62	Yash Devidas Yadav	
SB 28	Dhekale Nilesh Krushndev		SB 63	Zadkar Vaibhav Tukaram	
SB 29	Gaikwad Suraj Pandurang	AB	SB64	Shelake Prasad Ramchandra	AB
SB 30	Abhyankar Kedar Raghvendra		SB65	Kumbhar Lingeshwar	
SB 31	Ghadge Aadesh Shivaji	AB	SB66	Rangat Dhanaji Vitthal	
SB 32	Gunje Vinayak Bhimashankar		SB67	Ghadage Kunal Hanumant	AB
SB 33	Jadhav Aditya Siddheshwar				
SB 34	Katmore Yash Sanjay				
SB 35	Koli Prathmesh Sanjay	AB			

(Prof. P. B. Asabe)
Class Co-ordinator

SVERI's COLLEGE OF ENGINEERING PANDHARPUR
DEPARTMENT OF MECHANICAL ENGINEERING
A.Y.: 2021-22 SEM: II

Attendance Sheet

Class: S.Y. B.Tech. Div-B

Industrial Visit at Transcend Drive Technology, Satara on 23/06/2022

Roll No.	Name of Student	Sign.	Roll No.	Name of Student	Sign.
SB 01	/Asabe Avantika Mahesh		SB 36	Kore Ajay Angad	
SB 02	/Bodake Ashwini Sanjay		SB 37	Kumbhar Bhushan Bhalchandra	
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SB 06	/Dange Pramila Dhanaji	AB	SB 41	Nagtilak Aviraj Vijaykumar	
SB 07	/Dharmadhikari Shital		SB 42	Nakate Aditya Kantilal	
SB 08	/Gaikwad Kajal Sanjay	AB	SB 43	Patil Satyajit Patangrao	
SB 09	/Gaikwad Pranali Lakshman		SB 44	Pawar Akshay Baban	
SB 10	/Jadhav Akanksha Saudagar		SB 45	Pawar Ashok Vijay	
SB 11	/Jadhav Asavari Dhananjay	AB	SB 46	Pawar Tejas Vikram	AB
SB 12	/Jagtap Aakanksha Umesh		SB 47	Policepatil Shivarajgoud	
SB 13	/Kadam Aditi Arun		SB 48	Randive Gopal Madhu	AB
SB 14	/Kasbe Manisha Vilas	AB	SB 49	Raut Sudhir Rajkumar	
SB 15	/Kasbe Tejal Vilas		SB 50	Rayban Vishal Tukaram	AB
SB 16	/More Sakshi Rajendra		SB 51	Relekar Diptesh Vishal	
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SB 18	/Shelke Akanksha Bibhishan		SB 53	Ronge Raviraj Madhukar	
SB 19	/Sutar Nilam Satish	AB	SB 54	Shinde Ganesh Dhananjay	
SB 20	/Deshmukh Swaranjali Dattatray		SB 55	Sondage Akash Madhukar	
SB 21	Ambad Tukaram Manohar	AB	SB 56	Tamtam Chetan Pramod	
SB 22	Aywale Alpesh Arun	AB	SB 57	Tate Sagar Dadasaheb	AB
SB 23	Bhise Prasad Ramesh	AB	SB 58	Thigale Yash Vishvas	
SB 24	Bhoyate Ramdas Gautam		SB 59	Vairagkar Sanket Narayan	
SB 25	Bhumkar Parth Vaibhav		SB 60	Wale Ayush Ganesh	
SB 26	Chavan Shreehari Somnath		SB 61	Yamgar Shhubham Uttam	
SB 27	Dange Yash Bhaurao		SB 62	Yash Devidas Yadav	
SB 28	Dhekale Nilesh Krushndev		SB 63	Zadkar Vaibhav Tukaram	
SB 29	Gaikwad Suraj Pandurang	AB	SB64	Shelake Prasad Ramchandra	AB
SB 30	Abhyankar Kedar Raghvendra		SB65	Kumbhar Lingeshwar	
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SB 33	Jadhav Aditya Siddheshwar				
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SB 35	Koli Prathmesh Sanjay	AB			

(Prof. P. B. Asabe)
Class Co-ordinator

SVERI's COLLEGE OF ENGINEERING PANDHARPUR
DEPARTMENT OF MECHANICAL ENGINEERING
A.Y.: 2021-22 SEM: II

Attendance Sheet

Class: S.Y. B.Tech. Div-B

Industrial Visit at Suzlon Wind Power Plant, Chalkewadi, Satara on 24/06/2022

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SB 03	/Bhosale Kalyani Kisan	AB	SB 38	Lamkane Swapnil Devidas	
SB 04	/Chavan Asawari Bhimrao		SB 39	Mane Rohit Prakash	AB
SB 05	/Dakshata Dinesh Khare		SB 40	Mohite Raj Shrikant	AB
SB 06	/Dange Pramila Dhanaji	AB	SB 41	Nagtilak Aviraj Vijaykumar	
SB 07	/Dharmadhikari Shital		SB 42	Nakate Aditya Kantilal	
SB 08	/Gaikwad Kajal Sanjay	AB	SB 43	Patil Satyajit Patangrao	
SB 09	/Gaikwad Pranali Lakshman		SB 44	Pawar Akshay Baban	
SB 10	/Jadhav Akanksha Saudagar		SB 45	Pawar Ashok Vijay	
SB 11	/Jadhav Asavari Dhananjay	AB	SB 46	Pawar Tejas Vikram	AB
SB 12	/Jagtap Aakanksha Umesh		SB 47	Policepatil Shivarajgoud	
SB 13	/Kadam Aditi Arun		SB 48	Randive Gopal Madhu	AB
SB 14	/Kasbe Manisha Vilas	AB	SB 49	Raut Sudhir Rajkumar	
SB 15	/Kasbe Tejal Vilas		SB 50	Rayban Vishal Tukaram	AB
SB 16	/More Sakshi Rajendra		SB 51	Relekar Diptesh Vishal	
SB 17	/Salunkhe Pragati Suresh		SB 52	Ronge Abhay Dhanaji	
SB 18	/Shelke Akanksha Bibhishan		SB 53	Ronge Raviraj Madhukar	
SB 19	/Sutar Nilam Satish	AB	SB 54	Shinde Ganesh Dhananjay	
SB 20	/Deshmukh Swaranjali Dattatray		SB 55	Sondage Akash Madhukar	
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SB 27	Dange Yash Bhaurao		SB 62	Yash Devidas Yadav	
SB 28	Dhekale Nilesh Krushndev		SB 63	Zadkar Vaibhav Tukaram	
SB 29	Gaikwad Suraj Pandurang	AB	SB64	Shelake Prasad Ramchandra	AB
SB 30	Abhyankar Kedar Raghvendra		SB65	Kumbhar Lingeshwar	
SB 31	Ghadge Aadesh Shivaji	AB	SB66	Rangat Dhanaji Vitthal	
SB 32	Gunje Vinayak Bhimashankar		SB67	Ghadage Kunal Hanumant	AB
SB 33	Jadhav Aditya Siddheshwar				
SB 34	Katmore Yash Sanjay				
SB 35	Koli Prathmesh Sanjay	AB			

(Prof. P. B. Asabe)
Class Co-ordinator

Visit Photos

Satara, Maharashtra, India
Longitude Latitude
74.0441° E 17.663° N
28° C
Thursday, 23, Jun, 2022
03:05 PM

--, --, --
Longitude Latitude
73.8288° E 17.5629° N
24° C
Friday, 24, Jun, 2022
01:41 PM

--, --, --
Longitude Latitude
73.8287° E 17.563° N
0° C
Friday, 24, Jun, 2022
01:40 PM

Industrial Visit Report

Date: 06/06/2022

To,

The Principal,

College of Engineering,

Pandharpur.

Subject: Report of Industrial Visit.

Name of Industry with address: Tejas Agro Irrigation Systems Pvt. Ltd.,
Nishant Park, Bhandishegaon, Pandharpur,
Solapur, Maharashtra: 413304.

Date of visit: 04 June 2022 and 06 June 2022.

Respected sir,

As per the curriculum laid by Punyashlok Ahilyadevi Holkar Solapur University, Solapur for T.Y.B.Tech. Mechanical Engineering semester-II, Plastic Engineering Subject include industrial visit in this regard 135 students along with 05 faculty member visited Tejas Agro Irrigation Systems Pvt. Ltd, Bhandishegaon, Pandharpur, Solapur on 4th June. 2022 and 06th June 2022. During visit we had seen various molding processes used for plastic material like Injection molding, Extrusion molding along with different inspection methods used for checking raw material as well as finished plastic components. From this industrial visit student got practical knowledge about manufacturing of different agricultural products including PVC Pipes, Poly-fittings, Filters, Sprinklers, HDPE Pipes, LDPE Pipes, etc. using Injection molding and Extrusion molding process and they got satisfied with the visit.

This is for your kind information and needful action.

Thanking you

06/06/2022

(Mr. A.A. Shinde)
PE Subject Teacher
T.Y. B.Tech. (Mech) Div. A

(Prof. B.D.Gaikwad)
PE Subject Teacher
T.Y. B.Tech. (Mech) Div. B

(Dr.S.S Wangikar)
Head Mech. Engg. Dept.
SVERI's COE Pandharpur

HEAD,
Dept. of Mechanical Engg
C.O.E. Pandharpur

SHRI VITHAL EDUCATION & RESEARCH INSTITUTE's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Tal.- Pandharpur- 413 304,Dist.- Solapur (Maharashtra)
Tel.: 02186-216063, 9503103757, E-mail : coe@sveri.ac.in, Website: www.sveri.ac.in
(Approved by A.I.C.T.E., New Delhi and affiliated to Solapur University, Solapur)
NBA Accredited all Eligible UG Programmes and , **NAAC**, Accredited Institute,
Accredited by the Institution of Engineers (India), Kolkata and TCS, Pune ISO 9001-2015 Certified Institute

Ref: - COEPR /MECH/2021-22 /241 **Date: - 01/06/2022**

To,
The Director,
Tejas Agro Irrigation Systems Pvt. Ltd.,
Nishant Park, Gat No: 97/1/1 B, Bhandishegaon,
Tal- Pandharpur, Dist, Solapur, Maharashtra-413304.

Subject: - **Seeking permission to visit your esteemed Industry**

Respected Sir,

Hope this letter finds you in good health and pleasant mood.

It gives me immense pleasure to put before you few words about our institute. Shri Vithal Education and Research Institute (SVERI), a Charitable Trust formed by devoted technocrats, established its first project, College of Engineering, Pandharpur in 1998 with approval from AICTE, New Delhi and Government of Maharashtra. All eligible UG courses of our college are accredited by NBA. The Engineering College is accredited by NAAC, TCS, The Institution of Engineers (India), Kolkata and is also ISO 9001:2015 Certified. To continue with the developmental process, the trust has started College of Pharmacy and College of Pharmacy (Poly.) from academic year 2006-07 and also College of Engineering (Poly.) from the academic year 2008-09. The college administration is striving hard to provide the best facilities to the students along with the quality education. Every year our students are grabbing 10-12 University ranks. Campus placement rate of our college is also very high.

As per the curriculum laid down by Punyashlok Ahilyadevi Holkar Solapur University, Solapur for T.Y.B.Tech. (Mechanical) (Part-II), the subject of '**Plastic Engineering**' include industrial visit. In the processing of same, our third year students are interested to visit your esteemed Industry, which is under your supervision. Kindly grant permission **for 5 Faculty members** along with the **135 students** to visit your place on **04/06/2022.**

We will remain grateful to you if give chance for industrial visit.

Thanking you,
Yours faithfully,

Head
Department of Mechanical Engineering,
SVERI's COE, Pandharpur.

HEAD,
Dept. of Mechanical Engg
C.O.E. Pandharpur

Visited on 4.06.2022

Tejas Agro Irrigation Systems Private Limited

4/06/22

SVERI's COLLEGE OF ENGINEERING PANDHARPUR
DEPARTMENT OF MECHANICAL ENGINEERING
A.Y. 2021-22 SEM: II

Industrial Visit Attendance

Date: 06/06/2022

CLASS: T. Y. (MECH) DIV: A

Roll No.	Name of Student	Sign	Roll No.	Name of Student	Sign
TA 01	PAWAR SAURAV SUBHASH		TA 36	KALE RUTURAJ YUVRAJ	
TA 02	GANDULE SHUBHAM BALASO	AB	TA 37	GHAYTIDAK GAURAV SHIVAJI	
TA 03	KHANDALKAR GAURAV SUNIL		TA 38	MULANI MOAJJAM SALIM	
TA 04	KUKADE ABHIJIT MADHUKAR		TA 39	MANE SUJIT SUDHAKAR	
TA 05	GAIKWAD RAHUL VILAS	AB	TA 40	THENGAL DNYANESHWAR BAPU	
TA 06	DONGARE ANIL VITTHAL		TA 41	SARADE OMKAR ASHOK	AB
TA 07	BHUSNAR SHIVRAJ RAJENDRA		TA 42	ADMILE DIKSHA DIPAK	
TA 08	YALASANGI RAJKUMAR BHIMASHA	AB	TA 43	YADAV KEDAR SANJAY	
TA 09	BHANDARE ROHAN BALASAHEB		TA 44	SONTAKKE BAPENDRAKUMAR	
TA 10	SUKALE AJAY SHANKAR		TA 45	NADVINANGAL AJIT	
TA 11	NASHTE SUHAS NAGNATH		TA 46	EDAKE SAURABH DATTATRAYA	
TA 12	RATHOD TIRTH SUDHAKAR		TA 47	HETIYA AKSHAY PRAVIN	
TA 13	KHADAKE RAHUL BHAGAVAN		TA 48	DESHMUKH KARANSINH B	
TA 14	JODMOTE ABHISHEK RAVISHANKAR		TA 49	BANDGAR SADASHIV SUBHASH	
TA 15	KAPARE POOJA MOHAN		TA 50	PATIL PRATHAMESH PRASHANT	
TA 16	GANGTHADE KOMAL TANAJI	AB	TA 51	PATIL VIRAJ VIKAS	
TA 17	DESHMUKH RUSHIKESH		TA 52	INGALE SANDIP RAMESH	
TA 18	SUTAR SACHIN SHIVAJI	AB	TA 53	SURVE VIJAY HANUMANT	
TA 19	GAIKWAD AJIT SURYAKANT		TA 54	CHAUDHARI RAHUL	
TA 20	KHOBARE PRASANNA SANJAY		TA 55	AWALEKAR PRAMOD TANAJI	
TA 21	KADAM ROHIT MANOHAR	AB	TA 56	PISE BALAJI RAJENDRA	
TA 22	JADHAV SUYOG PRAKASH		TA 57	SHELAKE MAYUR BALASAHEB	
TA 23	DHOTRE SAGAR PANDURANG		TA 58	KARANDE GAURAV VIKAS	
TA 24	WAGHMODE SACHIN BALWANT		TA 59	NANE SHIVANI RAMESHWAR	
TA 25	PATIL SAMBHAJI BAJARANG		TA 60	SHETE KUNAL BALASAHEB	
TA 26	JADHAV AVINASH DNYANDEV	AB	TA 61	KHARADE SAINATH NAVNATH	AB
TA 27	KAPASE RUTUJA VINAYAK		TA 62	KONDUBHAIRI GORAKHANATH	
TA 28	PATIL NEHA GOVINDRAO		TA 63	MALI PRASHANT SIDDHESHWAR	AB
TA 29	SHENDE SAURABH VISHAL		TA 64	GHODAKE ROHIT DATTATRAYA	AB
TA 30	BIRAJDAR RAKESH PRAKASH		TA 65	CHANDOLE PRATIK RAJKUMAR	
TA 31	RAJPUT ABHIJEET SAMEERSING		TA 66	WAGH RUSHIKESH SUNIL	
TA 32	MISAL SHANAISHWAR BALASO		TA 67	BANDGAR MAHESH	
TA 33	SHINGAN SHUBHAM SHASHANK		TA 68	MUNTASIN BHAIJAN	AB
TA 34	JUNDALE ROHIT BALASAHEB		TA 69	RUTVUK SUNIL GORE	
TA 35	OVERIKAR SOHAM GANESH		TA70	NIKITA NAGNATH PAWAR	

06/06/2022

(Prof. A. A. Shinde)
Class Co-ordinator

(Dr. S. S. Wangikar)
Head, Mech. Engg. Dept.

HEAD,
Dept. of Mechanical Engg
C.O.E. Pandharpur

SVERI's COLLEGE OF ENGINEERING PANDHARPUR **Date:- 04/06/2022**
DEPARTMENT OF MECHANICAL ENGINEERING
A.Y. 2021-22 SEM: II

Industrial Visit Attendance

CLASS: TY B.Tech. (MECH) DIV: B

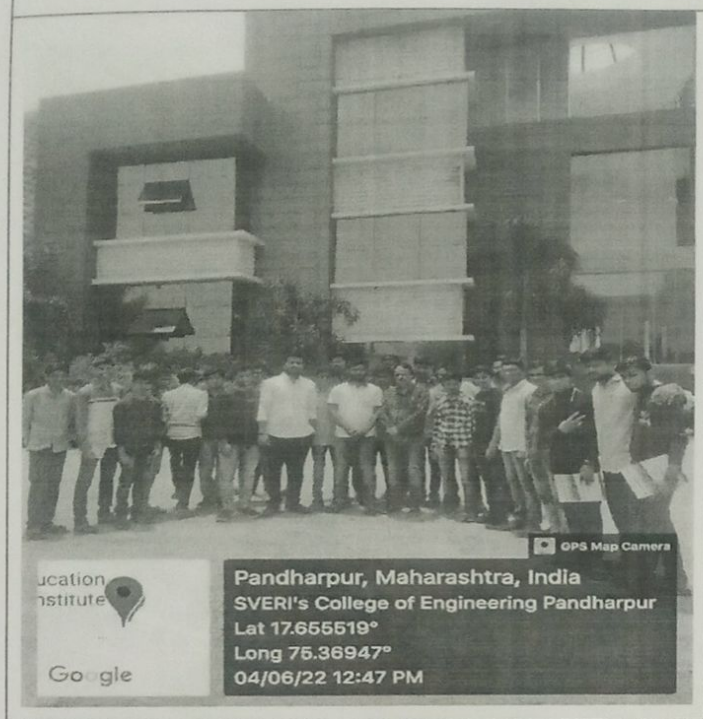
Roll No.	Name of Student	Sign	Roll No.	Name of Student	Sign
TB 01	/Birajdar Vaishnavi Rajendra		TB 37	Kotgond Prathamesh Mallikarjun	
TB 02	/Chougule Supriya Mahadev		TB 38	Londhe Suyash Nathaji	
TB 03	/Dongare Tejashri Rajendra		TB 39	Mali Krushna Sunil	
TB 04	/Kadam Dipti Santosh		TB 40	Mali Siddheshwar Krishna	
TB 05	/Kalubarme Swapnali Dnyaneshwar		TB 41	Mashalkar Swapnil Basavraj	
TB 06	/Lawate Divya Nagesh		TB 42	More Samadhan Appaso	
TB 07	/Mamure Shraddha Chandrakanth		TB 43	Mulani Shoaib Adam	
TB 08	/Naiknaware Madhuri Anil		TB 44	Nanaware Pratik Milind	
TB 09	/Patil Jyoti Mahesh		TB 45	Natikar Mukesh Laxman	
TB 10	/Suryawanshi Kranti Pradipkumar		TB 46	Nilgar Suryakant Bamaningappa	
TB 11	/Terave Puja Baban		TB 47	Paul Kalyan Rameshwar	
TB 12	Acharya Chaitanya Chandrakant		TB 48	Pawar Nikhil Rajkumar	
TB 13	Bachate Vishwajeet Jyotirling		TB 49	Phatke Ajinkya Radhesham	
TB 14	Badave Venugopal Abhay		TB 50		
TB 15	Bagal Prajwal Satish		TB 51	Ronge Vikram Vilas	
TB 16	Bansode Shankar Balasaheb		TB 52	Sartape Dharmendra Rajendra	
TB 17	Bhosale Vaibhav Balasaheb		TB 53	Sathe Ashitosh Rajendra	
TB 18	Bichitkar Rushikesh Arun		TB 54	Shaikh Shakil Salim	
TB 19	Bidri Basaveshwar Rajendra		TB 55	Shelake Anand Tatyaba	
TB 20	Chavan Prem Govardhan		TB 56	Shinde Gorakh Uttareshwar	
TB 21	Dabade Suraj Kushaba		TB 57	Shingate Dadasaheb Aba	
TB 22	Deshmukh Sagar Somnath		TB 58	Tanagavade Rohit Tanaji	
TB 23	Dhanawale Shubham Prakash		TB 59	Thakar Onkar Sham	
TB 24	Dhotre Rohit Somnath		TB 60	Thite Aditya Jeevan	
TB 25	Gavali Ajay Pandurang		TB 61		
TB 26	Gawali Mhahmaji Maruti		TB 62	Waghmode Ranjit Sunil	
TB 27	Goli Shrikant Ganesh		TB 63	Yadav Prathmesh Dipak	
TB 28	Gour Revansiddha Shivachalappa		TB 64	Deshmukh Sushil Dhananjay	
TB 29	Gundeti Arun Ambadas		TB 65	Shinde Nikhil babasaheb	
TB 30	Jade Shantanu Udaykumar				
TB 31	Jadhav Karan Tanaji				
TB 32	Jadhav Revannath Brahamnath				
TB 33	Kale Saurabh Santosh			**Batch:-**	
TB 34	Kale Swapnil Haridas			TB1: TB 01 to TB 22 (CCJ)	
TB 35	Kasagavade Kiran Uttam			TB2: TB 23 to TB 44 (SSJ)	
TB 36	Katkar Shubham Shashikant			TB3: TB 45 to TB 66 (SNM)	

(Prof. C. C. Jadhav)
Class Coordinator

(Dr. S. S. Wangikar)
Head, Mech. Engg. Dept.

HEAD,
Dept. of Mechanical Engg
C.O.E. Pandharpur

Industrial Visit Photos



Industrial Visit Photos

SHRI VITHAL EDUCATION & RESEARCH INSTITUTE'S
COLLEGE OF ENGINEERING, PANDHARPUR.
ISO 9001-2000 Certified Institute & Accredited by Institutes of Engineers, India,
Gopalpur -Ranjani Road, Gopalpur, P.B. No. 54, Tal - Pandharpur- 413 304,
Dist. Solapur (Maharashtra) Ph.: (02186) 225083, Fax: (02186) 225082.
(NBA Accredited and NACC Accredited)
Approved by AICTE, New Delhi and affiliated to Solapur University, Solapur)
E-mail : coe@sveri.ac.in Website: www.sveri.ac.in

Date:30/06/2022

To,
The Head Civil Engg.Dept
SVERI's COE Pandharpur.

Subject: S. Y. B. Tech Civil Industrial visit report of academic year 2021-2022 SEM-II.

Respected sir,

We have organized an industrial visit for the class S. Y. B. Tech. Class From date. 21/06/2022 to 25/06/2022.Under this industrial visit we have made arrangement to give the practical expose to the students for the following points and ANNEXURE-I is attached with important photographs during visit,

1.Krishnarajasagara Dam:- We visited krishnarajasagara dam which is located at Mandya of Karnataka. The dam was built across the river Kaveri in 1924. It is named after Maharaja Krishnaraja Wodeyar IV. The water from this dam is used for the irrigation in Mysore and Mandya. Also it is the main source of water for Mysore,Mandya and almost the whole city of Bangalore.

2. Chamundeswari temple: We visited Chamundeswari temple is situated on the top of Chamundi hill which is about 3,489 ft. above sea level and located at a distance of 13 Kms. from Mysore. The temple is dedicated to Sri Chamundeswari. Krishnaraja Wodeyar III built a Gopura with gold finials, and set up statues of his and his three queens. Nandi: The colossal Nandi is one of the largest in India, 16 ft. (4.8 metres) tall at the front and 25 ft. (7.5 metres) in length.

3.Mysore Palace:- We also visited Mysore palace which is located at Mysuru of Karnataka. It is also known as Amba vilas Palace which is a historical palace and a royal residence. The palace covers 72 acres of the heart of Mysore. It used to be the official residence of Wadiyar dynasty and it faces the Chamundi hills eastward. It gives students deep knowledge about structures and history of India. It is a three storey stone structure with marble domes and has a 145 foot 5 storey tower.

4.Golden Temple:- At a distance of 34 km from Madikeri, 4.5 km from Kushalnagar, 7 km from Cauvery Nisargadhama & 87 km from Mysore, the Golden Temple or Namdroling Monastery is a beautiful Buddhist Monastery situated in Bylakuppe. Bylakuppe is the second largest Tibetans settlement in India after Dharamshala. Students got to know about the Tibetan Buddhist Mythology. We watched there hundreds of Buddhist monks doing religious rituals and offering prayers and it was worth watching them.

Yours Sincerely,

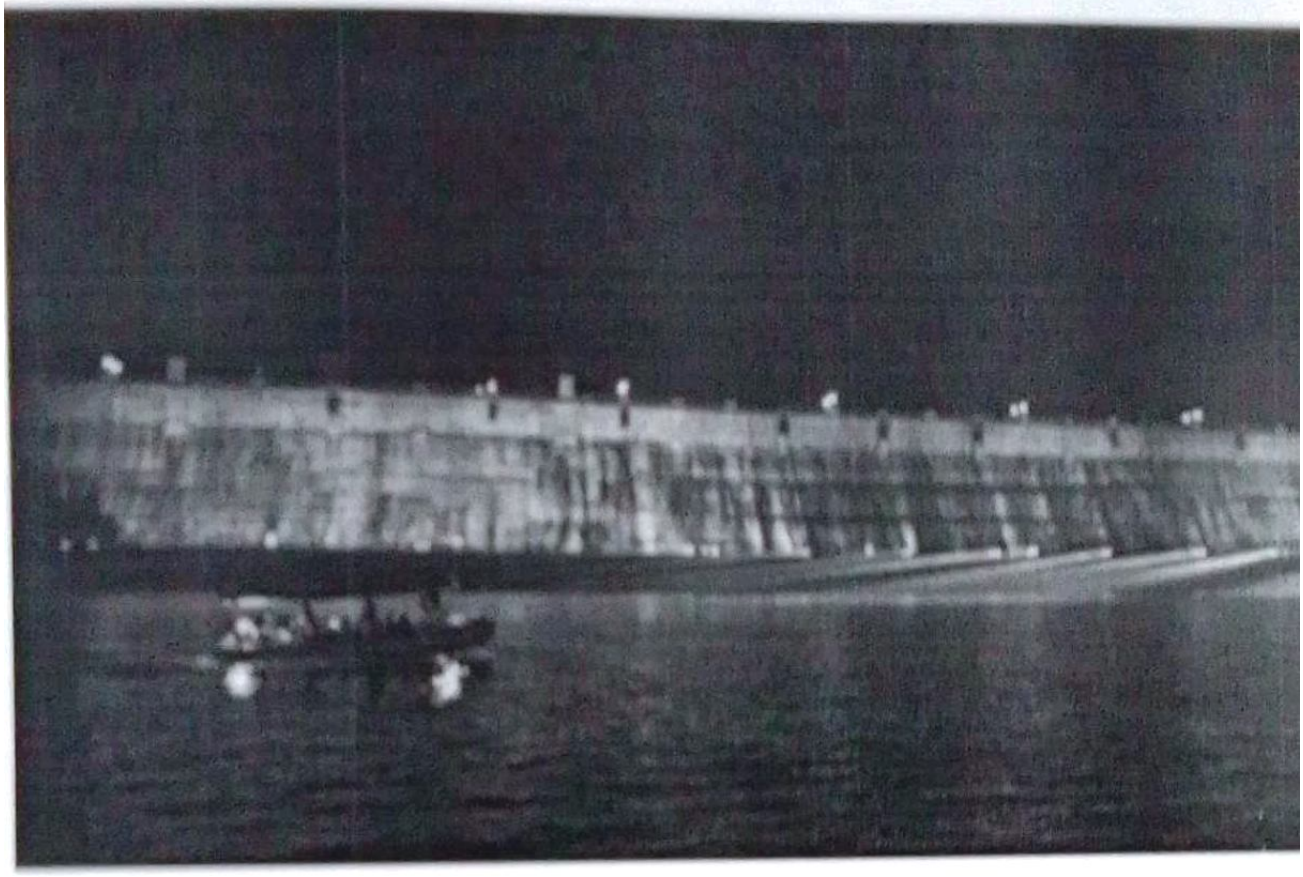
Mr. M. S. Survase

Class Coordinat(Div:A)

Ms. S.S. Patil

Class Coordinat(Div:B)

important photographs during industrial visit and description.



The photograph shows Mysore Palace at Mysore, Karnataka

The photograph shows Mysore Palace at Mysore, Karnataka

The photograph shows Golden Temple, Bylakuppe at Coorg, Karnataka

D.L. No. 20 MH-Sol-191142
20 C MH-Sol-418016
21 MH-Sol-418017

CASH-MEMO

श्री विठ्ठल मेडिकल

जुना कराड नाका, रुक्मिणी बँकेशेजारी, पंढरपूर, जि. सोलापूर

पंढरपूर न्यायकक्षेत
Ph. No. 9766635796
9545155796

8528

Pt's Name & Address : SVERI College Pandharpur

Dr's Name : —

Date : 20-06-22

Particulars	Mfg.	B.No.	Exp.	Qty./ML	Rs. Ps.
Para 500		LBRT-026	09-24	10	10
Lomojack		CN2004	10-22	10	10
Okacet		C111380	10-24	10	18
Ondem MD-4		22460086	12-23	10	52
Cotton Roll Bandage		A-15	—	4	20
				TOTAL	110

Overcharges if any will be refunded

ग्राहकांची सही

Pharmacist

Booth no & TC ID
Date & Time
Vehicle No.
Type of Vehicle
Type of Journey
Fee
Passes Fee
Total Fees

ily for
vehicle
of vehicle
rules.
HAVE YOU A SAFE JOURNEY

PAID

ಟಿ ಸಂ: 012-03082 ಅವಧಿ: 1
ಆಪ. ಕೋಡ 01 ಆಪ. ಹೆಸರು: ABC
ವಾಹನ: BUS/ LORRY
ದಿ.ಸೆ: 23/06/22 09:45:14
ಎಂ: M06
ಪಾರ್ಕಿಂಗ್ ಶುಲ್ಕ: 100.00
ವಾ. ಸಂ: 1

* PARKING AT YOUR OWN RISK
* LOST DAMAGE WE ARE NOT RESPOSIBLE
THANK YOU *** VISIT AGAIN
HAPPY JOURNEY

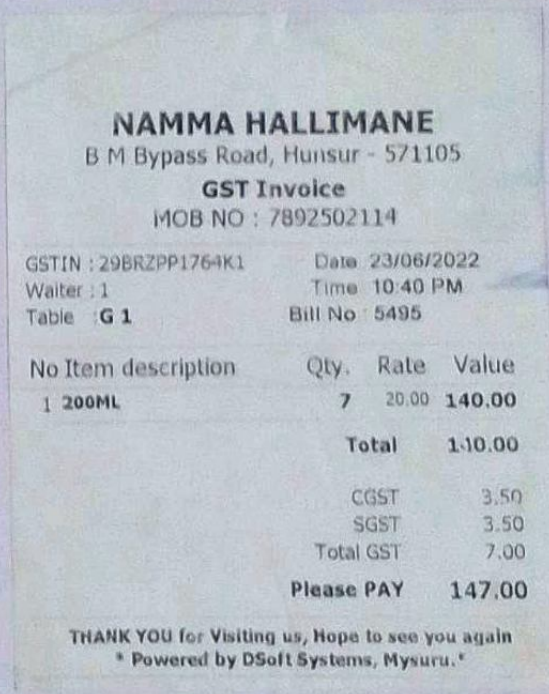
ಟಿ ಸಂ: 012-03081 ಅವಧಿ: 1
ಆಪ. ಕೋಡ: 01 ಆಪ. ಹೆಸರು: ABC
ವಾಹನ: BUS/ LORRY
ದಿ.ಸೆ: 23/06/22 09:44:49
ಎಂ: M06
ಪಾರ್ಕಿಂಗ್ ಶುಲ್ಕ: 100.00
ವಾ. ಸಂ: 1

* PARKING AT YOUR OWN RISK
* LOST DAMAGE WE ARE NOT RESPOSIBLE
THANK YOU *** VISIT AGAIN
HAPPY JOURNEY

AID :A0000000031010
AMT INR 21600.00
TIP INR
TOTAL INR
AXIS BANK
Powered by Worldline

MYSORE
HSN CODE:9996
VAN 0 70.00
ABOVE PRICES INCL. TAXES
@ 9.00
5.34
@ 9.00
5.34
10.68
M/C NO 1

MYSORE
HSN CODE:9996
CASH/BILL
000134 23-06-2022
BUS.COACHES 100.00
CASH 100.00
ABOVE PRICES INCL. TAXES
CGST @ 9.00%
ON 84.74 7.63
SGST @ 9.00%
ON 84.74 7.63
TOTAL GS 15.
C 1 15:08 M/C NO 1



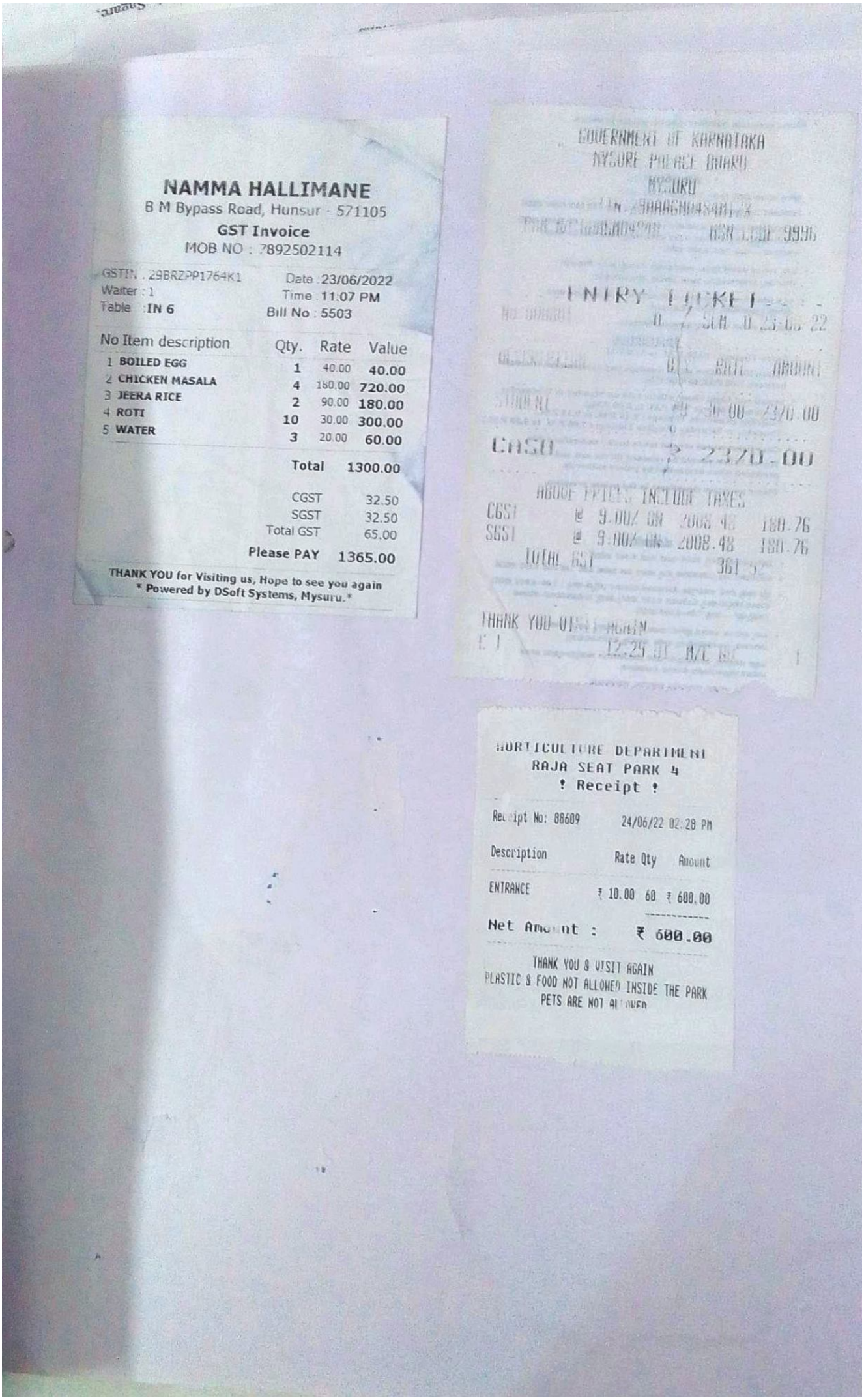
NAMMA HALLIMANE
B M Bypass Road, Hunsur - 571105
GST Invoice
MOB NO : 7892502114

GSTIN : 29BRZPP1764K1 Date 23/06/2022
Waiter : 1 Time 10:40 PM
Table : **G 1** Bill No : 5495

No	Item description	Qty.	Rate	Value
1	**200ML**	7	20.00	**140.00**
		Total		**140.00**

CGST	3.50
SGST	3.50
Total GST	7.00
Please PAY	**147.00**

THANK YOU for Visiting us, Hope to see you again
*** Powered by DSoft Systems, Mysuru.***



NAMMA HALLIMANE
B M Bypass Road, Hunsur - 571105
GST Invoice
MOB NO : 7892502114

GSTIN : 29BRZPP1764K1 Date : 23/06/2022
Waiter : 1 Time : 11:07 PM
Table : **IN 6** Bill No : 5503

No	Item description	Qty.	Rate	Value
1	BOILED EGG	1	40.00	40.00
2	CHICKEN MASALA	4	180.00	720.00
3	JEERA RICE	2	90.00	180.00
4	ROTI	10	30.00	300.00
5	WATER	3	20.00	60.00

Total	**1300.00**
CGST	32.50
SGST	32.50
Total GST	65.00
Please PAY	**1365.00**

THANK YOU for Visiting us, Hope to see you again
*** Powered by DSoft Systems, Mysuru.***

GOVERNMENT OF KARNATAKA
MYSORE PALACE BOARD
MYSURU

ENTRY TICKET

CASH ₹ 2370.00

ABOVE PRICES INCLUDE TAXES
CGST @ 9.00% ON 2000.48 180.76
SGST @ 9.00% ON 2000.48 180.76

THANK YOU VISIT AGAIN

HORTICULTURE DEPARTMENT
RAJA SEAT PARK 4
! Receipt !

Receipt No: 88689 24/06/22 02:28 PM

Description	Rate	Qty	Amount
ENTRANCE	₹ 10.00	60	₹ 600.00

Net Amount : ₹ 600.00

THANK YOU & VISIT AGAIN
PLASTIC & FOOD NOT ALLOWED INSIDE THE PARK
PETS ARE NOT ALLOWED

PALJOR DHARGYELING
GOLDEN TEMPLE
NO.: [illegible] BRB 00000000
VEHICLE TYPE: [illegible]
U.No : 0
IN DT: 14/06/22
IN TM: 18:30
₹ 80.00
THANKING YOU

Welcome to
NIRARGADAMA TOURIST CENTRE
R.M. Road, Kurseong - 734203, Darjeeling
Mob : +91 [illegible]

No. Vehicle No.

₹ 100/-

2864

Valid / Note

24X7 C.C.T.V. Camera
Parking at Vehicle at owners Risk
Smoking & Alcoholic Drinks are not allowed
Timing : 8.00am to 8.00pm

PALJOR DHARGYELING
GOLDEN TEMPLE
NO.: 0512 BRB 00000000
VEHICLE TYPE: T.T
U.No : 0
IN DT: 14/06/22
IN TM: 18:28
₹ 50.00
THANKING YOU

UDUPI SRI KRISHNA

NANDAGOKULA

VEG FAMILY RESTAURANT

Cash Bill

Bill No :36

Date :25-06-2022 Time :10:01 AM

Waiter :1 Table :101

Name	Rate	Qty	Amount
IDLI (2) VADA (1)	60.00	1	60.00
MSL DOSA	70.00	1	70.00
1LTR	20.00	1	20.00
VADA	30.00	1	30.00
LEMON TEA	35.00	1	35.00
			215.00

Qty :5

Rs.215.00

GSTIN : 29AAXFK2668K1ZC

Mob.: 9742360555

KAVERI HOTEL BED & BREAKFAST

#369, Cheluvamba Agrahara, Mysuru - 570 004
Ph.: 0821-2426816/2420675/4194100
Email: admin@kaverihotel.com, Website : www.hotelkaveri.com

Ref.

Date : 23.6.22

SVERI college of Engineering

Pandarpur.

Accommadation charges for 76 students @ 350/-

Per head. 26600/- Twenty six thousand six hundred of

For Kaveri Hotel Bed & Breakfast

Authorised Signatory

N : 29AWWPC5764P1Z1

KSHATRA RESIDENCY

B.M. ROAD, KUSHALNAGAR - 571234
PH : 08276 - 276853

TAX INVOICE

Bill No : 104

Date : 04/06/2022

Mrs / Mr. Suryash Yashavanth

Arrival Date 03/06/2022 Time 12.15 P.M Departure Date 04/06/2022 Time 10.00 A.M

Room No. 19 No of Persons 81 Nationality Indian

Description	Room No.	No. of Persons	No. of Days	Tariff	Amount
Indian	Total 19	81	1	800	800
				Total	
				% CGST	
				%SGST	
				Grand Total	
				Advance	
				Net Pay Amt.	800

Rupees ..... only

Guest Signature

Note :
Cheques are Not Accepted
Rates are subject to change without prior notice
Subject Jurisdiction of Kushalnagar only

Thank you Visit Again

Signature

Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P. B. No. 54, Gopalpur - Ranjani Road, Gopalpur, **Tal.:** Pandharpur - 413 304, **Dist.:** Solapur (MH)
Contact No.: 02456553888, 9545553737, **E-mail :** coe@sveri.ac.in, **Website :** www.sveri.ac.in
Approved by **A.I.C.T.E.**, New Delhi and affiliated to Punyashlok Ahilyadevi Holkar Solapur University, Solapur
NBA Accredited all eligible UG Programmes, **NAAC** Accredited Institute, ISO 9001 : 2015 Certified Institute.
Accredited by Institution of Engineers (India) & TCS.

Ref.: COEPR/2022-23/40 Date: 20/06/2022

To,
Head Krishna Raja Sagare,
Mysore.

Subject: Regarding Permission to visit Krishna Raja Sagare Dam & Getting Concession in the Fees.

Respected sir,

We are the students of S Y B Tech (Civil Engineering) from SVERI's College of Engineering, Pandharpur. As per curriculum of Punyashlok Ahilyadevi Holkar Solapur University, Solapur, Maharashtra, we are interested to visit Krishna Raja Sagare Dam to study about design & architectural aspects, for the same, we have organized this academic tour.

So, I kindly request you to give us permission to visit the place & also request you give concession in the fees.

Your help in this regard is highly appreciated.

Thanking you in anticipation.

Yours faithfully,

HOD Civil

HEAD,
Dept. of Civil. Engg.
C.O.E. Pandharpur

Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P. B. No. 54, Gopalpur - Ranjani Road, Gopalpur, Tal.: Pandharpur - 413 304, Dist.: Solapur (MH)
Contact No.: 9545553888, 9545553737, E-mail : coe@sveri.ac.in, Website : www.sveri.ac.in
Approved by A.I.C.T.E., New Delhi and affiliated to Punyashlok Ahilyadevi Holkar Solapur University, Solapur
NBA Accredited all eligible UG Programmes, NAAC Accredited Institute, ISO 9001 : 2015 Certified Institute.
Accredited by Institution of Engineers (India) & TCS.

Ref :-

Date:- 20/06/2022

Academic Year 2021-22 S.Y. B.Tech- Div. A Sem - II

List of Students for Industrial Visit

Sr. No.	Roll No.	NAME OF STUDENT	Sr. No.	Roll No.	NAME OF STUDENT
1	SA-1	AMBURE SNEHAL SHANKAR	44	SYB-1	Priyanka Dnyaneshwar Babar
2	SA-4	GHOLVE HARSHADA SUNIL	45	SYB-3	Akanksha Dnyaneshwar Bhakare
3	SA-5	HONMANE VAISHNAVI VIJAY	46	SYB-8	GODASE ANISHA ARUN
4	SA-7	JADHAV SHWETA HANAMANT	47	SYB-9	Vaishnavi Dharmraj Jadhav
5	SA-9	JAWADE ADISHAKTI ABASAHEB	48	SYB-10	Manasi Kantilal Karale
6	SA-14	MALI MAYURI TUKARAM	49	SYB-12	Mangedkar Shruti Sanjay
7	SA-15	PAWAR RUTUJA RAJABHAU	50	SYB-13	Prachi Manoj More
8	SA-18	SADIGLE RESHMA RAJENDRA	51	SYB-15	Patil Akshata Dnyaneshwar
9	SA-19	SALGAR MANASI MAHADEV	52	SYB-16	SHINDE NISHA Hari
10	SA-20	SHINDE MADHURI RAJARAM	53	SYB-17	Umbarje Shubhangi Chandrakant
11	SA-21	SHINDE POOJA SAHEBRAO	54	SYB-19	Agarkhed Aditya Anil
12	SA-22	THAKARE SUNAYANA NAGNATH	55	SYB-20	Rupesh Ravindra Badave
13	SA-23	THENGIL MINAL SURESH	56	SYB-21	Ritesh Ganesh Bhosale
14	SA-24	UBALE SAKSHI SUJIT	57	SYB-22	Vishvajit Daji Bhusnar
15	SA-25	ATKALE ASHISH RAJU	58	SYB-28	GAVALI TUSHAR SANTOSH
16	SA-26	BAGAL SANKET KALYAN	59	SYB-29	Gavhane Shripad Bhagwan
17	SA-27	BAGWAN SHAHID SADIK	60	SYB-32	Tejas Rajendra Hugar
18	SA-28	BHATKAR SANUSH SURENDRA	61	SYB-33	Jadhav Karan Madhukar
19	SA-29	BHOSALE KRUSHNA SAMBHAJI	62	SYB-34	Prashant Jyotiram Jadhav
20	SA-30	BICHUKALE ROHIT SHAHAJI	63	SYB-37	Suyash dattatray kasabe
21	SA-31	BORADE ASHISH NANDKUMAR	64	SYB-39	Sanket nagnath kesare
22	SA-33	CHAVAN ROHAN BAPU	65	SYB-40	Ganesh Annaso Khandagale
23	SA-34	DESHMUKH YUVRAJ NAVANATH	66	SYB-42	Suraj Tatyaso Kolekar
24	SA-36	DHOTRE GOVIND RAJU	67	SYB-48	More Samadhan Appaso
25	SA-41	HUBALE SUYASH YASHWANT	68	SYB-53	Sumit Bandu phate
26	SA-42	JADHAV HANUMANT BHAGAWAT	69	SYB-57	Kirankumar Bhaskar Satpute
27	SA-43	JAGTAP VIKRAM NANASAHEB	70	SYB-59	Shende Mayur Vishal
28	SA-45	KADLASKAR GANESH SUDHIR	71	SYB-60	Shinde Deepak Sambhaji
29	SA-49	KERKAL KHANDERAYA ANKUSH	72	SYB-	Ghodake Shivaji
30	SA-51	MASTUD RAVI ANIL	73	SYB-	Devmore Ajit
31	SA-52	MORE VISHAL BALASAO	74	SYB-	Devmore Dharmaji Laxmanji
32	SA-55	PATIL OM ANNASO	75	SY-A	Kale Rohit Subhash
33	SA-56	PHATE SURAJ ANNASO	76	SY-A	Kale Vivek Vilas
34	SA-57	PUJARI PRAJWAL GAJANAN			
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43	SA-75	RAUT ADITYA SUNIL			

HOD Civil Engg

HEAD,
Dept. of Civil. Engg.
C.O.E. Pandharpur

Shri Vithal Education & Research Institute's
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Ref. :-

Date :- 20/06/2022

Academic Year 2021-22 T.Y. B.Tech- Div. A Sem - II

List of Students for Industrial Visit

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11	SA-21	SHINDE POOJA SAHEBRAO	54	SYB-19	Agarkhed Aditya Anil
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Ref.:-

Date:- 20/06/2022

Office Order

As a part of Solapur University curriculum, S.Y.B.Tech Div. A and Div. B students visit is arranged at Pandharpur, Mysore, Coorg, Bandipur on 21st June 2022 at 7.30 pm . Following faculty members are appointed as accompanying members.

Sr.No.	Name of Faculty Member
1.	Prof. M.S. Survase
2.	Prof. S.S. Patil
3.	Prof. B.M Malagimani
4.	Prof. N.V.Mahamuni
5.	Prof. G.K.Koshti

All are requested to take the note of same and act accordingly.

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SVERI
Engineering for Excellence

Ref :-

Date : 20/12/2021

Academic Year 2021-22 S.Y. B.Tech- Div. A Sem - II

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Ref.:- COEPR/CIVIL/2022-23/40 Date:- 21-6-2022

To,
Chief Engineer,
Krishna Raja Sagara,Dam,
Mysore

Subject: Permission to Visit Krishna Raja Sagara Dam, Mysore.

Respected sir,

As per curriculum of Punyashlok Ahilyadevi Holkar Solapur University, students of SE civil class are interested to visit Krishna Raja Sagara Dam, Mysore to study components of Dam.

So I kindly request you to permit us for this technical visit and spare one technical person to give information.

Your help in this regard is highly appreciated.

Thanking you in anticipation.

Date of visit:- 22/06/2022

SE student:-71

No of faculty members:-05

Waiting for your reply.

Thanking You,

Yours faithfully,

(HOD Civil)

HEAD,
Dept. of Civil. Engg.
C.O.E. Pandharpur

Shri Vithal Education & Research Institute's
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Ref.:- COEPR/CIVIL/2022-23/39 Date:- 21/06/2022

To,
Head Jaylakshmi Mahal,
Mysore.

Subject: Regarding Permission to visit Jaylakshmi Mahal & Getting Concession in the Fees.

Respected sir,

We are the students of S Y B Tech (Civil Engineering) from SVERI's College of Engineering, Pandharpur. As per curriculum of Punyashlok Ahilyadevi Holkar Solapur University, Solapur, Maharashtra, we are interested to visit Jaylakshmi Mahal to study about design & architectural aspects, for the same, we have organized this academic tour.

So, I kindly request you to give us permission to visit the place & also request you give concession in the fees.

Your help in this regard is highly appreciated.

Thanking you in anticipation.

Yours faithfully,

HOD Civil
HEAD,
Dept. of Civil. Engg
C.O.E. Pandharpur

4. Sponsored Projects

Sunshine Powertronics Pvt Ltd
Reg.Off- B403, Karan Bella Vista, Sr.No 75/1,75/2 , Pune-Solapur Road, Manjari, Pune-412307

Date: 22.06.2021

To,
The Principal,
SVERI's College of Engineering, Pandharpur

Subject: Regarding sponsored project

Respected Sir,

With reference to above cited subject, Sunshine Power Electronics Pvt. Ltd. Pune conducted a meeting for sponsored projects with final year students on 21.06.2021. The following projects listed below are sponsored under MOU activity of SVERI's COE Pandharpur and Sunshine Power Electronics Pvt. Ltd. Pune for the academic year 2021-22.

Sr.No	Project Title	Student Name
1	Liquid Level Controller for Different Tank	Ms. Adsul Aboli Sanjay
		Ms. Kurnawal Kshipra Vidhyadhar
		Ms. Jadhav Rutuja Rajesh
2	Ultrasonic Water Level Transmitter	Ms. Paparkar Urmila Pandurang
		Ms. Dhere Vidya Tanaji
		Ms. Kadam Gayatri Nivrutti
3	Introduction of Raspberry Pi with Small Application	Ms. Khobare Pratiksha Sanjay
		Ms. Pawar Supriya Gopinath
		Ms. Survase Vaishnavi Zumbar
4	Wireless Data Monitoring	Mr. Vedpathak Mangesh Dhananjay
		Mr. Vedpathak Pavan Santosh
		Mr. Ausekar Shubham Baban
5	Hotel Management using Raspberry Pi	Ms. Alagi Laxmi Gurupadappa
		Ms. Anandpure Dipali Amasiddha
		Ms. Kulkarni Prajakta Dattatray
6	Emergency Bulb	Mr. Bhosale Nikhil Ramesh
		Mr. Deshpande Kaustubh Sunil
		Mr. Patil Shilisidh Amogsidh
		Mr. Sutar Rahul Iranna

Thanking you.

Regards,

(Mr. Ashwin Tayade)
Technical Director
Sunshine Powertronics Pvt. Ltd. Pune

5. Vocational Training

SHARDA ELECTRONICS & CO.

An ISO 9001:2015 & 14001:2015 Certified Company

Manufacturers of Power Capacitor & Electrical Products
Electrical Consultant & Auditor

Certificate of Achievement

Proudly Present to Mr / Ms / Mrs . . Shraddha Arjun Ambule . . . . . .

Has sincerely completed One Month **Technical Skill Development Internship** in Sharda Electronics & Co.,

MIDC Kupwad, Sangli, Maharashtra, India. From 15.06.2021 to 14.07.2021

Dr. Abhijeet R. Shete
Technical Director

SHARDA ELECTRONICS & CO. KUPWAD SANGLI

Mr. Rajendra S. Shete
Managing Director

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An ISO 9001:2015 & 14001:2015 Certified Company

Manufacturers of Power Capacitor & Electrical Products
Electrical Consultant & Auditor

Certificate of Achievement

Proudly Present to Mr / Ms / Mrs . . . Neha sukhadev bhosale . . . . . .

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Technical Director

SHARDA ELECTRONICS & CO. KUPWAD SANGLI

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Managing Director

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Certificate of Achievement

Proudly Present to Mr / Ms / Mrs . . . Pooja samadhan chavan . . . . . .

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Technical Director

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Mr. Rajendra S. Shete
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Mr. A. R. Shete
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Dr. Abhijeet R. Shete
Technical Director

SHARDA ELECTRONICS & CO. KUPWAD SANGLI

Mr. Rajendra S. Shete
Managing Director

SHARDA ELECTRONICS & CO.

An ISO 9001:2015 & 14001:2015 Certified Company

Manufacturers of Power Capacitor & Electrical Products
Electrical Consultant & Auditor

Certificate of Achievement

Proudly Present to Mr / Ms / Mrs . . Mangesh Haribhau Narkar . . . . . .

Has sincerely completed One Month **Technical Skill Development Internship** in Sharda Electronics & Co.,

MIDC Kupwad, Sangli, Maharashtra, India. From 15.06.2021 to 14.07.2021

Dr. Abhijeet R. Shete
Technical Director

SHARDA ELECTRONICS & CO. KUPWAD SANGLI

Mr. Rajendra S. Shete
Managing Director

SHARDA ELECTRONICS & CO.

An ISO 9001:2015 & 14001:2015 Certified Company

Manufacturers of Power Capacitor & Electrical Products
Electrical Consultant & Auditor

Certificate of Achievement

Proudly Present to Mr / Ms / Mrs . . . *Shantanu Ranganath Patil* . . . . . .

Has sincerely completed One Month **Technical Skill Development Internship** in Sharda Electronics & Co.,

MIDC Kupwad, Sangli, Maharashtra, India. From 15.06.2021 to 14.07.2021

Dr. Abhijeet R. Shete
Technical Director

SHARDA ELECTRONICS & CO. KUPWAD SANGLI

Mr. Rajendra S. Shete
Managing Director

SHARDA ELECTRONICS & CO.

An ISO 9001:2015 & 14001:2015 Certified Company

Manufacturers of Power Capacitor & Electrical Products
Electrical Consultant & Auditor

Certificate of Achievement

Proudly Present to Mr / Ms / Mrs . . Shivam Sunil Salunkhe . . . . . .

Has sincerely completed One Month **Technical Skill Development Internship** in Sharda Electronics & Co.,

MIDC Kupwad, Sangli, Maharashtra, India. From 15.06.2021 to 14.07.2021

Dr. Abhijeet R. Shete
Technical Director

SHARDA ELECTRONICS & CO. KUPWAD SANGLI

Mr. Rajendra S. Shete
Managing Director

SHARDA ELECTRONICS & CO.

An ISO 9001:2015 & 14001:2015 Certified Company

Manufacturers of Power Capacitor & Electrical Products
Electrical Consultant & Auditor

Certificate of Achievement

Proudly Present to Mr / Ms / Mrs . . Arbaaz Samad Shaikh . . . . . .

Has sincerely completed One Month **Technical Skill Development Internship** in Sharda Electronics & Co.,

MIDC Kupwad, Sangli, Maharashtra, India. From 15.06.2021 to 14.07.2021

Dr. Abhijeet R. Shete
Technical Director

SHARDA ELECTRONICS & CO. KUPWAD SANGLI

Mr. Rajendra S. Shete
Managing Director

SHARDA ELECTRONICS & CO.

An ISO 9001:2015 & 14001:2015 Certified Company

Manufacturers of Power Capacitor & Electrical Products
Electrical Consultant & Auditor

Certificate of Achievement

Proudly Present to Mr / Ms / Mrs . . Akash Dattatray Shinde . . . . . .

Has sincerely completed One Month **Technical Skill Development Internship** in Sharda Electronics **& Co.,**

MIDC Kupwad, Sangli, Maharashtra, India. From 15.06.2021 to 14.07.2021

Dr. Abhijeet R. Shete
Technical Director

SHARDA ELECTRONICS & CO. KUPWAD SANGLI

Mr. Rajendra S. Shete
Managing Director

SHARDA ELECTRONICS & CO.

An ISO 9001:2015 & 14001:2015 Certified Company

Manufacturers of Power Capacitor & Electrical Products
Electrical Consultant & Auditor

Certificate of Achievement

Proudly Present to Mr / Ms / Mrs . . . Tamboli Arbaj Alamgir . . . . . .

Has sincerely completed One Month **Technical Skill Development Internship** in Sharda Electronics & Co.,

MIDC Kupwad, Sangli, Maharashtra, India. From 15.06.2021 to 14.07.2021

Dr. Abhijeet R. Shete
Technical Director

SHARDA ELECTRONICS & CO. KUPWAD SANGLI

Mr. Rajendra S. Shete
Managing Director

SHARDA ELECTRONICS & CO.

An ISO 9001:2015 & 14001:2015 Certified Company

Manufacturers of Power Capacitor & Electrical Products
Electrical Consultant & Auditor

Certificate of Achievement

Proudly Present to Mr / Ms / Mrs . . . Vinay Balu Waghmare . . . . . .

Has sincerely completed One Month **Technical Skill Development Internship** in Sharda Electronics & Co.,

MIDC Kupwad, Sangli, Maharashtra, India. From 15.06.2021 to 14.07.2021

Dr. Abhijeet R. Shete
Technical Director

SHARDA ELECTRONICS & CO. KUPWAD SANGLI

Mr. Rajendra S. Shete
Managing Director

SHARDA ELECTRONICS & CO.

An ISO 9001:2015 & 14001:2015 Certified Company

Manufacturers of Power Capacitor & Electrical Products
Electrical Consultant & Auditor

Certificate of Achievement

Proudly Present to Mr / Ms / Mrs . . . Yadav Harshavardhan Mahesh . . . . . .

Has sincerely completed One Month **Technical Skill Development Internship** in Sharda Electronics & Co.,

MIDC Kupwad, Sangli, Maharashtra, India. From 15.06.2021 to 14.07.2021

Dr. Abhijeet R. Shete
Technical Director

SHARDA ELECTRONICS & CO. KUPWAD SANGLI

Mr. Rajendra S. Shete
Managing Director

SOLAR ELECTRONICS
green world in the making

Office/Works : Jijamata, 950, North Sadar Bazar,
Sat Rasta, Solapur - 413 003 (M.S.), India.
Tel. 91-217-2312467 / 2311713
Email : solarlighting11@gmail.com
solar_wireless@yahoo.co.in
Solar.Electronics1989@gmail.com

Website : www. solarelectronics.in www.solarelectronics.tradeindia.com www.indiamart.com/solar-electonics/

Date:-12/08/2021

CERTIFICATE COURSE
INDUSTRIAL TRAINING

This is to certify that Mr. Vishal Ingle has attended industrial training in our company on the basics and practical training in Electrical / Electronics & Green – Technology products from 24/07/21 to 10/08/21. During the training period student has undergone classroom teaching followed by practical on-hand training.

We wish him good luck for his future career.

For Solar Electronics,
Solapur.

SOLAR ELECTRONICS SSI NSIC/DGS&D Regd. Unit SOLAPUR (INDIA)

(Angad Bandal)
Mob: - 091-7588372616

AN ISO 9001:2008 COMPANY

Pune Office : Building No. 1, Flat No. 4, Zala Housing Society,
Karishma Chowk, Karve Road, Behind Papa Jones,
Pune 411 029, (M.S.), INDIA.

SOLAR ELECTRONICS
green world in the making

Office/Works : Jijamata, 950, North Sadar Bazar,
Sat Rasta, Solapur - 413 003 (M.S.), India.
Tel. 91-217-2312467 / 2311713
Email : solarlighting11@gmail.com
solar_wireless@yahoo.co.in
Solar.Electronics1989@gmail.com

Website : www. solarelectronics.in www.solarelectronics.tradeindia.com www.indiamart.com/solar-electonics/

Date:-12/08/2021

CERTIFICATE COURSE
INDUSTRIAL TRAINING

This is to certify that Mr. Shivaji Survase has attended industrial training in our company on the basics and practical training in Electrical / Electronics & Green – Technology products from 24/07/21 to 10/08/21. During the training period student has undergone classroom teaching followed by practical on-hand training.

We wish him good luck for his future career.

For Solar Electronics
Solapur.

SOLAR ELECTRONICS SSI Manufacturing Regd. Unit SOLAPUR (INDIA)

(Angad Bandal)
Mob: - 091-7588372616

AN ISO 9001:2008 COMPANY

Pune Office : Building No. 1, Flat No. 4, Zala Housing Society,
Karishma Chowk, Karve Road, Behind Papa Jones,
Pune 411 029, (M.S.), INDIA.

OSTROWHEEL venture of TECHANALOGY Inspiration | Ideation | Innovation incubated under

CERTIFICATE
OF EXCELLENCE

THIS CERTIFICATE IS PRESENTED TO

Shivani Ramdas Atkale

For their exemplary performance in the Robonetics, a 30 days intensive workshop on Robotics and it's Implementation conducted from 24th September'21.
The participant completed all the assignments with exemplary marks and was interactive throughout the sessions.

Tech Analogy is a certified MSME registered micro- enterprise under the Udyam Registration Portal Ministry of MSME

Ratik Gupta
Founder & CEO,
TechAnalogy

Arko Banerjee
Technical Head,
TechAnalogy

Verify at https://verification.givemycertificate.com/ts90d24a-3c7e-4cbe-a50c-7488eb4899f7

RUDRA INFOTECH

DRIVING TECHNOLOGICAL REVOLUTION
SANT TUKARAM NAGAR, SAIFUL, VIJAPUR ROAD, SOLAPUR- 413004
Email Id: makarandbuddhe13@gmail.com

RIS/Office/2021/MAHAC2017ACCV0091 **Date: 18/9/2021**

CERTIFICATE

To whomsoever it may concern

This is to certify that, Miss.Aarti Kishor Bandgar Of Electronics and Telecommunication Department from SVERI,Pandharpur. She has successfully completed an internship training of Web Development(PHP) for 15 days in our company from 2nd Sep 2021 to 17th Sep 2021 . During the training He/She found sincere and hardworking. We wish Him/Her all the best for future endeavor.

Seal
Of
company

Authority Signarture

Dolphin® Labs
www.dolphinlabs.in

Labs For Training, Development and Research of VLSI and Embedded Systems

| Training Kits | Development Boards| Prototype Development | Technology Transfer |
|Intellectual Property Consultancy|

Pune: Second Floor, Malvika Arcade, Above Ruchi Dhanya Bhandar, Vetalbuva Mandir, Narhe, Pune-411041

Email: dolphinlabs17@gmail.com

Mob. : 7276028051 / 9763714860

Date: 14/10/2021

TO WHOM IT MAY CONCERN

This is to certify that **Miss. Bandgar Aarti Kishor** from **Electronics and Telecommunication, SVERI's College of Engineering, Pandharpur** has successfully completed one month internship in our company from 15/09/2021 to 14/10/2021.

All necessary details were provided from our side for completion of internship.

We wish her the very best in all her future endeavors.

Thanking You,

Dolphin Labs, Pune
MSME
MH26A
0017175

Chittaranjan Mahajan

CEO, Dolphin Labs, Pune

OSTROWHEEL venture of TECHANALOGY Inspiration | Ideation | Innovation incubated under

CERTIFICATE
OF EXCELLENCE

THIS CERTIFICATE IS PRESENTED TO

Ankita Bansode

For their exemplary performance in the Robonetics, a 30 days intensive workshop on Robotics and it's Implementation conducted from 24th September'21.
The participant completed all the assignments with exemplary marks and was interactive throughout the sessions.

Tech Analogy is a certified MSME registered micro- enterprise under the Udyam Registration Portal Ministry of MSME

Ratik Gupta
Founder & CEO,
TechAnalogy

Arko Banerjee
Technical Head,
TechAnalogy

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OSTROWHEEL venture of TECHANALOGY incubated under

CERTIFICATE
OF PARTICIPATION

This certificate is proudly presented to

Ankita Bansode

For participating in Robonetics an intense 30 days workshop on Robotics and its implementation, conducted from 24th September 2021 by Tech Analogy.

Tech Analogy is a certified MSME registered micro- enterprise under the Udyam Registration Portal Ministry of MSME.

Ratik Gupta
Founder & CEO,
TechAnalogy

Arko Banerjee
Technical Head,
TechAnalogy

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RUDRA INFOTECH

DRIVING TECHNOLOGICAL REVOLUTION
SANT TUKARAM NAGAR, SAIFUL, VIJAPUR ROAD, SOLAPUR- 413004
Email Id: makarandbuddhe13@gmail.com

RIS/Office/2021/MAHAC2017ACCV0091 Date: 18/9/2021

CERTIFICATE

To whomsoever it may concern

This is to certify that,Miss.Srushti Rajendra Bhinge Of Electronics and Telecommunication Department from SVERI,Pandharpur. She has successfully completed an internship training of Web Development(PHP) for 15 days in our company from 2nd Sep 2021 to 17th Sep 2021 . During the training He/She found sincere and hardworking. We wish Him/Her all the best for future endeavor.

Rudra Info Tech Solapur Seal Of company

Authority Signature

Dolphin® Labs

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| Training Kits | Development Boards| Prototype Development | Technology Transfer | |Intellectual Property Consultancy|

Pune: Second Floor, Malvika Arcade, Above Ruchi Dhanya Bhandar, Vetalbuva Mandir, Narhe, Pune-411041

Email: dolphinlabs17@gmail.com

Mob. : 7276028051 / 9763714860

Date: 01/10/2021

TO WHOM IT MAY CONCERN

This is to certify that **Miss. Vaishnavi Sudhir Chavan** from **Electronics and Telecommunication Engineering , SVERI's College of Engineering, Pandharpur** has successfully completed one month internship in our company from 01/09/2021 to 30/09/2021.

All necessary details were provided from our side for completion of internship.

We wish her the very best in all her future endeavors.

Thanking You,

Dolphin Labs, Pune MSME MH26A 0017175

Chittaranjan Mahajan

CEO, Dolphin Labs, Pune

INTERNSHALA TRAININGS

Certificate of Training

Vaishnavi Deshmukh

from Shri Vithal Education And Research institute's college of Engineering Pandharpur has successfully completed a 6-week online training on **Programming with Python**. The training consisted of Introduction to Python, Using Variables in Python, Basics of Programming in Python, Principles of Object-oriented Programming (OOP), Connecting to SQLite Database, Developing a GUI with PyQT, Application of Python in Various Disciplines, and The Final Project modules.

We wish Vaishnavi all the best for future endeavours.

Sarvesh Agarwal

FOUNDER & CEO, INTERNSHALA

Date of certification: 2021-09-24 Certificate no. : DCD6D562-E34B-DCF6-2D03-053FBE799883

For certificate authentication, please visit https://trainings.internshala.com/verify_certificate

INTERNSHALA TRAININGS

Certificate of Training

Janhavi Devdikar

has successfully completed a 4-week online training on **Internet of Things**. The training consisted of Building an IoT Monitoring System, Controlling Devices Over the Internet, Cloud, APIs and Alerts, Machine Learning with IoT, and The Final Project modules.

In the final assessment, Janhavi scored 64% marks.

We wish Janhavi all the best for future endeavours.

Sarvesh Agarwal

FOUNDER & CEO, INTERNSHALA

Date of certification: 2021-10-14 Certificate no. : 5B6A05C2-6B6B-C1C8-5619-90CC3067342F

For certificate authentication, please visit https://trainings.internshala.com/verify_certificate

Dolphin® Labs
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Pune: Second Floor, Malvika Arcade, Above Ruchi Dhanya Bhandar, Vetalbuva Mandir, Narhe, Pune-411041

Email: dolphinlabs17@gmail.com

Mob. : 7276028051 / 9763714860

Date: 14/10/2021

TO WHOM IT MAY CONCERN

This is to certify that **Miss. Dhekane Rutuja Hanumant** from **Electronics and Telecommunication, SVERI's College of Engineering, Pandharpur** has successfully completed one month internship in our company from 15/09/2021 to 14/10/2021.

All necessary details were provided from our side for completion of internship.

We wish her the very best in all her future endeavors.

Thanking You,

Dolphin Labs, Pune
MSME
MH26A
0017175

Chittaranjan Mahajan

CEO, Dolphin Labs, Pune

RUDRA INFOTECH

DRIVING TECHNOLOGICAL REVOLUTION
SANT TUKARAM NAGAR, SAIFUL, VIJAPUR ROAD, SOLAPUR- 413004 Email
Id: makarandbsaddhe13@gmail.com

RIS/Office/2021/MAHAC2017ACCV0091

Date: 18/9/2021

CERTIFICATE

To whomsoever it may concern

This is to certify that,Miss. Akanksha Anil Jadhav Of Electronics and Telecommunication Department from SVERI,Pandharpur. She has successfully completed an internship training of Web Development(PHP) for 15 days in our company from 2nd Sep 2021 to 17th Sep 2021 . During the training He/She found sincere and hardworking. We wish Him/Her all the best for future endeavor.

Rudra Info Tech Solapur

Authority Signarture

RUDRA INFOTECH

DRIVING TECHNOLOGICAL REVOLUTION
SANT TUKARAM NAGAR, SAIFUL, VIJAPUR ROAD, SOLAPUR- 413004
Email Id: makarandbuddhe13@gmail.com

RIS/Office/2019/MAHAC2017ACCV0091 Date: 26/9/2021

CERTIFICATE

To whomsoever it may concern

This is to certify that, Miss.Gayatri Jaywant Joshi Of Electronics and Telecommunication Department from Sveri,Pandharpur. She has successfully completed an internship training for 15 days in our company from 10th Sep 2021 to 25th Sep 2021 . During the training He/She found sincere and hardworking. We wish Him/Her all the best for future endeavor.

Rudra Info Tech
Seal
Of
company
Solapur

Authority Signature

INTERNSHALA TRAININGS

Certificate of Training

Sayali Lendave

from Shri Vithal Education & Research Institute,Pandharpur, has successfully completed a 6-week online training on **Programming with Python**. The training consisted of Introduction to Python, Using Variables in Python, Basics of Programming in Python, Principles of Object-oriented Programming (OOP), Connecting to SQLite Database, Developing a GUI with PyQT, Application of Python in Various Disciplines and The Final Project modules.

Sayali scored 95% marks in the final assessment and is a top performer in the training.

We wish Sayali all the best for the future endeavours.

Sarvesh Agarwal

FOUNDER & CEO, INTERNSHALA

Date of certification: 2021-09-11 Certificate no. : 20F78135-59FD-476F-C47A-E4605FC0832F

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DRIVING TECHNOLOGICAL REVOLUTION
SANT TUKARAM NAGAR, SAIFUL, VIJAPUR ROAD, SOLAPUR- 413004
Email Id: makarandbuddhe13@gmail.com

RIS/Office/2021/MAHAC2017ACCV0091

Date: 18/9/2021

CERTIFICATE

To whomsoever it may concern

This is to certify that,Miss.Samruddhi Suresh Mali Of Electronics and Telecommunication Department from SVERI,Pandharpur. She has successfully completed an internship training of Web Development(PHP) for 15 days in our company from 2nd Sep 2021 to 17th Sep 2021 . During the training He/She found sincere and hardworking. We wish Him/Her all the best for future endeavor.

Rudra Info Tech Seal Of company Solapur

Authority Signature

SHAMS ENERGY

Training, Trading and Services

Certificate

Sr.No. SLR/21K08/1955

This is to certify that

Mr./Mrs./Miss. Sonal Arun Nikam *has*

successfully completed workshop of **" Solar Technologies "** *during*

the period from 01/09/2021 *to* 16/09/2021

in college campus.

D.L. Khadem.
Chief Trainer

Shams Energy Training, Trading, Services

Director
(Shams Energy)

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INTERNSHALA TRAININGS

Certificate of Training

Aishwarya Patane

has successfully completed a 6-week online training on **Programming with Python**. The training consisted of Introduction to Python, Using Variables in Python, Basics of Programming in Python, Principles of Object-oriented Programming (OOP), Connecting to SQLite Database, Developing a GUI with PyQT, Application of Python in Various Disciplines and The Final Project modules.

Aishwarya scored 93% marks in the final assessment and is a top performer in the training.

We wish Aishwarya all the best for the future endeavours.

Sarvesh Agarwal

FOUNDER & CEO, INTERNSHALA

Date of certification: 2021-09-11 Certificate no. : 40F62DFB-B25D-DF93-46B4-C41C49DCA4F7

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RUDRA INFOTECH

DRIVING TECHNOLOGICAL REVOLUTION
SANT TUKARAM NAGAR, SAIFUL, VIJAPUR ROAD, SOLAPUR- 413004
Email Id :makarandbuddhe13@gmail.com

RIS/Office/2019/MAHAC2017ACCV0091 Date: 26/9/2021

CERTIFICATE

To whomsoever it may concern

This is to certify that, Miss.Aditi Devidas Patil Of Electronics and Telecommunication Department from Sveri,Pandharpur. She has successfully completed an internship training for 15 days in our company from 10th Sep 2021 to 25th Sep 2021 . During the training He/She found sincere and hardworking. We wish Him/Her all the best for future endeavor.

Rudra Info Tech Seal Of company Solapur

Authority Signature

RUDRA INFOTECH

DRIVING TECHNOLOGICAL REVOLUTION
SANT TUKARAM NAGAR, SAIFUL, VIJAPUR ROAD, SOLAPUR- 413004
Email Id: makarandbuddhe13@gmail.com

RIS/Office/2021/MAHAC2017ACCV0091 Date: 18/9/2021

CERTIFICATE

To whomsoever it may concern

This is to certify that,Miss.Meenakshi Bramhanand Patil Of Electronics and Telecommunication Department from SVERI,Pandharpur. She has successfully completed an internship training of Web Development(PHP) for 15 days in our company from 2nd Sep 2021 to 17th Sep 2021 . During the training He/She found sincere and hardworking. We wish Him/Her all the best for future endeavor.

Rudra Info Tech Seal Of company Solapur

Authority Signature

RUDRA INFOTECH

DRIVING TECHNOLOGICAL REVOLUTION
SANT TUKARAM NAGAR, SAIFUL, VIJAPUR ROAD, SOLAPUR-413004
Email Id makarandhuddhe13@gmail.com

RIS/Office/2021/MAHAC2017ACCV0091 Date: 18/9/2021

CERTIFICATE

To whomsoever it may concern

This is to certify that,Miss.Madhura Sunil Phalphale Of Electronics and Telecommunication Department from SVERI,Pandharpur. She has successfully completed an internship training of Web Development(PHP) for 15 days in our company from 2nd Sep 2021 to 17th Sep 2021 . During the training He/She found sincere and hardworking. We wish Him/Her all the best for future endeavor.

Rudra Info Tech Seal Of company Solapur

Authority Signature

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INTERNSHALA TRAININGS

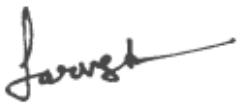
Certificate of Training

Swati Rasal

from Shri Vithal Education & Research Institute, College Of Engineering, Pandharpur has successfully completed a 6-week online training on **Programming with Python**. The training consisted of Introduction to Python, Using Variables in Python, Basics of Programming in Python, Principles of Object-oriented Programming (OOP), Connecting to SQLite Database, Developing a GUI with PyQT, Application of Python in Various Disciplines, and The Final Project modules.

Swati is a top performer in the training.

We wish Swati all the best for future endeavours.



Sarvesh Agarwal

FOUNDER & CEO, INTERNSHALA

Date of certification: 2021-09-11 Certificate no. : CF94E461-E686-E9C8-50CC-287ADEDF78AD

For certificate authentication, please visit https://trainings.internshala.com/verify_certificate

INTERNSHALA TRAININGS

Certificate of Training

Kajal Sawant

from Shri Vithal Education Research and Institute has successfully completed a 6-week online training on **Programming with Python**. The training consisted of Introduction to Python, Using Variables in Python, Basics of Programming in Python, Principles of Object-oriented Programming (OOP), Connecting to SQLite Database, Developing a GUI with PyQT, Application of Python in Various Disciplines, and The Final Project modules.

Kajal is a top performer in the training.

We wish Kajal all the best for future endeavours.

Sarvesh Agarwal

FOUNDER & CEO, INTERNSHALA

Date of certification: 2021-09-20 Certificate no. : 9100F02A-9F7C-5CEF-4068-37787A7370A5

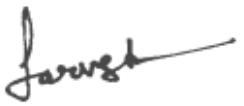
For certificate authentication, please visit https://trainings.internshala.com/verify_certificate

INTERNSHALA TRAININGS

Certificate of Training

Chaitali Shinde

from SVERI'S College Of Engineering,Pandharpur, has successfully completed a 6-week online training on **Programming with Python**. The training consisted of Introduction to Python, Using Variables in Python, Basics of Programming in Python, Principles of Object-oriented Programming (OOP), Connecting to SQLite Database, Developing a GUI with PyQT, Application of Python in Various Disciplines and The Final Project modules.
Chaitali scored 100% marks in the final assessment and is a top performer in the training.
We wish Chaitali all the best for the future endeavours.



Sarvesh Agarwal

FOUNDER & CEO, INTERNSHALA

Date of certification: 2021-09-11 Certificate no. : 183AD56A-859D-A6CC-AC0E-826343085A8D

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SANT TUKARAM NAGAR, SAIFUL, VIJAPUR ROAD, SOLAPUR- 413004
Email Id: makarandbuddhe13@gmail.com

RIS/Office/2021/MAHAC2017ACCV0091 Date: 18/9/2021

CERTIFICATE

To whomsoever it may concern

This is to certify that,Miss.Trupti Govind Sonar Of Electronics and Telecommunication Department from SVERI,Pandharpur. She has successfully completed an internship training of Web Development(PHP) for 15 days in our company from 2nd Sep 2021 to 17th Sep 2021 . During the training He/She found sincere and hardworking. We wish Him/Her all the best for future endeavor.

Rudra Info Tech Seal Of company Solapur

Authority Signature

RUDRA INFOTECH

DRIVING TECHNOLOGICAL REVOLUTION
SANT TUKARAM NAGAR, SAIFUL, VIJAPUR ROAD, SOLAPUR- 413004
Email Id: makarandbuddhe13@gmail.com

RIS/Office/2021/MAHAC2017ACCV0091 Date: 18/9/2021

CERTIFICATE

To whomsoever it may concern

This is to certify that,Miss.Himani Anand Swami Of Electronics and Telecommunication Department from SVERI,Pandharpur. She has successfully completed an internship training of Web Development(PHP) for 15 days in our company from 2nd Sep 2021 to 17th Sep 2021 . During the training He/She found sincere and hardworking. We wish Him/Her all the best for future endeavor.

Rudra Info Tech Seal Of company Solapur

Authority Signature

INTERNSHALA TRAININGS

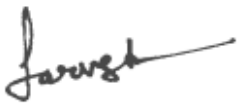
Certificate of Training

Komal Thorat

from SVERI'S college of engineering, Pandharpur, has successfully completed a 6-week online training on **Programming with Python**. The training consisted of Introduction to Python, Using Variables in Python, Basics of Programming in Python, Principles of Object-oriented Programming (OOP), Connecting to SQLite Database, Developing a GUI with PyQT, Application of Python in Various Disciplines and The Final Project modules.

Komal scored 100% marks in the final assessment and is a top performer in the training.

We wish Komal all the best for the future endeavours.



Sarvesh Agarwal

FOUNDER & CEO, INTERNSHALA

Date of certification: 2021-09-12 Certificate no. : 52BEA04F-03A9-3C83-3530-FC81535B3C4E

For certificate authentication, please visit https://trainings.internshala.com/verify_certificate

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Email : arteeflow@arteeflow.com Web : www.arteeflow.com
CIN No. : U29299GJ2003PTC41854

Ref No.: AFC/PUNE/21/Oct/015

Date: 28-Oct-21

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Miss Pratiksha Ashok Yadav, 3rd Year, E&TC PRN 2019032500210017 of SVERI College of Engineering, Pandharpur** has successfully completed Industrial Internship Program with our company under the guidance of **Mr. Pratap Panchal, Lead Engineer.**

Duration of internship was 01-Sep to 28-Oct-21, where she had gone through Process automation systems such as PLC, DCS, SCADA, etc.

Pratiksha has been sincere and hardworking in all her efforts. We wish very best in all her future endeavors.

Thanking You,

FOR ARTEE FLOW CONTROLS PVT LTD

Artee Flow Controls Pvt. Ltd. Ankleshwar

AUTHORISED SIGNATORY

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Email Id: makarandbuddhe13@gmail.com

RIS/Office/2021/MAHAC2017ACCV0091

Date: 18/9/2021

CERTIFICATE

To whomsoever it may concern

This is to certify that, Mr.Shubham Satish Badake Of Electronics and Telecommunication Department from SVERI,Pandharpur. he has successfully completed an internship training of Web Development(PHP) for 15 days in our company from 2nd Sep 2021 to 17th Sep 2021 . During the training He/She found sincere and hardworking. We wish Him/Her all the best for future endeavor.

Rudra Info Tech Solapur
Seal Of company

Authority Signarture

SHAMS
ENERGY

Certificate

Sr.No. SLR/21K09/1604

This is to certify that

Mr./Ms./Miss. YISHAYTEJ HANUMANT BHOSLE *has successfully completed an Implant training in* "**Solar Technologies**" *during the period from* 01/09/2021 *to* 16/09/2021 *in our company campus.*

Chief Trainer

Shams Energy Training, Training Services

Director
(Shams Energy)

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Training, Trading and Services

Certificate

Sr.No. SLR/21K0 8/1956

This is to certify that

Mr./~~Mrs.~~/~~Miss.~~ Mahesh Sunil Deshmukh. has

successfully completed workshop of " **Solar Technologies** " during

the period from 01/09/2021 to 16/09/2021

in college campus.

D.L. Khadem.
Chief Trainer

Shams Energy Training & Service

Director
(Shams Energy)

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SHAMS ENERGY

Certificate

Sr.No. SLR/21K09/1502

This is to certify that

Mr./~~Mrs.~~/ Miss. SHRINATH ASHOK PULPATI has successfully completed an Implant training in **" Solar Technologies "** during the period from 01/09/2021 to 16/09/2021 in our company campus.

Chief Trainer

Shams Energy Training & Services

Director
(Shams Energy)

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udemy

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Certificate url: ude.my/UC-438c9d95-518d-46b5-9754-b45b479abbf1
Reference Number: 0004

CERTIFICATE OF COMPLETION

Machine Learning with SciKit-Learn with Python

Instructors **Exam Turf**

Sumedh Sanjaykumar Gaikwad

Date **Oct. 17, 2021**
Length **8.5 total hours**

RUDRA INFOTECH

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Email Id mukundbaddhe13@gmail.com

RIS/Office 2021/MAHAC2017ACCV0091 Date: 18/09/2021

CERTIFICATE

To whomsoever it may concern

This is to certify that,Mr. Amol Mahadev Gophane Of Electronics and Telecommunication Department from SVERI,Pandharpur. She has successfully completed an Internship training of Web Development(PHP) for 15 days in our company from 2nd Sep 2021 to 17th Sep 2021. During the training He/She found sincere and hardworking. We wish Him/Her all the best for future endeavor.

Rudra Info Tech Solapur

Authority Signature

SHAMS
ENERGY

Certificate

Sr.No. SLR/21K08/1934

This is to certify that

Mr./~~Mrs.~~/~~Miss.~~ Sunil shamrao karande has successfully completed an Implant training in **" Solar Technologies "** during the period from 01/09/2021 to 16/09/2021 in our company campus.

D.L. Khadem
Chief Trainer

Shams Energy Training, Trading, Services

Director
(Shams Energy)

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Certificate

Sr.No. SLR/21K09/1891

This is to certify that

Mr./Mr./Miss. ADITYA BIBISHAN KASHID has successfully completed an Implant training in **" Solar Technologies "** during the period from 01/09/2021 to 16/09/2021 in our company campus.

Chief Trainer

Shams Energy Training Services Dupari

Director
(Shams Energy)

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SHAMS
ENERGY

Certificate

Sr.No.SLR/21K09/1591

This is to certify that

Mr./Mrs./Miss. LAXMAN DADASAHEB KASHID. has successfully completed an Implant training in " **Solar Technologies** " during the period from 01/09/2021 to 16/09/2021. in our company campus.

Shams Energy Training, Testing, Services

Chief Trainer

Director
(Shams Energy)

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Certificate

Sr.No.SLR/21K09/1844.

This is to certify that

Mr./Ms./Miss. ANIKET SUHAS KATARE. has successfully completed an Implant training in "**Solar Technologies**" during the period from 01/09/2021 to 30/09/2021. in our company campus.

Chief Trainer

Shams Energy Training & Services

Director
(Shams Energy)

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ENERGY

Certificate

Sr.No. SLR/21K09/1501

This is to certify that

Mr./Mrs./Miss. GANESH DADARAO KAVADE has successfully completed an Implant training in "**Solar Technologies**" during the period from 01/09/2021 to 16/09/2021.

in our company campus.

Chief Trainer

Shams Energy Training, Trading, Services

Director
(Shams Energy)

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Certificate

Sr.No. SLR/21K09/1492

This is to certify that

Mr./Mrs./Miss. PRANAV MADHAV KHARAT has successfully completed an Implant training in **" Solar Technologies "** during the period from 01/09/2021 to 16/09/2021 in our company campus.

Chief Trainer

Shams Energy Training, Trading

Director
(Shams Energy)

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Training, Trading and Services

Certificate

Sr.No. SLR/21KO8/1953

This is to certify that

Mr./~~Mrs./ Miss.~~ Kaishna Mahadev koli *has*

successfully completed workshop of **" Solar Technologies "** *during*

the period from 01/09/2021 *to* 16/09/2021

in college campus.

D.L. Khadew.
Chief Trainer

Director
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Congratulations, Aniket Langote

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7083270281
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Outward No.: TCerti/2021-22/458 **Date: 17/08/2021**

CERTIFICATE

This is to certify that **Ruturaj Anil Mali** from **SVERI's College of Engineering, Pandharpur** has successfully completed the Industrial Training on "**PCB Design**" at **TuringTech Pvt. Ltd. Dombivli** from **30th July 2021 to 13th Aug. 2021.**

Turingtech T.T.

Mr. Sohel Nadaf

(CEO)

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Certificate of Completion

This is to certify that **Vaibhav chandrkant masal** has successfully completed **PLC (Programmable Logic Control) & SCADA (Supervisory Control & Data Acquisition)** online Workshop jointly organized by **The World of Automation** in association department of Electrical Engineering and SVERIs COE, Pandharpur, during **7th Feb.2022 to 8th Feb. 2022.**

☑ AB PLC ☑ In touch SCADA

Manik Raj Park, 2nd Floor, Office no – 4, Opp. Elpro City Square Mall, PCMC Link Road, Chinchwad – 411033

8530084777 / 8530084777 / 9075102234

Dr. Mrs. D. A. Tamboli
HOD (Electrical Engineering)
SVERIs COEP Pandharpur

Dr. B.P. Ronge
Principal
SVERIs COEP, Pandharpur

The World of Automation Pune

Authorised Signatory
Mrs. Priyanka Oza

SHAMS
ENERGY

Certificate

Sr.No. SLR/21K08/1931

This is to certify that

Mr./~~Mrs./Miss.~~ Sudarshan Balasaheb Nazsale *has successfully completed an Implant training in* **" Solar Technologies "** *during the period from* 01/09/2021 *to* 16/09/2021 *in our company campus.*

D.L.Khadem
Chief Trainer

Shams Energy Training, Training, Services

Director
(Shams Energy)

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Certificate

Sr.No.SLR/21K09/1601

This is to certify that

Mr./Mrs./Miss. SHIVRAJ NARAYAN NIMBALKAR has successfully completed an Implant training in "**Solar Technologies**" during the period from 01/09/2021 to 16/09/2021 in our company campus.

Shams Energy Training, Trading Services

Chief Trainer

Director
(Shams Energy)

SHAMS
ENERGY

Certificate

Sr.No.SLR/21K08/1935

This is to certify that

Mr./~~Mrs./Miss.~~ Rushikesh Uttam Pol has successfully completed an Implant training in "**Solar Technologies**" during the period from 01/09/2021 to 16/09/2021 in our company campus.

D.L.Khadem.
Chief Trainer

Shams Energy Training, Training, Service

Director
(Shams Energy)

SHAMS
ENERGY

Certificate

Sr.No. SLR/21K09/1491

This is to certify that

Mr./Mrs./Miss. GANESH NILAPPA RUPANAR. has successfully completed an Implant training in **" Solar Technologies "** during the period from 01/09/2021 to 16/09/2021 in our company campus.

Ziya

Chief Trainer

Shams Energy Training Training

Director
(Shams Energy)

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Training, Trading and Services

Certificate

Sr.No. SLR/21K08/1946

This is to certify that

Mr./~~Mrs./~~ ~~Miss.~~ Shubham Atul Shedkhane has successfully completed workshop of "**Solar Technologies**" during the period from 01/09/2021 to 16/09/2021 in college campus.

D.L. Khadem
Chief Trainer

Shams Energy Training, Training, Services

Director
(Shams Energy)

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Email Id: makarandbuddhe13@gmail.com

RIS/Office/2021/MAHAC2017ACCV0091 Date: 18/9/2021

CERTIFICATE

To whomsoever it may concern

This is to certify that,Mr..Sagar Navnath Thorat Of Electronics and Telecommunication Department from SVERI,Pandharpur. She has successfully completed an internship training of Web Development(PHP) for 15 days in our company from 2nd Sep 2021 to 17th Sep 2021 . During the training He/She found sincere and hardworking. We wish Him/Her all the best for future endeavor.

Rudra Info Tech Seal Of company Solapur

Authority Signature

Ref.No: LTRSOFT/2021/107 Date: 25/09/2021

EXPERIENCE CERTIFICATE

This is to certify that Mr. Umberkar Shripad Nishikant *is worked as the* intern for Electronic Project Development named ANDROMOT, at LTR SOFT PRIVATE LIMITED from 03/09/2021 to 24/09/2021.

During the period we observe that he is obedient and dedicated to his assignments.

Director

DIRECTOR
LTR SOFT PRIVATE LIMITED.

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ENERGY

Certificate

Sr.No. SLR/21 K08/1927

This is to certify that

Mr./Mrs./ Miss. Omkar Ankush Zingade has successfully completed an Implant training in "Solar Technologies" during the period from 01/09/2021 to 16/09/2021 in our company campus.

D.L. Khodev.
Chief Trainer

Shams Energy Training & Trading Services

Director
(Shams Energy)

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ENERGY

Certificate

Sr.No.SLR/21KOB/1957

This is to certify that

~~Mr./Mrs.~~ *Miss.* Shivani Hanumant Azekar *has successfully completed an Implant training in* **" Solar Technologies "** *during the period from* 01/09/2021 *to* 16/09/2021 *in our company campus.*

D.L.Khadem
Chief Trainer

Shams Energy Training, Training, Services

Director
(Shams Energy)

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RIS/Office/2021/MAHAC2017ACCV0091 Date: 18/9/2021

CERTIFICATE

To whomsoever it may concern

This is to certify that,Miss.Megha Dinkar Babar Of Electronics and Telecommunication Department from SVERI,Pandharpur. She has successfully completed an internship training of Web Development(PHP) for 15 days in our company from 2nd Sep 2021 to 17th Sep 2021 . During the training He/She found sincere and hardworking. We wish Him/Her all the best for future endeavor.

Rudra Info Tech Seal Of company Solapur

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Email: dolphinlabs17@gmail.com

Mob. : 7276028051 / 9763714860

Date: 01/10/2021

TO WHOM IT MAY CONCERN

This is to certify that , **Miss. Rohini Baban Bhandare** from **Electronics and Telecommunication Engineering , SVERI's College of Engineering, Pandharpur** has successfully completed one month internship in our company from 01/09/2021 to 30/09/2021.

All necessary details were provided from our side for completion of internship.

We wish her the very best in all her future endeavors.

Thanking You,

Dolphin Labs, Pune

Chittaranjan Mahajan

CEO, Dolphin Labs, Pune

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SHAMS
ENERGY

Certificate

Sr.No. SLR/21K08/1950

This is to certify that

Mr./~~Mrs.~~/ Miss. Sakshitai Shivsharan Bharama. *has successfully completed an Implant training in* **" Solar Technologies "** *during the period from* 01/09/2021 *to* 16/09/2021 *in our company campus.*

D.L.Khodev
Chief Trainer

Shams Energy Training, Trading, Services

Director
(Shams Energy)

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Certificate

Sr.No.SLR/21K09/1925

This is to certify that
M/./Ms./ Miss. DNYANESHWARI BALASAHEB DAS has successfully completed an Implant training in "**Solar Technologies**" during the period from 01/09/2021 to 16/09/2021 in our company campus.

Chief Trainer SHAMS ENERGY

Director
(Shams Energy)

Proprietor

RUDRA INFOTECH

DRIVING TECHNOLOGICAL REVOLUTION
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Email Id: makarandbuddhe13@gmail.com

RIS/Office/2021/MAHAC2017ACCV0091 Date: 18/9/2021

CERTIFICATE

To whomsoever it may concern

This is to certify that,Miss.Aishwarya Appa Devkule Of Electronics and Telecommunication Department from SVERI,Pandharpur. She has successfully completed an internship training of Web Development(PHP) for 15 days in our company from 2nd Sep 2021 to 17th Sep 2021 . During the training He/She found sincere and hardworking. We wish Him/Her all the best for future endeavor.

Rudra Info Tech Seal Of company Solapur

Authority Signature

SHAMS
ENERGY

Certificate

Sr.No. SLR/21K09/1492.

This is to certify that

Mr./Ms./ Miss. Shejali Ajay Gaddam. has successfully completed an Implant training in "**Solar Technologies**" during the period from 1/09/2021 to 16/09/2021 in our company campus.

Chief Trainer

Director
(Shams Energy)

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Certificate

Sr.No. SLR/RIK08/1937

This is to certify that

~~Mr./Mrs.~~/ Miss. Shrishti Satyawan Jagdale has successfully completed an Implant training in **" Solar Technologies "** during the period from 01/09/2021 to 16/09/2021 in our company campus.

D.L.Khadem
Chief Trainer

Shams Energy Training, Trading, Services

Director
(Shams Energy)

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Certificate

Sr.No.SLR/21K08/1952

This is to certify that

Mr./~~Mrs.~~/ Miss. kamble Prajakta Pramod has successfully completed an Implant training in **" Solar Technologies "** during the period from 01/09/2021 to 16/09/2021 in our company campus.

D.L.Ichadeve
Chief Trainer

Shams Energy Training Institute

Director
(Shams Energy)

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SHAMS
ENERGY

Certificate

Sr.No. SLR/21K09/1493.

This is to certify that

Mr./Mrs./Miss. Supriya Jakappa Kote. has successfully completed an Implant training in "**Solar Technologies**" during the period from 1/09/2021 to 16/09/2021 in our company campus.

Chief Trainer

Shams Energy Training Institute

Director
(Shams Energy)

RUDRA INFOTECH

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Email Id: makarandbuddhe13@gmail.com

RIS/Office/2021/MAHAC2017ACCV0091 Date: 18/9/2021

CERTIFICATE

To whomsoever it may concern

This is to certify that,Miss.Shreya Dipak Kulkarni Of Electronics and Telecommunication Department from SVERI,Pandharpur. She has successfully completed an internship training of Web Development(PHP) for 15 days in our company from 2nd Sep 2021 to 17th Sep 2021 . During the training He/She found sincere and hardworking. We wish Him/Her all the best for future endeavor.

Rudra Info Tech Seal Of company Solapur

Authority Signature

SHAMS
ENERGY

Certificate

Sr.No. SLR/21K09/1921

This is to certify that

Mr./Ms./Miss. PRIYANKA BALASO LENDAVE has successfully completed an Implant training in "Solar Technologies" during the period from 01/09/2021 to 16/09/2021 in our company campus.

SHAMS ENERGY
Proprietor

Chief Trainer

Director
(Shams Energy)

SHAMS
ENERGY

Certificate

Sr.No.SLR/21K08/1945

This is to certify that

Mr./~~Mrs.~~/Miss. Ankita Rajabhau Lokare has successfully completed an Implant training in "Solar Technologies" during the period from 01/09/2021 to 16/09/2021 in our company campus.

D.L. Khadav
Chief Trainer

Director
(Shams Energy)

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ENERGY

Certificate

Sr.No.SLR/21K09/1922

This is to certify that
M./M/s./ Miss. POOJA KRUSHNA LOKHANDE has
successfully completed an Implant training in "Solar Technologies" during
the period from 01/09/2021 to 16/09/2021
in our company campus.

Chief Trainer SHAMS ENERGY
Proprietor

Director
(Shams Energy)

SHAMS
ENERGY

Certificate

Sr.No. SLR/21K09/1495

This is to certify that
Mr./Mrs./Miss. Smita Uttreshwar Lokhande has
successfully completed an Implant training in "**Solar Technologies**" during
the period from 1/09/2021 to 16/09/2021
in our company campus.

Chief Trainer

Director
Shams Energy

RUDRA INFOTECH

DRIVING TECHNOLOGICAL REVOLUTION
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Email Id: makarandbuddhe13@gmail.com

RIS/Office/2021/MAHAC2017ACCV0091 **Date: 18/9/2021**

CERTIFICATE

To whomsoever it may concern

This is to certify that,Miss.Rutuja Suryakant Mane Of Electronics and Telecommunication Department from SVERI,Pandharpur. She has successfully completed an internship training of Web Development(PHP) for 15 days in our company from 2nd Sep 2021 to 17th Sep 2021 . During the training He/She found sincere and hardworking. We wish Him/Her all the best for future endeavor.

Rudra Info Tech Seal Of company Solapur

Authority Signature

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ENERGY

Certificate

Sr.No. SLR/21K 09/1496

This is to certify that

Mr./Mrs./Miss. Minal Mhamane. has successfully completed an Implant training in " **Solar Technologies** " during the period from 1/09/2021 to 16/09/2021 in our company campus.

Chief Trainer

Director
(Shams Energy)

SHAMS
ENERGY

Certificate

Sr.No.SLR/21K09/1926

This is to certify that

Mr./Ms./ Miss. ASHVINI DHANAJI MORE has successfully completed an Implant training in "**Solar Technologies**" during the period from 01/09/2021 to 16/09/2021.

in our company campus.

Chief Trainer SHAMS ENERGY

Director
(Shams Energy)

Proprietor

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Email Id: makarandbuddhe13@gmail.com

RIS/Office/2021/MAHAC2017ACCV0091 Date: 18/9/2021

CERTIFICATE

To whomsoever it may concern

This is to certify that,Miss.Roopam Revannath Muluk Of Electronics and Telecommunication Department from SVERI,Pandharpur. She has successfully completed an internship training of Web Development(PHP) for 15 days in our company from 2nd Sep 2021 to 17th Sep 2021 . During the training He/She found sincere and hardworking. We wish Him/Her all the best for future endeavor.

Rudra Info Tech Solapur
Seal Of company

Authority Signature

SHAMS
ENERGY

Certificate

Sr.No.SLR|21K08|1932

This is to certify that

~~Mr./Mrs.~~/ Miss. Vaishali kundlik Nagargoje has successfully completed an Implant training in **" Solar Technologies "** during the period from 01|09|2021 to 16|09|2021 in our company campus.

D.L.Khadem.
Chief Trainer

Shams Energy Training, Training, Services

Director
(Shams Energy)

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SHAMS
ENERGY

Certificate

Sr.No. SLR/21K09/1924

This is to certify that

Mr./Mrs./Miss. SHWETA RAJABHAU NIPASE has successfully completed an Implant training in "**Solar Technologies**" during the period from 01/09/2021 to 16/09/2021 in our company campus.

Chief Trainer SHAMS ENERGY

Proprietor

Director
(Shams Energy)

RUDRA INFOTECH

DRIVING TECHNOLOGICAL REVOLUTION
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Email Id: makarandbuddhe13@gmail.com

RIS/Office/2021/MAHAC2017ACCV0091 Date: 18/9/2021

CERTIFICATE

To whomsoever it may concern

This is to certify that, Miss.Pratiksha Raghunath Ronge_Of Electronics and Telecommunication Department from SVERI,Pandharpur. She has successfully completed an internship training of Web Development(PHP) for 15 days in our company from 2nd Sep 2021 to 17th Sep 2021 . During the training He/She found sincere and hardworking. We wish Him/Her all the best for future endeavor.

Rudra Info Tech Seal Of company Solapur

Authority Signarture

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Email: dolphinlabs17@gmail.com

Mob. : 7276028051 / 9763714860

Date: 01/10/2021

TO WHOM IT MAY CONCERN

This is to certify that **Miss. Rutuja Sanjay Shelake** from **Electronics and Telecommunication Engineering , SVERI's College of Engineering, Pandharpur** has successfully completed one month internship in our company from 01/09/2021 to 30/09/2021.

All necessary details were provided from our side for completion of internship.

We wish her the very best in all her future endeavors.

Thanking You,

Dolphin Labs, Pune MSME MH26A 0017175

Chittaranjan Mahajan

CEO, Dolphin Labs, Pune

SHAMS ENERGY

Certificate

Sr.No. SLR/21K08/1928

This is to certify that

~~Mr./Mrs.~~/ Miss. Pratibha Prasad Suryawanshi has successfully completed an Implant training in **" Solar Technologies "** during the period from 01/09/2021 to 16/09/2021 in our company campus.

D.L. khadew
Chief Trainer

Shams Energy Training, Training Service

Director
(Shams Energy)

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ENERGY

Certificate

Sr.No. SLR/2IKO9/1923

This is to certify that

Mr./Ms./ Miss. VAISHNAVI VIDYADHAR SWAMI has successfully completed an Implant training in "**Solar Technologies**" during the period from 01/09/2021 to 16/09/2021 in our company campus.

Director

SHAMS
ENERGY

Certificate

Sr.No. SER/21K09/1491

This is to certify that

Mr./Mrs./ Miss. Saguna Ashok Unhale has successfully completed an Implant training in "**Solar Technologies**" during the period from 1/09/2021 to 16/09/2021 in our company campus.

Chief Trainer

Shams Energy Training

Director
(Shams Energy)

Dolphin® Labs
www.dolphinlabs.in

Labs For Training, Development and Research of VLSI and Embedded Systems

| Training Kits | Development Boards| Prototype Development | Technology Transfer |
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Email: dolphinlabs17@gmail.com **Mob. : 7276028051 / 9763714860**

Date: 01/10/2021

TO WHOM IT MAY CONCERN

This is to certify that **Miss. Vaishnavi Digambar Walke** from **Electronics and Telecommunication Engineering , SVERI's College of Engineering, Pandharpur** has successfully completed one month internship in our company from 01/09/2021 to 30/09/2021.

All necessary details were provided from our side for completion of internship.

We wish her the very best in all her future endeavors.

Thanking You,

Dolphin Labs, Pune MSME MH26A 0017175

Chittaranjan Mahajan

CEO, Dolphin Labs, Pune

SHAMS
ENERGY

Certificate

Sr.No. SLR/21KOB/1939

This is to certify that

Mr./~~Mrs./Miss.~~ Nikhil Madhukar Bhosale has successfully completed an Implant training in "**Solar Technologies**" during the period from 01/09/2021 to 16/09/2021 in our company campus.

D.L.Khadem
Chief Trainer

Director
(Shams Energy)

SHAMS ENERGY

Training, Trading and Services

Certificate

Sr.No. SLR/21K08/1944

This is to certify that

Mr./~~Mrs./ Miss.~~ Amar Shrishail Chabukswar *has*

successfully completed workshop of **" Solar Technologies "** *during*

the period from 01/09/2021 *to* 16/09/2021

in college campus.

D.L. Khadem

Chief Trainer

Shams Energy Training, Trading Services

Director

(Shams Energy)

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SHAMS
ENERGY

Training, Trading and Services

Certificate

Sr.No. SLR/21K08/1949

This is to certify that

Mr./~~Mrs./Miss.~~ Audumbar kanifnath Chavan has successfully completed workshop of " **Solar Technologies** " during the period from 01/09/2021 to 16/09/2021 in college campus.

D.L.Khadem
Chief Trainer

Shams Energy Training, Trading, Services

Director
(Shams Energy)

Scanned with CamScanner

SHAMS ENERGY

Certificate

Sr.No. SLR/21K08/1948

This is to certify that

Mr./~~Mrs.~~/~~Miss.~~ Sandesh Subhash kale *has successfully completed an Implant training in* **" Solar Technologies "** *during the period from* 01/09/2021 *to* 16/09/2021 *in our company campus.*

D.L.khadem.
Chief Trainer

Shams Energy Training, Trading, Services

Director
(Shams Energy)

Scanned with CamScanner

SHAMS
ENERGY

Certificate

Sr.No.SLR/21K08/1951

This is to certify that

Mr./~~Mrs./ Miss.~~ Onkar Ashok Madgyal *has successfully completed an Implant training in* **"Solar Technologies"** *during the period from* 01/09/2021 *to* 16/09/2021 *in our company campus.*

D.L.Khadem
Chief Trainer

Shams Energy Training Centre

Director
(Shams Energy)

SHAMS
ENERGY

Certificate

Sr.No. SLR/21K08/1941

This is to certify that

Mr./Mrs./Miss. Shubham Navnath Pazbat has successfully completed an Implant training in "**Solar Technologies**" during the period from 01/09/2021 to 16/09/2021 in our company campus.

D.L Khadem
Chief Trainer

Director
(Shams Energy)

Scanned with CamScanner

SHAMS
ENERGY

Certificate

Sr.No. SLR/21K08/1928

This is to certify that

Mr./~~Mrs.~~/~~Miss.~~ Shubham Mahadev Patil *has successfully completed an Implant training in* "**Solar Technologies**" *during the period from* 01/09/2021 *to* 16/09/2021 *in our company campus.*

D.L. khadem.
Chief Trainer

Shams Energy Training Services

Director
(Shams Energy)

SHAMS
ENERGY

Certificate

Sr.No.SLR/21k08/1936

This is to certify that

Mr./~~Mrs./Miss.~~ Rahul laxman sing Rajput *has successfully completed an Implant training in* **" Solar Technologies "** *during the period from* 01/09/2021 *to* 16/09/2021 *in our company campus.*

D.L.khadem
Chief Trainer

Shams Energy Training, Service

Director
(Shams Energy)

SHAMS
ENERGY

Training, Trading and Services

Certificate

Sr.No. SLR/21K08/1947

This is to certify that

Mr./Mrs./Miss. Abhishek Jaysing Sathe has

successfully completed workshop of " Solar Technologies " during

the period from 01/09/2021 to 16/09/2021

in college campus.

R. L. Khadem
Chief Trainer

Director
(Shams Energy)

SHAMS ENERGY

Certificate

Sr.No.SLR/21K08/1933

This is to certify that

Mr./~~Mrs./Miss.~~ Sagar kalyandas Sawant has successfully completed an Implant training in **" Solar Technologies "** during the period from 01/09/2021 to 16/09/2021 in our company campus.

D.L.Khadem
Chief Trainer

Shams Energy Training, Trading, Services

Director
(Shams Energy)

Scanned with CamScanner

SHAMS
ENERGY
Training, Trading and Services

Certificate

Sr.No. SLR/21K08/1943

This is to certify that

Mr./Mrs./Miss. Mahendra Madhu Shripuram has

successfully completed workshop of " **Solar Technologies** " during

the period from 01/09/2021 to 16/09/2021

in college campus.

D.L. Khadem
Chief Trainer

Shams Energy Training, Services

Director
(Shams Energy)

REDMI NOTE 10 PRO MAX | MAHI

SHAMS
ENERGY

Certificate

Sr.No. SLR/21k08/1929

This is to certify that

Mr./~~Mrs.~~/~~Miss.~~ Suhas Shirish Umate *has successfully completed an Implant training in* **" Solar Technologies "** *during the period from* 01/09/2021 *to* 16/09/2021 *in our company campus.*

D.L.Khadem.
Chief Trainer

Shams Energy Training, Servicing

Director
(Shams Energy)

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SHAMS
ENERGY

Certificate

Sr.No. SLR/21K08/1930

This is to certify that

Mr./~~Mrs./Miss.~~ Pratik Balbhim Waghmode. has successfully completed an Implant training in **" Solar Technologies "** during the period from 01/09/2021 to 16/09/2021 in our company campus.

D.L.khadem.
Chief Trainer

Shams Energy Training Services

Director
(Shams Energy)

6. Internship

SVERI's
College of Engineering, Pandharpur.

Department of Mechanical Engineering

Internship Training Record

A.Y. 2021-22_Final Year B.Tech.

Sr. No.	Name of the Student	Division	Roll No.	Name and Address of Industry	Start Date of Internship Training Training (MM/DD/YYYY)	End Date of Internship Training Training (MM/DD/YYYY)
1	/Achugatla Komal Revansidheshwar	A	1	Intellipaat Software Solutions Pvt. Ltd. Bommanahalli Hosur Road Bangalore	1/24/2022	6/24/2022
2	/Gajakosh Shraddha Dattatray	A	2	Parth Valves and Hoses LLP, MIDC Chinchwad- Akurdi, Pune, Maharashtra.	3/16/2022	6/25/2022
3	/Joshi Gayatri Vinayak	A	3	Parth Valves and Hoses LLP, MIDC Chinchwad- Akurdi, Pune, Maharashtra.	3/16/2022	6/25/2022
4	/Lakheri Vaishnavi Mahesh	A	4	Kakade Agro Equipments , At Tandulwadi, Tah. Malshiras, Dist. Solapur	3/2/2022	6/30/2022
5	/Mirjkar Saleha Salim	A	5	Kakade Agro Equipments , At Tandulwadi, Tah. Malshiras, Dist. Solapur	3/2/2022	6/30/2022
6	/Parchandrao Madhuri Vinayak	A	6	Kakade Agro Equipments , At Tandulwadi, Tah. Malshiras, Dist. Solapur	3/2/2022	6/30/2022
7	/Parvat Namrata Raju	A	7	Intech Olympiad, Pune.	1/1/2022	7/15/2022
8	/Sathe Deepjyoti Dattatray	A	8	Sujay Industries PLOT G9, Phase III, MIDC, Chakan, Pune - 410501	3/15/2022	6/25/2022
9	/Tarapurkar Rutuja Suresh	A	9	Kalyani Technologies, Mundhawa - Pune	10/24/2021	4/27/2022
10	Admane Dhananjay Rajendra	A	10	RDL Auto Industries, Chincholi, Madha, Solapur.	3/2/2022	7/2/2022
11	Sul Amol Dhondiba	A	11	Wirpo Ltd. Pune.	3/4/2022	6/30/2022
12	Bansode Dnyaneshwar Rohidas	A	12	Top Gear Transmissions, MIDC, Satara, Maharashtra.	3/15/2022	7/15/2022
13	Jadhav Atish Balaso	A	13	NAWD Software Pvt. Ltd., Pune.	2/15/2022	6/17/2022
14	Burungale Bharat Dnyandev	A	14	Top Gear Transmissions, MIDC, Satara, Maharashtra.	3/15/2022	7/15/2022
15	Chavan Samarth Suresh	A	15	Tata Toyo Radiator, Hinjewadi, Mulshi, Pune.	3/17/2022	7/16/2022
16	Chavan Saurabh Chandrakant	A	16	Top Gear Transmissions, MIDC, Satara, Maharashtra.	3/15/2022	7/15/2022
17	Chavan Shreeyash Rajaram	A	17	Spartan Technologies pvt ltd, Mangalwedha-Solapur Road, Machnur, Maharashtra 413305	3/10/2022	7/10/2022
18	Chavan Yogesh Prakash	A	18	RDL Auto Industries, Chincholi, Madha, Solapur.	3/2/2022	7/2/2022
19	Chavare Sumeet Suhas	A	19	Kakade Agro Equipments , At Tandulwadi , Tah. Malshiras Dist. Solapur	3/2/2022	6/30/2022
20	Chitari Ghanasham Shashikant	A	20	Kakade Agro Equipments , At Tandulwadi , Tah. Malshiras Dist. Solapur	3/2/2022	6/29/2022
21	Dandage Omkar Babaso	A	21	Spartan Technologies pvt ltd, Mangalwedha-Solapur Road, Machnur, Maharashtra 413305	3/19/2022	6/23/2022
22	Deokar Onkar Rajendra	A	22	NAWD Software Pvt. Ltd., Pune.	2/15/2022	6/15/2022
23	Deshmukh Pruthviraj Somnath	A	23	Spartan Technologies pvt ltd, Mangalwedha-Solapur Road, Machnur, Maharashtra 413305	3/10/2022	7/10/2022

[Mr. A.A. Shinde.]
Internship Training
co-ordinator.

HEAD
Dept. of Mechanical Engg
C.O.E. Pandharpur

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College of Engineering, Pandharpur.

Department of Mechanical Engineering

Internship Training Record

A.Y. 2021-22_Final Year B.Tech.

Sr. No.	Name of the Student	Division	Roll No.	Name and Address of Industry	Start Date of Internship Training Training (MM/DD/YYYY)	End Date of Internship Training Training (MM/DD/YYYY)
24	Todkar Ganesh Shankar	A	24	Wipro Ltd. Pune.	8/3/2022	8/7/2022
25	Gadekar Yash Yuvraj	A	25	Atlas Copco Ltd. Dapodi, Pune.	4/12/2022	7/11/2022
26	Gaikwad Vaibhav Nanasaheb	A	26	FUEL, PUNE	2/1/2022	7/10/2022
27	Gaikwad Vaibhav Ramdas	A	27	V AND V Engineering Company Charholi, Pune 412105	3/10/2022	6/15/2022
28	Ghadage Prakash Bhimrao	A	28	NAWD Software Pvt. Ltd., Pune.	2/15/2022	6/17/2022
29	Shelar Yuvraj Vinod	A	29	Spartan Technologies pvt ltd, Mangalwedha-Solapur Road, Machnur, Maharashtra 413305	3/19/2022	6/23/2022
30	Satapute Rahul Rajaram	A	30	Verzeo edutech pvt ltd bangalore	3/3/2022	6/30/2022
31	Godse Rutik Ramesh	A	31	NAWD Software Pvt. Ltd., Pune.	2/15/2022	6/17/2022
32	Patil Rushikesh Vidyadhar	A	32	NAWD Software Pvt. Ltd., Pune.	2/15/2022	6/17/2022
33	Hambirrao Kiran Vinayak	A	33	Spartan Technologies pvt ltd, Mangalwedha-Solapur Road, Machnur, Maharashtra 413305	3/19/2022	6/23/2022
34	Jagadale Milind Shashikant	A	34	Spartan Technologies pvt ltd, Mangalwedha-Solapur Road, Machnur, Maharashtra 413305	3/19/2022	6/23/2022
35	Parchandrao Chandragupt V.	A	35	Kakade Agro Equipments At: Tandulwadi, P/T: Malshiras, Distribution.: Solapur, Maharashtra, 413310	3/2/2022	6/30/2022
36	Jatkar Prathamesh Manohar	A	36	Spartan Technologies pvt ltd, Mangalwedha-Solapur Road, Machnur, Maharashtra 413305	3/10/2022	6/25/2022
37	Joshi Atharv Santosh	A	37	Autocal Engineers Ltd, near Jayashree Takies, Pimpri-Chinchwad, Pune, Maharashtra.	3/2/2022	6/30/2022
38	Kadasare Saurabh Bandu	A	38	Autocal Engineers Ltd, near Jayashree Takies, Pimpri-Chinchwad, Pune, Maharashtra.	3/2/2022	6/30/2022
39	Kale Ayush Nitin	A	39	RDL Auto Industries, Chincholi, Madha, Solapur.	3/2/2022	7/2/2022
40	Khandagale Rohit Ananda	A	40	NTB International, Pune	2/1/2022	4/30/2022
41	Kirgat Prathmesh Ramesh	A	41	Autocal Engineers Ltd, near Jayashree Takies, Pimpri-Chinchwad, Pune, Maharashtra.	3/2/2022	6/30/2022
42	Kshirsagar Sachin Ashok	A	42	Spartan Technologies pvt ltd, Mangalwedha-Solapur Road, Machnur, Maharashtra 413305	3/10/2022	7/10/2022
43	Pansare Akshay Balasaheb	A	43	Shree Pandurang Sahakari Sakhar Karkhana, Shreepur , Malshiras, Solapur.	3/15/2022	6/15/2022
44	Misal Mangesh Mahavir	A	44	Spartan Technologies pvt ltd, Mangalwedha-Solapur Road, Machnur, Maharashtra 413305	3/10/2022	6/25/2022
45	More Suraj Dattatray	A	45	Spartan Technologies pvt ltd, Mangalwedha-Solapur Road, Machnur, Maharashtra 413305	3/10/2022	6/25/2022

[Mr. A. A. Shinde]
Internship Training
Co-ordinator.

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Department of Mechanical Engineering

Internship Training Record

A.Y. 2021-22_Final Year B.Tech.

Sr. No.	Name of the Student	Division	Roll No.	Name and Address of Industry	Start Date of Internship Training Training (MM/DD/YYYY)	End Date of Internship Training Training (MM/DD/YYYY)
46	Motewar Aditya Vyankatesh	A	46	Top Gear Transmissions, MIDC, Satara, Maharashtra.	3/15/2022	7/15/2022
47	Mundhe Nikhil Dilip	A	47	RDL Auto Industries, Chincholi, Madha, Solapur.	3/2/2022	7/2/2022
48	Narute Bhushan Narayan	A	48	Automotive Research Association of India (ARAI), Pune.	3/2/2022	6/30/2022
49	Waghmare Sachin Dattatray	A	49	RDL Auto Industries, Chincholi, Madha, Solapur.	3/2/2022	7/2/2022
50	Disale Pranay	A	50	ACME TOOLS, E-10/ 11/ 2, MIDC Bhosari, Pune-411026, Maharashtra, India	3/12/2022	6/28/2022
51	Mane-Deshmukh Samarth B.	A	51	V M Industries, Kolhapur.	3/10/2022	6/24/2022
52	Mohammad Sajid Khan	A	52	Jamkash Vehicleads Pvt. Ltd. Baripora, Handwara	2/25/2022	6/25/2022
53	Mujawar Nihal Yusuf	A	53	Kaizen Engineering India Private Limited, Chakan, Pune.	3/5/2022	6/20/2022
54	Mulani Irfan Rashid	A	54	Kaizen Engineering India Private Limited, Chakan, Pune.	3/5/2022	6/20/2022
55	Musale Prajwal Dattatraya	A	55	Rakuten India Enterprises Pvt. Ltd. Banglore	3/18/2022	7/17/2022
56	Nagargoje Rambhajee Ramchandra	A	56	Softtech Cloud Technologies, Near Sai Park, Dighi, Pune-411015.	2/10/2022	6/15/2022
57	Padage Pritam Balaji	A	57	Dudh Pandhari, Isbavi, Pandharpur, Maharashtra 413304.	2/15/2022	6/15/2022
58	Paras Mahavir Mule	A	58	Spark Avos Techno Llp, MIDC, Bhosari, Pune, Maharashtra 411026.	2/8/2022	6/15/2022
59	Pawar Shailesh Mahadev	A	59	V M Industries, Kolhapur.	3/10/2022	6/24/2022
60	Phalake Onkar Haridas	A	60	V M Industries, Kolhapur.	3/10/2022	6/24/2022
61	Ronge Vivek Dashrath	A	61	Shree Samarth Fabrication and Engineering Works, Palus, Sangli.	3/10/2022	6/30/2022
62	Sadul Sunil Ambadas	A	62	Shri Renuka Engineering Works, Akkalkot Rd, MIDC, Solapur, Maharashtra 413006.	3/15/2022	6/30/2022
63	Shaikh MdAazamEjaz Ahmed	A	63	Wipro Ltd. Pune.	3/4/2022	6/30/2022
64	Shikalgar Sohel Humayun	A	64	Shree Samarth Fabrication and Engineering Works, Palus, Sangli.	3/10/2022	6/30/2022
65	Somadale Pravin Dilip	A	65	V M Industries, Kolhapur.	3/10/2022	6/24/2022
66	Thorat Shashikant Dadarao	A	66	Qspider, Wakad, Pune.	3/16/2022	7/15/2022
67	Vairagkar Kanhaiya Sudarshan	A	67	Qspider, Wakad, Pune.	2/16/2022	6/30/2022
68	Wadekar Chaitanya Dattatray	A	68	Aarna Engineering, Shivraj industrial Spine city road Bhosari, Pune.	3/15/2022	6/15/2022
69	Patil Omkar Sanjay	A	69	V M Industries, Kolhapur.	3/10/2022	6/24/2022

[Mr. A.A. Shinde.]
Internship Training
Co-ordinator.

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Sr. No.	Name of the Student	Division	Roll No.	Name and Address of Industry	Start Date of Internship Training Training (MM/DD/YYYY)	End Date of Internship Training Training (MM/DD/YYYY)
70	Pavan Gavali Parit	A	70	Softtech Cloud Technology, Pune	3/5/2022	6/30/2022
71	Gawali Vinayak Shivaji	A	71	Spartan Technologies pvt ltd, Mangalwedha-Solapur Road, Machnur, Maharashtra 413305	3/19/2022	6/23/2022
72	Thomas Ashley A	A	72	Druidic Energy Pvt Ltd. Pathanamthita Kerala.	3/1/2022	6/30/2022
73	Shinde Ravikiran Tukaram	A	73	Shree Pandurang Sahakari Sakhar Karkhana, Shreepur , Malshiras, Solapur.	3/15/2022	6/15/2022
74	Vardole Ashutosh Ganesh	A	74	Newton's school, Bengaluru	12/20/2021	6/23/2022
75	Shendage Siddhanath Shahaji	A	75	Newton's school, Bengaluru	12/20/2021	6/20/2022
76	Waghmare Raj Vikas	A	76	Raja Software Labs, Pune	3/21/2022	6/21/2022
77	/Deshpande Samruddhi Rajendra	B	1	Intellipaat Software Solutions Pvt. Ltd. Bommanahalli Hosur Road Bangalore	1/24/2022	7/24/2022
78	/Ekatpure Prerana Shrirang	B	2	Shubhangad Industries, Akurdi, Pune	3/1/2022	6/30/2022
79	/Lale Arati Gajanan	B	3	Kakade Agro Equipments , At Tandulwadi , Tah. Malshiras Dist. Solapur	3/2/2022	6/30/2022
80	/More Vaishali Dilip	B	5	Shubhangad Industries. S. No. 64, Advani Oerlikon Rd, MIDC, Chinchwad, Pune, Maharashtra 411019	3/1/2022	6/30/2022
81	/Sonawane Dhanashree Bharat	B	6	Spartan Technologies pvt ltd, Mangalwedha-Solapur Road, Machnur, Maharashtra 413305	3/10/2022	6/25/2022
82	Sarwade Karuna Sunil	B	7	Samruddhi Engineers, gokul shirgaon. Kolhapur	4/1/2022	6/29/2022
83	Surve Prajakta Dharmraj	B	8	Kothari Agritech Pvt. Ltd. B-13, MIDC Tembhurni, Taluka, Madha, Maharashtra 413211	3/10/2022	6/26/2022
84	Bankar Adesh Gorakh	B	9	Skolar, ARK Tech Park Road, Hosur Rd, Garvebhavipalya, Krishna Reddy Industrial Area, Hosapalaya, Garvebhavi Palya, Bengaluru,	2/20/2022	6/20/2022
85	Bansode Aniket Annaso	B	10	Cooper standard India pvt.ltd Pune	3/10/2022	6/10/2022
86	Bapat Vinayak Vishnu	B	11	Shubhada Polymers Pvt. Ltd. Nangargaon, Lonavala, Maharashtra.	3/4/2022	7/2/2022
87	Bhosale Hritik Ramesh	B	12	Dr.Babasaheb Ambedkar Sahkari Sakhar Karkhana Ltd. Arvindnagar Post Keshegaon Dist:Osmanadbad	2/25/2022	6/25/2022
88	Bhosale Vaibhav Rajendra	B	13	Spartan Technologies pvt ltd, Mangalwedha-Solapur Road, Machnur, Maharashtra 413305	3/10/2022	6/25/2022
89	Deshmukh Pratik Pravin	B	14	Shree Pandurang Sahakari Sakhar Karkhana Shreepur, Solapur.	3/1/2022	6/30/2022
90	Dhotre Sourabh Sanjay	B	15	Vittalrao Shinde Sugar Works Ltd, Karkamb, Pandharpur.	2/25/2022	6/25/2022
91	Dixit Manthan Milind	B	16	S M Auto engineering. Pvt. Ltd. Nanekarwadi, Chankan, Pune.	3/10/2022	7/9/2022

[Mr. A. A. Shinde.]
Internship Training
Co-ordinator.

HEAD,
Dept. of Mechanical Engg
C.O.E. Pandharpur

SVERI's
College of Engineering, Pandharpur.

Department of Mechanical Engineering

Internship Training Record

A.Y. 2021-22_Final Year B.Tech.

Sr. No.	Name of the Student	Division	Roll No.	Name and Address of Industry	Start Date of Internship Training Training (MM/DD/YYYY)	End Date of Internship Training Training (MM/DD/YYYY)
92	Gaikwad Abhinay Rajendra	B	17	R. S. K. Cranes and Components, Chakan, Pune	3/2/2022	6/30/2022
93	Gavali Suraj Rajendra	B	18	Spartan Technologies pvt ltd, Mangalwedha-Solapur Road, Machnur, Maharashtra 413305	3/10/2022	6/25/2022
94	Waghmode Chetan Machchhindra	B	19	Wipro Ltd. Bangalore.	2/21/2022	4/30/2022
95	Waghmode Dhondiram Madhu	B	20	TATA Ficosa Automotive System private LTD chakan pune	3/1/2022	6/30/2022
96	Kadam Nilesh Sanjay	B	21	New Phaltan Sugar Works Distillery Division Limited. Surwadi – 415528 Tal. Phaltan, Dist. Satara	3/3/2022	6/23/2022
97	Khote Abhijeet Sunil	B	22	Spartan Technologies pvt ltd, Mangalwedha-Solapur Road, Machnur, Maharashtra 413305	3/10/2022	6/25/2022
98	Kulkarni Atharv Makarand	B	23	Cooper Standard India Pvt. Ltd. Pune.	3/10/2022	6/10/2022
99	Londhe Vaibhav Anil	B	24	Laxmi hydrolics pvt.Ltd, Chincholi, Solapur, Maharashtra .	2/25/2022	6/25/2022
100	Madane Avinash Ajinath	B	25	Spartan Technologies pvt ltd, Mangalwedha-Solapur Road, Machnur, Maharashtra 413305	3/10/2022	6/25/2022
101	Mali Amol Vijay	B	26	Spartan Technologies, Machnur, Mangalwedha.	3/10/2022	6/25/2022
102	Mashalkar Omkar Basavraj	B	27	Spartan Technologies pvt ltd, Mangalwedha-Solapur Road, Machnur, Maharashtra 413305	3/10/2022	6/25/2022
103	Metkari Om Damodar	B	28	Cooper Standard India Pvt Ltd, Pune	3/10/2022	6/10/2022
104	Mulani Aman Allauddin	B	29	Copper Standard India Pvt.Ltd. Pune	3/10/2022	6/10/2022
105	Nagtilak Harshal Rajendra	B	30	Spartan Technologies pvt ltd, Mangalwedha-Solapur Road, Machnur, Maharashtra 413305	3/10/2022	6/25/2022
106	Nanaware Jaydev Dipak	B	31	Cooper Standard India Pvt Ltd, Pune	3/10/2022	6/10/2022
107	Nikam Saurabh Sanjay	B	32	NAWD Software Pvt. Ltd., Pune.	2/15/2022	7/17/2022
108	Parmar Ridham Girish	B	33	Spartan Technologies pvt ltd, Mangalwedha-Solapur Road, Machnur, Maharashtra 413305	3/10/2022	7/10/2022
109	Patil Madan Kalyan	B	34	Cooper Standard India Pvt Ltd, Pune	3/10/2022	6/10/2022
110	Patil Santosh Hanamant	B	35	Cooper Standard India Pvt Ltd, Pune	3/10/2022	6/10/2022
111	Patil Yogesh Kumar	B	36	Spartan Technologies pvt ltd, Mangalwedha-Solapur Road, Machnur, Maharashtra 413305	3/10/2022	6/25/2022
112	Pawar Omkar Santosh	B	37	Wipro Ltd (Pune)	3/10/2022	5/31/2022
113	Pawar Shubham Uttam	B	38	Spartan Technologies, Machnur, Mangalwedha.	3/10/2022	6/25/2022
114	Rai Hrishav Raj	B	39	Atlas Copco Ltd. Dapodi, Pune.	4/12/2022	7/11/2022
115	Rohit Dattatry Chatage	B	40	Laxmi hydrolics pvt.Ltd, Chincholi, Solapur, Maharashtra .	2/25/2022	6/25/2022

[Mr A.A.Shinde]
Internship Training.
Co-ordinator.

HEAD
Dept. of Mechanical Engg
C.O.E. Pandharpur

SVERI's
College of Engineering, Pandharpur.

Department of Mechanical Engineering

Internship Training Record

A.Y. 2021-22_Final Year B.Tech.

Sr. No.	Name of the Student	Division	Roll No.	Name and Address of Industry	Start Date of Internship Training Training (MM/DD/YYYY)	End Date of Internship Training Training (MM/DD/YYYY)
116	Yasar Yusuf Khatik	B	41	Spartan Technologies pvt ltd, Mangalwedha-Solapur Road, Machnur, Maharashtra 413305	3/19/2022	6/23/2022
117	Sarak Kashiling Kalidas	B	42	Spartan Technologies pvt ltd, Mangalwedha-Solapur Road, Machnur, Maharashtra 413305	3/19/2022	6/23/2022
118	Saravale Aniket Rajkumar	B	43	Spartan Technologies pvt ltd, Mangalwedha-Solapur Road, Machnur, Maharashtra 413305	3/10/2022	6/25/2022
119	Shaikh Aftab Bashir	B	44	R. S. K. Cranes and Components, Chakan, Pune	3/2/2022	6/30/2022
120	Shaikh Salim Husen	B	45	Spartan Technologies pvt ltd, Mangalwedha-Solapur Road, Machnur, Maharashtra 413305	3/10/2022	6/25/2022
121	Shinde Dipak Pandurang	B	46	Spartan Technologies pvt ltd, Mangalwedha-Solapur Road, Machnur, Maharashtra 413305	3/19/2022	6/23/2022
122	Shinde Nanasaheb Siddheshwar	B	47	M/S Loknete Baburao Patil Sugar Industries Limited Laxminagar , Angar Tal.Mohol , Dist.Solapur 413213	3/2/2022	6/30/2022
123	Shinde Vishwajit Ashok	B	48	Kakade Agro Equipments At: Tandulwadi, P/T: Malshiras, Distribution.: Solapur, Maharashtra, 413310	3/2/2022	6/30/2022
124	Shitole Dnyaneshawr Ganpat	B	49	Sai Engineering Works SN40,Keshav Nagar , Pawar Vasti , Mundhwa Pune - 411036	3/1/2022	6/30/2022
125	Ubale Harshvardhan Sudhir	B	50	Spartan Technologies pvt ltd, Mangalwedha-Solapur Road, Machnur, Maharashtra 413305	3/10/2022	6/25/2022
126	Taur Mohit Nagesh	B	51	Phadtare Fabtech Pvt. Ltd. Gokhli, Indapur, Near Sonai Dairy, ,Pune, Maharashtra	3/1/2022	6/29/2022
127	Kengar Sachin Uttam	B	52	Bhairavnath Sugar Works Ltd. Alegan, Solapur.	3/10/2022	6/25/2022
128	Langote Krishana Suryakant	B	53	Bhairavnath Sugar Works Ltd. Alegan, Solapur.	3/10/2022	6/25/2022
129	Vidhate Rohit Dattatraya	B	54	Spartan Technologies pvt ltd, Mangalwedha-Solapur Road, Machnur, Maharashtra 413305	3/10/2022	6/25/2022
130	Wadekar Saurabh Ganesh	B	55	Utopian Sugars Ltd. Mangalvedha, Solapur.	3/10/2022	6/27/2022
131	Ajgar Akash Prasad	B	56	Classic Die Tools, Chakan MIDC, Pune	3/23/2022	6/23/2022
132	Autade Yogesh Samrut	B	57	Vertex Tecnosys, Near wit college, Solapur	3/28/2022	6/25/2022
133	Bagul Sandip Bhagwan	B	58	Vhaash Technologies Pvt.Ltd. Pune	3/21/2022	6/30/2022
134	Bhandare Pranav Milind	B	59	Qspider Technical Institute Deccan,Pune	3/7/2022	7/7/2022
135	Dhabade Avinash Basavraj	B	60	Santkrupa Engineering, Chincholi MIDC,Solapur	3/10/2022	6/30/2022
136	Dhere Rupesh Ambrushi	B	61	Minda Vast Access System Pvt. Ltd. B-21 M.I.D.C Chavan , AT Nighoje Kurali,Khed, Pune Manesar,Maharashtra.	3/10/2022	6/24/2022
137	Eakamalli Nitin Tatya	B	62	Santkrupa Engineering Works Solapur	3/10/2022	6/30/2022

[Mr. A A. Shinde.]
Internship Training Co-ordinator.

HEAD
Dept. of Mechanical Engg
C.O.E. Pandharpur

SVERI's
College of Engineering, Pandharpur.

Department of Mechanical Engineering

Internship Training Record

A.Y. 2021-22_Final Year B.Tech.

Sr. No.	Name of the Student	Division	Roll No.	Name and Address of Industry	Start Date of Internship Training Training (MM/DD/YYYY)	End Date of Internship Training Training (MM/DD/YYYY)
138	Gaikwad Saurabh Shahaji	B	63	Kaizen Engineering India pvt. Ltd, Chakan, Pune	4/20/2022	7/1/2022
139	Gangthade Vishal Ankush	B	64	Shree Samarth Fabricators and Engineering Works, Palus, Sangli.	3/10/2022	6/30/2022
140	Jadhav Sushant Bhausaheb	B	65	Qspider Wakad, Pune.	3/16/2022	6/22/2022
141	Jagtap Omkar Chandrakant	B	66	Technip Engineering Works Pvt. Ltd. Charted Coworks, Balewadi High St, Laxman Nagar, Balewadi, Pune, Maharashtra.	3/1/2022	6/28/2022
142	Koli Akash Revappa	B	67	Sai Enterprises, Bibavewadi-Pune	3/10/2022	6/24/2022
143	Lavate Dashrath Pandurang	B	68	Qspider Wakad, Pune.	3/16/2022	6/22/2022
144	Londhe Avinash Sandipan	B	69	Mahadev Fabrication & Engineering Works, Tembhurni.	3/10/2022	6/20/2022
145	Mane Akash Sambhaji	B	70	Kaizen Engineering (India) Pvt. Ltd. Chakan,pune.	5/2/2022	7/2/2022
146	Kale Onkar Mohon	B	71	Krushiraj Sugar PVT. LTD. Bhose (K), Tal.: Pandharpur	3/2/2022	6/25/2022
147	Deokar Shubham Bandu	B	72	Qspider Wakad, Pune.	3/16/2022	8/15/2022
148	Jagtap Vaibhav Sambhaji	B	73	Softtech Cloud Technologies, Near Sai Park, Dighi, Pune-411015.	3/5/2022	6/30/2022
149	Salgar Rohit Adinath	B	74	Newton School, Bengaluru	12/20/2021	7/20/2022
150	Walujkar Hrushikesh Santosh	B	75	Newton School, Bengaluru	12/20/2021	7/20/2022
151	Amit Mallhari Yele	B	76	Newton School, Bengaluru	12/20/2021	7/20/2022
152	Patwari Sumit Chandrakant	B	77	Newton School, Bengaluru	12/20/2021	7/20/2022
153	/Patil Harshada Bhausaheb	B	78	Ganraj Engineering, Kothrud, Pune.	3/3/2022	7/6/2022
154	Mali Sudarshan Ragunath	B	79	RSB Transmission India Pvt. Ltd, Nagar Road, Sanaswadi, Pune	3/10/2022	7/2/2022
155	Khandare Nilinand Manohar	B	80	NAWD Software Pvt. Ltd., Pune.	2/15/2022	6/15/2022

Mr. A. A. Shinde

Internship Training Co-Ordinator
Department of Mechanical engineering,
SVERI's COE Pandharpur.

Head
Department of Mechanical engineering,
SVERI's COE Pandharpur.

HEAD,
Dept. of Mechanical Engg.
C.O.E. Pandharpur

Floor TowerB, Hongasandra
Village, Bommanahalli Hosur Road
Bangalore – 560068
(M): +917022374614
www.intellipaat.com

Date: 25th June 2022

To Whomsoever It May Concern

This is to certify that **Ms. Komal Achugatla,** is pursuing her internship from **24th January 2022 to 25th June 2022.** She has completed **5 months** of Internship and the duration of the internship is of **6 months** from then. However, as requested by the college to confirm their Internship for their Final Viva. We hope this email assists with the same**.**

Yours Sincerely,
Intellipaat Software Solutions Pvt. Ltd.

Dewaker Singh Bisht
Director – Human Resources

Kakade Agro Equipments

(Manufacturer of All Kinds of Modern, Agro Sprayers and Equipments)
An ISO 9001: 2015 certified company
A/P: Near Shivaji Staschu Tandulwadi, Tah: Malshiras Dist: Solapur,
Contact: +917709685151,9503836313 Email:
kakadetoofanblowers@gmail.com

Date 30/06/2022

TO WHOM SO EVER IT MAY CONCERN

This is certify that **Miss. Lakheri Vaishnavi Mahesh** student of **SVERI's COLLEGE OF ENGG, PANDHARPUR** has successfully completed sponsored project titled **Design and Development of Welding Fixture of Air Assisted Sprayer Chassis**. At **Kakade Agro Equipment's**. During this period she gone through design and fabrication of sprayer's chassis.

During this periods their involvement was good, and we wish best luck for their bright future....

Mr . Subhash N Kakade, M. Tech Agril Engg. FMPE

M/s. KAKADE AGRO EQUIPMENTS

PROPRIETOR

Founder and Director

Kakade Agro Equipments
(Manufacturer of All Kinds of Modern, Agro Sprayers and Equipments)
An ISO 9001: 2015 certified company
A/P: Near Shivaji Staschu Tandulwadi, Tah: Malshiras Dist: Solapur,
Contact: +917709685151,9503836313 Email:
kakadetoofanblowers@gmail.com

Date :30/06/2021

Certificate

This is certify that **Miss. Lakheri Vaishnavi Mahesh** student of **SVERI's COLLEGE OF ENGG, PANDHARPUR** has done training of Manufacturing, assembling and testing of agro sprayers equipment's at our company from02/03/2022 to 30/06/2022.

During training her involvements was good, and we wish best luck to her for bright future....

Er. Subhash N Kakade, M. Tech Agril Engg. FMPE

M/s. KAKADE AGRO EQUIPMENTS

PROPRIETOR

Founder

Internship and SponsershipTraining Completion Certificate:

Kakade Agro Equipments
(Manufacturer of All Kinds of Modern, Agro Sprayers and Equipments)
An ISO 9001: 2015 certified company
A/P: Near Shivaji Staschu Tandulwadi, Tah: Malshiras Dist: Solapur,
Contact: +917709685151,9503836313 Email:
kakadetoofanblowers@gmail.com

Date :30/06/2021

Certificate

This is certify that **Miss. Mirjkar Saleha Salim** student of **SVERI's COLLEGE OF ENGG, PANDHARPUR** has done training of Manufacturing, assembling and testing of agro sprayers equipment's at our company from02/03/2022 to 30/06/2022.

During training her involvements was good, and we wish best luck to her for bright future....

Er. Subhash N Kakade, M. Tech Agril Engg. FMPE

M/s. KAKADE AGRO EQUIPMENTS

PROPRIETOR

Founder

Kakade Agro Equipments
(Manufacturer of All Kinds of Modern, Agro Sprayers and Equipments)
An ISO 9001: 2015 certified company
A/P: Near Shivaji Staschu Tandulwadi, Tah: Malshiras Dist: Solapur,
Contact: +917709685151,9503836313 Email:
kakadetoofanblowers@gmail.com

Date 30/06/2022

TO WHOM SO EVER IT MAY CONCERN

This is certify that **Miss. Mirjkar Saleha Salim** student of **SVERI's COLLEGE OF ENGG, PANDHARPUR** has successfully completed sponsored project titled **Design and Development of Welding Fixture of Air Assisted Sprayer Chassis**. At **Kakade Agro Equipment's**. During this period she gone through design and fabrication of sprayer's chassis.

During this periods their involvement was good, and we wish best luck for their bright future....

Mr . Subhash N Kakade, M. Tech Agril Engg. FMPE

M/s. KAKADE AGRO EQUIPMENTS

PROPRIETOR

Founder and Director

M/S Kakade Agro Equipments, near to shivaji stachu, Tandulwadi, Tah: Malshiras , Dist :olapur 413310, MH. 7709685151, kakadesn@gmail.com, www.kakadeagro.com

Kakade Agro Equipments
(Manufacturer of All Kinds of Modern, Agro Sprayers and Equipments)
An ISO 9001: 2015 certified company
A/P: Near Shivaji Staschu Tandulwadi, Tah: Malshiras Dist: Solapur,
Contact: +917709685151,9503836313 Email:
kakadetoofanblowers@gmail.com

Date 30/06/2022

TO WHOM SO EVER IT MAY CONCERN

This is certify that **Miss. Parchandrao Madhuri Vinayak** student of **SVERI's COLLEGE OF ENGG, PANDHARPUR** has successfully completed sponsored project titled **Design and Development of Welding Fixture of Air Assisted Sprayer Chassis**. At **Kakade Agro Equipment's**. During this period she gone through design and fabrication of sprayer's chassis.

During this periods their involvement was good, and we wish best luck for their bright future....

Mr . Subhash N Kakade, M. Tech Agril Engg. FMPE

M/s. KAKADE AGRO EQUIPMENTS

PROPRIETOR

Founder and Director

Kakade Agro Equipments
(Manufacturer of All Kinds of Modern, Agro Sprayers and Equipments)
An ISO 9001: 2015 certified company
A/P: Near Shivaji Staschu Tandulwadi, Tah: Malshiras Dist: Solapur,
Contact: +917709685151,9503836313 Email:
kakadetoofanblowers@gmail.com

Date :30/06/2021

Certificate

This is certify that **Miss. Parchandrao Madhuri Vinayak** student of **SVERI's COLLEGE OF ENGG, PANDHARPUR** has done training of Manufacturing, assembling and testing of agro sprayers equipment's at our company from02/03/2022 to 30/06/2022.

During training her involvements was good, and we wish best luck to her for bright future....

Er. Subhash N Kakade, M. Tech Agril Engg. FMPE

M/s. KAKADE AGRO EQUIPMENTS

PROPRIETOR

Founder

Virtual Labs
An MoE Govt of India Initiative

INTECH OLYMPIAD

ONLINE INTERNSHIP

CERTIFICATE

This is to certify that

Mr /Mrs / Ms **Namrata Parvat**

participated and successfully completed the project " **Build a smart segregation system for municipal solid waste collection truck** " assigned in InTech Olympiad during Online internship from 1st January 2022 to 15th July 2022

Mr. Mahesh A. Kulkarni
AFour Technologies

Prof. Sudhir D. Agashe
COEP

AFOUR TECHNOLOGIES

SUJAY INDUSTRIES

(Unit : III)

Manufacturer of Sheet Metal Press Components, Jigs, Fixtures, Press Tools, & Engg. Goods.

Plot No. G-9/3/3, G-Block, Phase - III, MIDC Chakan, Pune - 410 501 : 8888818629

Email : sujayind.pune@gmail.com | sujay[redacted]@sujayind.com

Date :- 29.06.2022

TO WHOM IT MAY CONCERN

This is to certify that **Miss. Deepjyoti Dattatray Sathe** student of Mechanical Engineering from **SVERI's College of Engineering Pandharpur**, has successfully completed Internship Training program at **Sujay Industries, Chakan** from 15/03/2022 to 25/06/2022.

We wish her all the best in her future endeavours.

Date:

Sujay Industries

SUJAY INDUSTRIES (Unit - III) M.I.D.C., CHAKAN

Authorized Signatory

Scanned with CamScanner

CONFIDENTIAL

KALYANI STRATEGIC MANAGEMENT SERVICES

(Formerly KALYANI TECHNOLOGIES)

KSMSL/HR/2021-22/10 **13- Oct-2021**

Internship Offer Letter

Dear Mr. Rutuja Tarapurkar,

With reference to the subsequent interview you had with us, we are pleased to offer you the 'Technical Internship Programme' in our organization for 6 months.

You will be paid stipend of Rs.12,000/-(Rupees Twelve Thousand) per month.

The Appointment Letter will be issued to you after joining our organization. You are requested to join on **25 -Oct-2021.**

For Kalyani Strategic Management Services Ltd.

Yogesh Zope
CEO

At the time of joining you have to submit self-attested photocopy of following documents: -

1) Age Proof 2) Address Proof 3) Letter of recommendation from institute 4) Photo: I card Size, 5) Medical Fitness Certificate alongwith Covid-19 Vaccination 2nd Dose certificate.

KALYANI

RDL Auto Industries
G.No/H.No-449/1B.Chincholi. Madha Dist- Solapur
GENUINE FIBER PARTS GSTIN:. 27AEQPL6967F1ZU
Mob no. 09552702128
Email:-newshivkrupa9850@gmail.com

Date: 04/ 07/ 2022

Certificate

This is certify that Mr. **Dhananjay Rajendra Admane** (Roll no.- **201803250024390 3**) pursuing B.Tech (Mechanical Engineering) from SVERI'S College of Engineering Pandharpur, has undergone Internship at **RDL Auto Industries**, during the period from 2nd March to 2nd July 2022.

During the above period his conduct & character were found Very Good. We wish him all success in all future endeavors.

Authorised

PLACE:-

RDL AUTO INDUSTRIES
A/p. Chincholi, Tal. Madha
Dist. Solapur - 413208

TOP GEAR TRANSMISSIONS
M-70, Additional M.I.D.C., SATARA 415004.
MOB:9158006361,9158006344,9158006386
Email: hradmin@topgeartransmission.com

Date 15.03.2022

To,
Mr.Dnyaneshwar Rohidas Bansode
Mr.Aditya Vyankatesh Motewar
Mr.Bharat Dnyandev Burungale
Mr.Saurabh Chandrakant Chavan
College of Engineering Pandhapur

Internship letter

In reference to your applicaton we would like congratulated you on being selected for internship with Top Gear Transmissions, You will be based at our Satara office. Your internship is scheduled to start effective 15.03.2022 for period for 120 Days.

Pleaase note that this is not an employment contract and does not entitle for any benefits associated to the employment. The internship can he terminated at any given point in time.

For,Top Gear Transmission

G.M.HR.

NAWD SOFTWARE PVT. LTD.
Pune & Ahmednagar, Maharashtra
Gov.Reg.No.:- MH01D0020483

Date:- 20/06/2022

Internship Certificate

This is to certify **that Mr. Atish Balaso Jadhav** has done his internship in Full Stack Web Developer at **NAWD Software Pvt. Ltd**, Ahmednagar from **15 Feb 2022 to 17 June 2022**.

He had worked on a project titled **"Employee Details".** This project has mainly covered information of the customers, In this system have developed all types of CRUD.

During the internship he demonstrated good design skills with a self-motivated attitude to learn new things. His performance exceeded expectations and was able to complete the project successfully on time.

We wish him all the best for his future endeavors.

NAWD SOFTWARE PVT. LTD. AHMEDNAGAR

FOR NAWD SOFTWARE PVT. LTD.

Adm.Assistant

Mob.:- 935 971 6081 Website:- www.nawdsoftware.co.in Email:- info@nawdsoftware.co.in

nawd_software nawdsoftware nawd-software-prv-ltd nawdsoft

Internship Training Completion Certificate:

TOP GEAR TRANSMISSIONS
M-70, Additional M.I.D.C., SATARA 415004.
MOB:9158006361,9158006344,9158006386
Email: hradmin@topgeartransmission.com

Date 15.03.2022

To,
Mr.Dnyaneshwar Rohidas Bansode
Mr.Aditya Vyankatesh Motewar
Mr.Bharat Dnyandev Burungale
Mr.Saurabh Chandrakant Chavan
College of Engineering Pandhapur

Internship letter

In reference to your applicaton we would like congratulated you on being selected for internship with Top Gear Transmissions, You will be based at our Satara office. Your internship is scheduled to start effective 15.03.2022 for period for 120 Days.

Pleaase note that this is not an employment contract and does not entitle for any benefits associated to the employment. The internship can he terminated at any given point in time.

For,Top Gear Transmission

G.M.HR.

Internship Training Completion Certificate:

TOP GEAR TRANSMISSIONS
M-70, Additional M.I.D.C., SATARA 415004.
MOB:9158006361,9158006344,9158006386
Email: hradmin@topgeartransmission.com

Date 15.03.2022

To,
Mr.Dnyaneshwar Rohidas Bansode
Mr.Aditya Vyankatesh Motewar
Mr.Bharat Dnyandev Burungale
Mr.Saurabh Chandrakant Chavan
College of Engineering Pandhapur

Internship letter

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Pleaase note that this is not an employment contract and does not entitle for any benefits associated to the employment. The internship can he terminated at any given point in time.

For,Top Gear Transmission

G.M.HR.

Arunoday Enterprises

Address: 1243/35 Shivaji Udyamnagar,
Kolhapur-416008.
Email : info@arunodayenterprises.com
Contact : +91 9028216691 , 7741034774

Authorized Channel Partner for Siemens PLM Softwares

Date : 11/07/2022

TO WHOM SO EVER IT MAY CONCERN

This is to certify that **Mr. Chavan Shreeyash Rajaram** of **SVERI's College of Engineering , Pandharpur** has completed 120 days Internship training at **Arunoday Enterprises, Kolhapur** from 10/03/2022 to 10/07/2022. During this internship he has gone through hands on practices on 3D printing as well as 3D modeling.

During the period of internship , we found him sincere and hard working. We wish him all the best for all their future endeavors.

Date : 11/07/2022

Arunoday Enterprises

ARUNODAY ENTERPRISES * KOLHAPUR *

Authorized Signatory

Internship Training Completion Certificate:

RDL Auto Industries
G.No/H.No-449/1B.Chincholi. Madha Dist- Solapur
GENUINE FIBER PARTS GSTIN:. 27AEQPL6967F1ZU
Mob no. 09552702128
Email:-newshivkrupa9850@gmail.com

Date: 04/ 07/ 2022

Certificate

This is certify that Mr. **Yogesh Prakash Chavan** (Roll no.- **2018032500245086**) pursuing B.Tech (Mechanical Engineering) from SVERI'S College of Engineering Pandharpur, has undergone Internship at **RDL Auto Industries**, during the period from 2nd March to 2nd July 2022.

During the above period his conduct & character were found Very Good. We wish him all success in all future endeavors.

PLACE:-

Authorised

RDL AUTO INDUSTRIES
A/p. Chincholi, Tal. Madha
Dist. Solapur - 413208

Kakade Agro Equipments
(Manufacturer of All Kinds of Modern, Agro Sprayers and Equipments)
An ISO 9001: 2015 certified company
A/P: Near Shivaji Staschu Tandulwadi, Tah: Malshiras Dist: Solapur,
Contact: +917709685151,9503836313 Email:
kakadetoofanblowers@gmail.com

Date :30/06/2021

Certificate

This is certify that **Mr. Ghanasham Shashikant Chitari** student of **SVERI's COLLEGE OF ENGG, PANDHARPUR** has done training of Manufacturing, assembling and testing of agro sprayers equipment's at our company from02/03/2022 to 30/06/2022.

During training his involvements was good, and we wish best luck to his for bright future....

Er. Subhash N Kakade, M. Tech Agril Engg. FMPE

M/s. KAKADE AGRO EQUIPMENTS
Founder

PROPRIETOR

Scanned with CamScanner

SPARTAN TECHNOLOGIES PVT LTD

An ISO 9001 : 2015Certified Company
Gat No. 468/2 Mundhewadi Road, A-Machnur,P-Bramhpuri,Mangalwedha 413305, Dist-Solapur,Maharashtra.
www.spartansolartechnologies.com E.mail-info@spartansolartechnologies.com

Ref: SST/SL2022/06 **Date- 23/06/2022**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. Omkar Babaso Dandage** of **SVERI's College Of Engineering Pandharpur** has done his internship in "Solar Equipment Design And Making" at SPARTAN SOLAR TECHNOLOGIES, Mangalwedha, from 19th March 2022 to 23rd June 2022.

During his internship he has demonstrated his skills with self-motivation to learn new skills. His performance exceeded our expectations and he was able to complete the project on time.

We wish him all the best for his upcoming career.

For SPARTAN TECHNOLOGIES PVT. LTD,

Dhiraj Doke
[Chief Product Officer]

Suraj Doke
[Founder-Director]

Spartan Technologies Pvt.Ltd.
Machnur, Ta... Mangalwed...
Dist. So...

NAWD SOFTWARE PVT. LTD.
Pune & Ahmednagar, Maharashtra
Gov.Reg.No.:- MH01D0020483

Date:- 20/06/2022

Internship Certificate

This is to certify **that Mr. Omkar Rajendra Devokar** has done his internship in Full Stack Web Developer at **NAWD Software Pvt. Ltd**, Ahmednagar from **15 Feb 2022 to 17 June 2022**.

He had worked on a project titled **"Employee Details".** This project has mainly covered information of the customers, In this system have developed all types of CRUD.

During the internship he demonstrated good design skills with a self-motivated attitude to learn new things. His performance exceeded expectations and was able to complete the project successfully on time.

We wish him all the best for his future endeavors.

NAWD SOFTWARE PVT. LTD. AHMEDNAGAR

FOR NAWD SOFTWARE PVT. LTD.

Adm.Assistant

Mob.:- 935 971 6081 Website:- www.nawdsoftware.co.in Email:- info@nawdsoftware.co.in

nawd_software nawdsoftware nawd-software-prv-ltd nawdsoft

Arunoday Enterprises

Address: 1243/35 Shivaji Udyamnagar,
Kolhapur-416008.
Email : info@arunodayenterprises.com
Contact : +91 9028216691 , 7741034774

Authorized Channel Partner for Siemens PLM Softwares

Date : 11/07/2022

TO WHOM SO EVER IT MAY CONCERN

This is to certify that **Mr. Deshmukh Pruthviraj Somnath** of **SVERI's College of Engineering , Pandharpur** has completed 120 days Internship training at **Arunoday Enterprises, Kolhapur** from 10/03/2022 to 10/07/2022. During this internship he has gone through hands on practices on 3D printing as well as 3D modeling.

During the period of internship , we found him sincere and hard working. We wish him all the best for all their future endeavors.

Date : 11/07/2022

Arunoday Enterprises

ARUNODAY ENTERPRISES KOLHAPUR

Authorized Signatory

March 8, 2022

Dear Ganesh Todkar,

Sub: Letter of Engagement as Intern

We are pleased to inform you that you have been selected for undergoing Internship in our organization Wipro Limited (Wipro) as Intern under the following terms and conditions:

1. Nature of Engagement

You will be engaged as an **Intern at Wipro.**

2. Duration of training

The duration of **internship** will be 10 to 16 weeks starting from March 10th. During this period, Wipro shall evaluate your performance. Unless Wipro extends the period of internship, in writing, solely at its discretion, your internship shall automatically stand terminated at the expiry of the internship period.

3. Verification Report

Your engagement with Wipro will be subject to receipt of satisfactory report with regard to verification of the particulars furnished by you in your application and information given at the time of Interview. If any declaration or information furnished to Wipro proves to be false or if you have wilfully suppressed any material information, in such case, you will be liable to removal from training without any notice.

4. Obligations and Responsibilities

a. During your internship period, Wipro expects you to undergo training in any department / section in which you are placed with high standard of initiative and efficiency. You shall devote yourself exclusively for undergoing training. You shall not take up any other work for remuneration (part-time or otherwise) or work on advisory capacity or be interested directly or indirectly in any other trade or business (except as share-holder or debenture holder) during the training period without obtaining permission in writing from the appointing authority at Wipro. You will be governed by the service rules / standing orders, policies and regulations as may be promulgated by Wipro from time to time in relation to conduct, discipline and other matters. You will not seek membership of any local or public bodies without first attaining specific permission from the appointing authority at Wipro. You are expected to comply with the policies of Wipro including the Code of Business Conduct and other policies of Wipro as they form an integral part of the terms of your training with Wipro.

   Consequently, you are required to understand the scope and intent behind these policies and to comply with the same. These Policies are updated / modified on a periodic basis and new Policies may be introduced and notified to employees/trainees from time to time and you will be required to comply with the same. Any matter or situation or incident that may arise that could potentially result, or has resulted, in any violation of the Policies or the terms of your employment, shall immediately be brought to the notice of Wipro and appropriate disciplinary action will be initiated.

b. During the training period, if you conceive any new or advanced method of improving processes / formulae / systems in relation to the Business or Trade of Wipro, such developments will be fully communicated to Wipro and will be the sole property of Wipro. In consideration of the opportunities, training and access to new techniques and know-how that will be made available to you, you will be required to comply with the Confidentiality Policy of Wipro. Therefore, please maintain all Confidential Information as defined from time to time in the Confidentiality Policy of Wipro, as secret and confidential and do not use or disclose any such Confidential Information except as may be required

under obligation of law or as may be required by Wipro and in the course of your training. This covenant shall endure during your training and beyond the cessation of your training with Wipro.

c. During the training period and thereafter, you will not pass onto anyone in writing or by word of mouth or otherwise, particulars or details of work, processes, technical know-how, research carried out, security arrangements, administrative and organization matters of confidential or secret nature, which you may come across during your training period or become known to you by virtue of your undergoing training in Wipro or otherwise.

d. In connection with your internship and during the term of your internship, upon conception or creation, you shall disclose and assign to Wipro as its exclusive property, all inventions, ideas, concepts, discoveries, techniques, and improvements (including without limitation legal documents, training materials, computer software and associated materials) developed or conceived by you solely or jointly with others (whether or not during business hours), and shall comply with the Policies of Wipro in relation to Intellectual Property.

5. Posting

During your training period, you are liable to be transferred or assigned to training in any division / department / establishment or location at which Wipro or its associate companies have their offices or operation and whether at present existing or which may be set up in future at any time and at any place in India, without any increase in stipend. On such posting, you will be governed by the policies, rules and regulations as applicable in that Unit / Branch / Establishment.

6. Travel

You will be required to undertake travel as required by Wipro and you will be paid travel expenses as per Wipro rules.

7. Termination

Notwithstanding any of the clauses of this letter of engagement, Wipro reserves the right in its sole discretion of terminating this agreement during the training period without assigning any reason by giving one week’s (7 days) notice or payment of one week’s stipend, in lieu of notice.

8. Training Hours and Holidays

As an intern you will be called upon to undergo training during the hours and days as may be fixed by Wipro. Normally all Sundays will be weekly holidays together with all National and Festival Holidays observed by the establishment.

9. After completion / termination of internship

On completion / termination of internship, you will immediately surrender to Wipro all specifications, documents, literature, drawings, records etc. belonging to Wipro or relating to its Businesses and shall not take or retain any copies of the said items.

10. Date of commencement of training

In case the above terms and conditions are acceptable to you, you are required to return the duplicate copy of this letter of engagement within one week, duly signed by you, in token of your acceptance of the offer and report for training on or before the date of commencement of training. While reporting for training, please bring 3 copies of your latest passport size photographs and two copies each of your certificates and testimonials along with the originals. The original certificates will be returned to you after verification.

Yours sincerely,
For Wipro Limited,

Aparna Shailen
General Manager - Human Resources

Endorsement:

Atlas Copco

Date: 29/06/2022

Dear **Yash Gadekar**

In reference to your application we would like to congratulate you on being selected for internship with **Atlas Copco (I) Limited** based at **Dapodi, Pune.** Your training has been scheduled to start effective **18th MAY - 17th AUGUST** for a period of 3 months.

Thanks and Regards,
For Atlas Copco (India) Ltd.

Shruti Devarde
Assistant Manager Human Resources
Product Company, Dapodi.

Atlas Copco (India) Ltd.
Sveanagar
Mumbai - Pune Road
Dapodi Pune 411 012
Reach us @ 1800 200 0030

Telephone : +91 - 20 - 39852455/39852100
Fax : +91 - 20 - 27147928
Website : www.atlascopco.in

CIN : U27106PN1960PLC020566

Registered Office :
Sveanagar
Mumbai - Pune Road
Dapodi, Pune 411 012

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Certificate

OF COMPLETION

PROUDLY PRESENTED TO

Vaibhav Nanasaheb Gaikwad.

Has successfully completed Future Skills Training in PYTHON along with Aptitude and Personality Development Training

The candidate is awarded this certificate post completion of mandatory training.

Ketan Deshpande
Chairman FUEL, Ashoka Fellow
Fellow JBS, University of Cambridge

Santosh Huralikoppi
Chief Mentor FUEL, Fellow JBS,
University of Cambridge

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E-Mail -vandvengineering7@gmail.com

Date: -15/06/2022

Sub.: Internship Completion Letter

We are glad to inform you that **Mr.Vaibhav Ramdas Gaikwad** (Roll no. **2018032500244005**)from **SVERI'S College Of Engineering ,Pandharpur (Solapur University)** has successfully completed his internship at **V And V Engineering** from **10th March** to **15th June 2022**.

During his internship he was exposed to the various activities in **CNC Machining.**

We found him extremely inquisitive and hard working . He was very much interested to learn the functions of our core division and also willing to put his best efforts and get into the depth of the subject to understand it better .

His association with us was very fruitful and we wish him all the best in his future endeavors.

For V And V Engineering

V AND V ENGINEERING

Authorized Signatory

NAWD SOFTWARE PVT. LTD.
Pune & Ahmednagar, Maharashtra
Gov.Reg.No.:- MH01D0020483

Date:- 20/06/2022

Internship Certificate

This is to certify **that Mr. Prakash Bhimrao Ghadage** has done his internship in Full Stack Web Developer at **NAWD Software Pvt. Ltd**, Ahmednagar from **15 Feb 2022 to 17 June 2022**.

He had worked on a project titled **"Employee Details".** This project has mainly covered information of the customers, In this system have developed all types of CRUD.

During the internship he demonstrated good design skills with a self-motivated attitude to learn new things. His performance exceeded expectations and was able to complete the project successfully on time.

We wish him all the best for his future endeavors.

NAWD SOFTWARE PVT. LTD. AHMEDNAGAR

FOR NAWD SOFTWARE PVT. LTD.

Adm.Assistant

Mob.:- 935 971 6081 Website:- www.nawdsoftware.co.in Email:- info@nawdsoftware.co.in

nawd_software nawdsoftware nawd-software-prv-ltd nawdsoft

verzeo
learn here lead any where

CERTIFICATE

This is to certify that **Mr.satapute Rahul Rajaram** (Roll no-**2018032500244663**) pursuing **B.Tech (Mechanical Engineering)** from **SVERI'S College of Engineering Pandharpur**, has undergone internship at **VERZEO EDUTECH PRIVATE LIMITED BENGALORE.**

He Successfully Completed an internship Program from **03/03/2022** to **28/06/2022.**

During the internship,the student was found to be dedicated, hardworking,and diligent.

Date :- 28/06/2022

Ajay Billav
Asst Vp Operations

NAWD SOFTWARE PVT. LTD.
Pune & Ahmednagar, Maharashtra
Gov.Reg.No.:- MH01D0020483

Date:- 20/06/2022

Internship Certificate

This is to certify **that Mr. Rutik Ramesh Godse** has done his internship in Full Stack Web Developer at **NAWD Software Pvt. Ltd**, Ahmednagar from **15 Feb 2022 to 17 June 2022**.

He had worked on a project titled **"Employee Details".** This project has mainly covered information of the customers, In this system have developed all types of CRUD.

During the internship he demonstrated good design skills with a self-motivated attitude to learn new things. His performance exceeded expectations and was able to complete the project successfully on time.

We wish him all the best for his future endeavors.

NAWD SOFTWARE PVT. LTD. AHMEDNAGAR

FOR NAWD SOFTWARE PVT. LTD.

Adm.Assistant

Mob.:- 935 971 6081 Website:- www.nawdsoftware.co.in Email:- info@nawdsoftware.co.in

nawd_software nawdsoftware nawd-software-prv-ltd nawdsoft

Internship Training Completion Certificate:

NAWD SOFTWARE PVT. LTD.
Pune & Ahmednagar, Maharashtra
Gov.Reg.No.:- MH01D0020483

Date:- 20/06/2022

Internship Certificate

This is to certify **that Mr. Rushikesh Vidyadhar Patil** has done his internship in Full Stack Web Developer at **NAWD Software Pvt. Ltd**, Ahmednagar from **15 Feb 2022 to 17 June 2022**.

He had worked on a project titled **"Employee Details".** This project has mainly covered information of the customers, In this system have developed all types of CRUD.

During the internship he demonstrated good design skills with a self-motivated attitude to learn new things. His performance exceeded expectations and was able to complete the project successfully on time.

We wish him all the best for his future endeavors.

NAWD SOFTWARE PVT. LTD. AHMEDNAGAR

FOR NAWD SOFTWARE PVT. LTD.

Adm.Assistant

Mob.:- 935 971 6081 Website:- www.nawdsoftware.co.in Email:- info@nawdsoftware.co.in

nawd_software nawdsoftware nawd-software-prv-ltd nawdsoft

SPARTAN TECHNOLOGIES PVT LTD

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www.spartansolartechnologies.com E.mail-info@spartansolartechnologies.com

Ref: SST/SL2022/07 **Date- 23/06/2022**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. Kiran Vinayak Hambirrao** of **SVERI's College Of Engineering Pandharpur** has done his internship in "Solar Equipment Design And Making" at SPARTAN SOLAR TECHNOLOGIES, Mangalwedha, from 19th March 2022 to 23rd June 2022.

During his internship he has demonstrated his skills with self-motivation to learn new skills. His performance exceeded our expectations and he was able to complete the project on time.

We wish him all the best for his upcoming career.

For SPARTAN TECHNOLOGIES PVT. LTD,

Dhiraj Doke
[Chief Product Officer]

Suraj Doke
[Founder-Director]

Spartan Technologies Pvt.Ltd.
Machnur, Ta. Mangalwedha
Dist. Solapur

SPARTAN TECHNOLOGIES PVT LTD

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www.spartansolartechnologies.com E.mail-info@spartansolartechnologies.com

Ref: SST/SL2022/05 **Date- 23/06/2022**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. Milind Shashikant Jagadale** of **SVERI's College Of Engineering Pandharpur** has done his internship in "Solar Equipment Design And Making" at SPARTAN SOLAR TECHNOLOGIES, Mangalwedha, from 19th March 2022 to 23rd June 2022.

During his internship he has demonstrated his skills with self-motivation to learn new skills. His performance exceeded our expectations and he was able to complete the project on time.

We wish him all the best for his upcoming career.

For SPARTAN TECHNOLOGIES PVT. LTD,

Dhiraj Doke
[Chief Product Officer]

Suraj Doke
[Founder-Director]

Spartan Technologies Pvt.Ltd.
Machnur, Tal. Mangalwedha
Dist. Solapur

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Contact: +917709685151,9503836313 Email:
kakadetoofanblowers@gmail.com

Date :30/06/2021

Certificate

This is certify that **Mr. Chandragupta Vinayak Parchandrao** student of **SVERI's COLLEGE OF ENGG, PANDHARPUR** has done training of Manufacturing, assembling and testing of agro sprayers equipment's at our company from02/03/2022 to 30/06/2022.

During training his involvements was good, and we wish best luck to his for bright future....

Er. Subhash N Kakade, M. Tech Agril Engg. FMPE

M/s. KAKADE AGRO EQUIPMENTS

PROPRIETOR

Founder

SPARTAN TECHNOLOGIES PVT LTD

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www.spartansolartechnologies.com E.mail-info@spartansolartechnologies.com

Ref: SST/SL2022/16 **Date- 25/06/2022**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr.** Prathmesh Jatkar of **SVERI's College of Engineering Pandharpur** has done his internship in "Solar Equipment Design And Making" at SPARTAN SOLAR TECHNOLOGIES, Mangalwedha, from 10th March 2022 to 25th June 2022.

During his internship he has demonstrated his skills with self-motivation to learn new skills. His performance exceeded our expectations and he was able to complete the project on time.

We wish him all the best for his upcoming career.

For SPARTAN TECHNOLOGIES PVT. LTD,

Dhiraj Doke
[Chief Product Officer]

Suraj Doke
[Founder-Director]

Spartan Technologies Pvt.Ltd.
Machnur, Tal. Mangalwedha
Dist. Solapur

RDL Auto Industries
G.No/H.No-449/1B.Chincholi. Madha Dist- Solapur
GENUINE FIBER PARTS GSTIN:. 27AEQPL6967F1ZU
Mob no. 09552702128
Email:-newshivkrupa9850@gmail.com

Date: 04/ 07/ 2022

Certificate

This is certify that Mr. **Ayush Nitin Kale** (Roll no.- **20180325002440 36**) pursuing B.Tech (Mechanical Engineering) from SVERI'S College of Engineering Pandharpur, has undergone Internship at **RDL Auto Industries**, during the period from 2nd March to 2nd July 2022.

During the above period his conduct & character were found Very Good. We wish him all success in all future endeavors.

PLACE:-

Authorised

RDL AUTO INDUSTRIES
A/p. Chincholi, Tal. Madha
Dist. Solapur - 413208

NTB INTERNATIONAL PVT. LTD.

Corporate Office & Works : 622/2 Kuruli, Near Chakan,
Pune - Nasik Highway, Tal. Khed, Pune - 410 501. India.
Tel.: 02135 - 662762/66 Fax : 02135 - 662761
Email : belting@ntbindia.com
Website : www.ntbindia.com
CIN : U51900PN1984PTC136697

NTB GROUP

Ref: NTB/PR/2022-23

June 18, 2022.

CERTIFICATE OF INTERNSHIP COMPLETION

This is to certify that **Mr. ROHIT ANANDA KHANDAGALE**, has successfully completed his internship with us from 01-02-2022 to 28-04-2022.

He was associated with the Quality Assurance Department during the course of his internship worked under the guidance of MR.N. R.WALVE.

During his tenure, he proved to be a dynamic, good learner and committed to the execution of the defined task.

We wish him all the success in his future endeavors.

Thanking You,

For NTB INTERNATIONAL PVT. LTD.

N. R. WALVE
SR.MANAGER (PRODUCTION)

Arunoday Enterprises

Address: 1243/35 Shivaji Udyamnagar,
Kolhapur-416008.
Email : info@arunodayenterprises.com
Contact : +91 9028216691 , 7741034774

Authorized Channel Partner for Siemens PLM Softwares

Date : 11/07/2022

TO WHOM SO EVER IT MAY CONCERN

This is to certify that **Mr. Kshirsagar Sachin Ashok** of **SVERI's College of Engineering , Pandharpur** has completed 120 days Internship training at **Arunoday Enterprises, Kolhapur** from 10/03/2022 to 10/07/2022. During this internship he has gone through hands on practices on 3D printing as well as 3D modeling.

During the period of internship , we found him sincere and hard working. We wish him all the best for all their future endeavors.

Date : 11/07/2022

Arunoday Enterprises

ARUNODAY ENTERPRISES * KOLHAPUR *

Authorized Signatory

SPARTAN TECHNOLOGIES PVT LTD

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www.spartansolartechnologies.com E.mail-info@spartansolartechnologies.com

Ref: SST/SL2022/10 **Date- 25/06/2022**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. Mangesh Mahavir Misal** of **SVERI's College of Engineering Pandharpur** has done his internship in "Solar Equipment Design And Making" at SPARTAN SOLAR TECHNOLOGIES, Mangalwedha, from 10th March 2022 to 25th June 2022.

During his internship he has demonstrated his skills with self-motivation to learn new skills. His performance exceeded our expectations and he was able to complete the project on time.

We wish him all the best for his upcoming career.

For SPARTAN TECHNOLOGIES PVT. LTD,

Dhiraj Doke
[Chief Product Officer]

Suraj Doke
[Founder-Director]

Spartan Technologies Pvt.Ltd.
Machnur, Tal. Mangalwedha
Dist. Solapur

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www.spartansolartechnologies.com E.mail-info@spartansolartechnologies.com

Ref: SST/SL2022/11 **Date- 25/06/2022**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. Suraj Dattatray More** of **SVERI's College of Engineering Pandharpur** has done his internship in "Solar Equipment Design And Making" at SPARTAN SOLAR TECHNOLOGIES, Mangalwedha, from 10th March 2022 to 25th June 2022.

During his internship he has demonstrated his skills with self-motivation to learn new skills. His performance exceeded our expectations and he was able to complete the project on time.

We wish him all the best for his upcoming career.

For SPARTAN TECHNOLOGIES PVT. LTD,

Dhiraj Doke
[Chief Product Officer]

Suraj Doke
[Founder-Director]

Spartan Technologies Pvt.Ltd.
Machnur, Tal. Mangalwedha
Dist. Solapur

TOP GEAR TRANSMISSIONS
M-70, Additional M.I.D.C., SATARA 415004.
MOB:9158006361,9158006344,9158006386
Email: hradmin@topgeartransmission.com

Date 15.03.2022

To,
Mr.Dnyaneshwar Rohidas Bansode
Mr.Aditya Vyankatesh Motewar
Mr.Bharat Dnyandev Burungale
Mr.Saurabh Chandrakant Chavan
College of Engineering Pandhapur

Internship letter

In reference to your applicaton we would like congratulated you on being selected for internship with Top Gear Transmissions, You will be based at our Satara office. Your internship is scheduled to start effective 15.03.2022 for period for 120 Days.

Pleaase note that this is not an employment contract and does not entitle for any benefits associated to the employment. The internship can he terminated at any given point in time.

For,Top Gear Transmission

G.M.HR.

RDL Auto Industries
G.No/H.No-449/1B.Chincholi. Madha Dist- Solapur
GENUINE FIBER PARTS GSTIN:. 27AEQPL6967F1ZU
Mob no. 09552702128
Email:-newshivkrupa9850@gmail.com

Date: 04/ 07/ 2022

Certificate

This is certify that Mr. **Nikhil Dilip Mundhe**(Roll no.- **201803250024582l**) pursuing B.Tech (Mechanical Engineering) from SVERI'S College of Engineering Pandharpur, has undergone Internship at **RDL Auto Industries**, during the period from 2nd March to 2nd July 2022.

During the above period his conduct & character were found Very Good. We wish him all success in all future endeavors.

PLACE:-

Authorised

RDL AUTO INDUSTRIES
A/p Chincholi, Tal Madha
Dist Solapur - 413208

Internship Training Completion Certificate:

RDL Auto Industries
G.No/H.No-449/1B.Chincholi. Madha Dist- Solapur
GENUINE FIBER PARTS GSTIN:. 27AEQPL6967F1ZU
Mob no. 09552702128
Email:-newshivkrupa9850@gmail.com

Date: 04/ 07/ 2022

Certificate

This is certify that Mr. **Sachin Dattatray Waghmare** (Roll no.- **2018032500245113**) pursuing B.Tech (Mechanical Engineering) from SVERI'S College of Engineering Pandharpur, has undergone Internship at **RDL Auto Industries**, during the period from 2nd March to 2nd July 2022.

During the above period his conduct & character were found Very Good. We wish him all success in all future endeavors.

PLACE:-

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Date: 29.06.2022

Internship Certificate

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. Pranay Pradip Disale,** the Student of Shri Vitthal Education And Research Institute College of Engineering, Gopalpur-Pandharpur, was doing Internship in our Organization from 12TH March 2022 to 28th June,2022.

We thank you for your efforts and contribution during your tenure with us and best wish you all the best in your future endeavors.

Thank You.

Yours,

For **ACME TOOLS,**

ACME TOOLS
ACME TOOLS
(01/(2) MIDC, Bhosari, Pune - 26

Sheshrao Kulkarni.
(Manager Accounts & H R, Admin)

V. M. INDUSTRIES

(A Manufacturing ,Training & Consulting Division)

Address : H-3,Near Patel Petro Pump, M.I.D.C. Gokul Shirgaon,Kolhapur - 416 234
Mob : 7387808018 / 9588672913 / 7875860400
Email: vm.industrieskop@gmail.com

Ref : VM/RH00256

Date : 30-6-20

TO WHOM SO EVER IT CONCERN

This is to certify that **Mr Samarth Babruvan Mane-Deshmukh** pursuing Bachelor of technology in SVERI'S College Of Engineering, Pandharpur He has done internship in trainee in production department VM industries, Kolhapur from **10 March 2022** to **24 June 2022**

During this internship he has demonstrated his skills with self motivation to learn new skills. His performance exceeded our expectation and he was able to complete the internship in time.

We wish him all the very best for his upcoming career

For VM industries, kolhapur

V.M. INDUSTRIES & TRAINING CENTER KOLHAPUR

M.D. Mane

CIN No.: - U50103JK2009PTC003042
JAMKASH VEHICLEADES (KASHMIR) PVT.LTD.
(Authorized Dealers of Maruti Suzuki India Ltd.)
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Dated: - 27/06/2022

INTERNSHIP COMPLETION CERTIFICATE

This is certified that student Namely: - **Mohammad Sajid Khan** S/O: - **Ghulam Mohammad Khan** Under course: - **B.Tech Mechanical Engineering** who deputed to **JAMKASH VEHICLEADES (KMR) PVT. LTD. HANDWARA** by **Shri Vithal Education Research Institute's College of Engineering, Pandharpur** has completed his internship of **120 days** from **25th OF Feb 2022** to **25TH OF June 2022**. He was found sincere and hardworking during his period here and he has gained good experience during his internship, and he has worked to our best expectation.

We wish him success in his future endeavors.

Jamkash Vehicleades (KMR) Pvt. Ltd.

KAIZEN
ENGINEERING (INDIA) PVT. LTD.

Date: 18th April 2022

To,

Mr. Nihal Yusuf Mujawar ,

Sub: Appointment Letter

Dear Mr. Nihal Yusuf Mujawar,

This has reference to your interview for the post of Trainee Engineer on 10.04.2022

We are pleased to inform you that you're being appointed as **Trainee Engineer – Quality** Plant 3 for Training period of one year, starting from 20.04.2022 to 20.04.2023.

Upon successful completion of the Training period, your services will be confirmed or terminated, depending on your performance. The management reserves the right to extend or curtail the period of Training.

Your stipend during this period will be Rs. 12000 PM (in words Rs. Twelve Thousand only per month) + Staying arrangement + Canteen facility.

Please return the signed copy of this letter to acknowledgement & acceptance.

We wish you all the best.

Thanking you,

For Kaizen Engineering (India) Pvt. Ltd.

Geeta Patil ,

Section Head –HR

Plot No. 20, WMDC, Near Chakan Tele. Exchange Tower, Chakan-Ambethan Road, Chakan, Dist. Pune. 410 501.
Phone. No.: + 91 02135 -256 135, E- mail: latkar.kaizen@gmail.com Web: www.kaizengroup.in

KAIZEN
ENGINEERING (INDIA) PVT. LTD.

Date: 7th May 2022

To,

Mr. Irfan Rashid Milani

Sub: Appointment Letter

Dear Mr. Irfan Rashid Milani,

This has reference to your interview for the post of Trainee Engineer on 10.04.2022

We are pleased to inform you that you're being appointed as **Trainee Engineer – Quality** Plant 1 for Training period of one year, starting from 09.05.2022 to 09.05.2023.

Upon successful completion of the Training period, your services will be confirmed or terminated, depending on your performance. The management reserves the right to extend or curtail the period of Training.

Your stipend during this period will be Rs. 12000 PM (in words Rs. Twelve Thousand only per month) + Staying arrangement + Canteen facility.

Please return the signed copy of this letter to acknowledgement & acceptance.

We wish you all the best.

Thanking you,

For Kaizen Engineering (India) Pvt. Ltd.

KAIZEN ENGINEERING (I) PVT. LTD. CHAKAN

Geeta Patil ,

Section Head –HR

Rakuten

18th April, 2022
Bangalore.

Internship Certificate

Dear **Prajwal Dattaraya Musale**,
In reference to your application we would like to congratulate you on being selected for internship with **Rakuten India** based **Bangalore**. Your training has been scheduled to start effective 18th April - 17th July 2022 for a period of 3 months.

From Rakuten India Enterprise Private Limited.

*

Nalini George,

Chief Human Resource Officer, Rakuten India

I accept internship opportunity at Rakuten India on the terms and conditions set out in this letter.

SOFTTECH
Solutions

+91 90211 84002
info@softtechcloud.com

REF: INT- STC151-2022 Date: 20/06/2022

INTERNSHIP LETTER

This is to certify that **Rambhajee R. Nagargoje** has completed Internship program in **"Salesforce"** as a partial fulfillment of requirement towards of his Internship Project.

Duration: - 10th February 2022 to 15th June 2022.

Technology: - Salesforce

During the period of internship with us he was found punctual, hardworking and inquisitive. As abided by intellectual property and confidentiality policy of Softtech Solutions Pune. He is unable to produce the source code of above mentioned project.

We wish him every success in life.

For SOFTTECH SOLUTIONS

Company Confidential - This communication is confidential between you and Softtech Solutions.

Softtech Cloud Technologies Private Limited

Shop No.01, Shalan Heights, S. No. 84/2B,
Near Sai Par,Dighi, Pune (MH) 411015 India.

ISO 22000-2005
FOOD SAFETY
CERTIFIED DAIRY

Certificate-2021
REG. NO. SUR (DRY) 1451
Dated-10-12-81

सोलापूर जिल्हा सहकारी दूध उत्पादक व प्रक्रिया संघ मर्या., सोलापूर
Solapur Zilla Sahakari Dudh Utpadak Va Prakriya Sangh Maryadit, Solapur

SUM/ADM/ 384 /2022 Date- 17/06/2022

CERTIFICATE

This is to certify that **Mr. Pritam Balaji Padage** of B.Tech from **Department of Mechanical Engineering,SVERI's COE, Pandharpur** Completed the Intership Work on "**Mechanical Engineering**" from 15.02.2022 to 15.06.2022 at our Kegaon plant.

During the period he was found to be hard working and sincere. We wish him all the best of his future career.

Asst. Manager (Adm)

प्रधान कार्यालय : २४/१ अ, मुरारजी पेठ, सोलापूर- ४१३००१. पोस्ट बॉक्स नंबर-१९.
Head Office: 24/1A, Murarji Peth, Solapur- 413001. Post Box No. 19,
▪ Ph. Office : (0217) 2733645 ▪ Chairman Office : (0217) - 2621104
▪ M.D. Office (0217) - 2626628 ▪ e-mail : dudhpandhari@gmail.com

Internship Training Completion Certificate:

SPARK AVOS TECHNO LLP.
Plot No. 282/1, Sector No. 10, PCNTDA, Bhosari, Pune - 411 026.
Mob.: +91 8806755888 / 8412834357 / 7666378818 / 7447787887
Email : sparkavostechno@gmail.com • GSTIN : 27AEGFS0024J1Z5

TO WHOM SO EVER IT MAY CONCERN

DATE: 29-06-2022

This is to certify that Mr. Paras Mahavir Mule has worked in our organization as intern from 8th April 2022 till 29th June 2022.
During this period he showed himself to be a very hard working, intelligent, reliable and submissive.
We wish him success in life and assure you would never regret by employing this person.

Jay Tomar
(Commercial Director)
Spark Avos Techno LLP.

V. M. INDUSTRIES

(A Manufacturing , Training & Consulting Division)

Address : H-3,Near Patel Petro Pump, M.I.D.C. Gokul Shirgaon,Kolhapur - 416 234
Mob : 7387808018 / 9588672913 / 7875860400
Email: vm.industrieskop@gmail.com

Ref: VM/PH 00256

Date: 30-6-2022

TO WHOM SO EVER IT CONCER

This is to certify that **Mr Shailesh Mahadev Pawar** pursuing Bachelor of technology in SVERI'S College Of Engineering, Pandharpur He has done internship in trainee in production department VM industries, Kolhapur from **10 March 2022** to **24 June 2022**

During this internship he has demonstrated his skills with self motivation to learn new skills. His performance exceeded our expectation and he was able to complete the internship in time.

We wish him all the very best for his upcoming career

For VM industries, kolhapur

M.D.Mane

V.M. INDUSTRIES & TRAINING CENTER KOLHAPUR

V. M. INDUSTRIES

(A Manufacturing ,Training & Consulting Division)

Address : H-3,Near Patel Petro Pump, M.I.D.C. Gokul Shirgaon,Kolhapur - 416 234
Mob : 7387808018 / 9588672913 / 7875860400
Email: vm.industrieskop@gmail.com

Ref : V:M/RH 00256 Date : 30-6-2022

TO WHOM SO EVER IT CONCER

This is to certify that **Mr Onkar Haridas Phalake** pursuing Bachelor of technology in SVERI'S College Of Engineering, Pandharpur He has done internship in trainee in production department VM industries, Kolhapur from **10 March 2022** to **24 June 2022**

During this internship he has demonstrated his skills with self motivation to learn new skills. His performance exceeded our expectation and he was able to complete the internship in time.

We wish him all the very best for his upcoming career

For VM industries, kolhapur

V.M. INDUSTRIES & TRAINING CENTER KOLHAPUR

M. D. Mane

SHREE SAMARTH FABRICATORS & ENGINEERING WORKS

A/p – Ramanandnagar, Tal – Palus, Dist – Sangli. Pin code - 416308
Mob- 9075096365 / 8975616365 E-mail – shreesamarthfab1@gmail.com

Certificate

This is certify that **Mr. Vivek Dasharath Ronge** (Roll no.- 2019032500221495) pursuing **B.Tech (Mechanical Engineering)** from **SVERI'S College of Engineering Pandharpur**, has undergone Internship at M/S - **Shree Samarth Fabricators & Engineering Work's**, during the period from **10th March to 30th Jun 2022.**

During the above period his conduct & character were found **Very Good**. We wish him all success in all future endeavors.

DATE: - 30/06/2022

PLACE: - RAMANANDNAGAR

Authorised

Shree Samarth Fabricators & Engg. Works • Ramanandnagar

Scanned with CamScanner

Shri Renuka Engineering Works

Plot No. E-92/5/7, Akkalkot Road MIDC, Robotex Park, Solapur - 413 006. Cell: 9822249304
E-mail - rew_engg@yahoo.co.in shriRenukaEngineering

IQA
NS-EN ISO 9001:2008
QMS ISO 9001:2008

Certificate

No. :

Date : 28/06/2022

Our Valuable Clients

This is certify that Mr./~~Ms./Miss.~~ Sunil Sadul

has successfully completed Internship

during the period 15/03/2022 to 30/06/2022

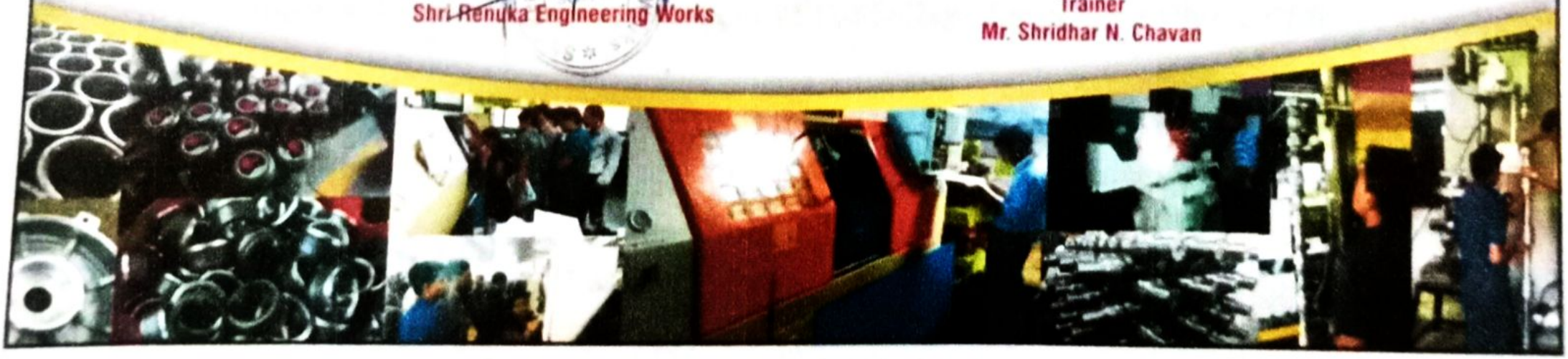
During his training His/Her performance was satisfactory.

The grade obtained by Him/Her in test conducted after training is A+

(O=Extra Ordinary / A+ = Excellent / A= Good)

Shri Renuka Engineering Works

Trainer
Mr. Shridhar N. Chavan



March 4, 2022

Dear Md Aazam Shaikh,

Sub: Letter of Engagement as Intern

We are pleased to inform you that you have been selected for undergoing Internship in our organization Wipro Limited (Wipro) as Intern under the following terms and conditions:

1. Nature of Engagement

You will be engaged as an **Intern at Wipro.**

2. Duration of training

The duration of **internship** will be 10 to 16 weeks starting from March 10th. During this period, Wipro shall evaluate your performance. Unless Wipro extends the period of internship, in writing, solely at its discretion, your internship shall automatically stand terminated at the expiry of the internship period.

3. Verification Report

Your engagement with Wipro will be subject to receipt of satisfactory report with regard to verification of the particulars furnished by you in your application and information given at the time of Interview. If any declaration or information furnished to Wipro proves to be false or if you have wilfully suppressed any material information, in such case, you will be liable to removal from training without any notice.

4. Obligations and Responsibilities

a. During your internship period, Wipro expects you to undergo training in any department / section in which you are placed with high standard of initiative and efficiency. You shall devote yourself exclusively for undergoing training. You shall not take up any other work for remuneration (part-time or otherwise) or work on advisory capacity or be interested directly or indirectly in any other trade or business (except as share-holder or debenture holder) during the training period without obtaining permission in writing from the appointing authority at Wipro. You will be governed by the service rules / standing orders, policies and regulations as may be promulgated by Wipro from time to time in relation to conduct, discipline and other matters. You will not seek membership of any local or public bodies without first attaining specific permission from the appointing authority at Wipro. You are expected to comply with the policies of Wipro including the Code of Business Conduct and other policies of Wipro as they form an integral part of the terms of your training with Wipro.

   Consequently, you are required to understand the scope and intent behind these policies and to comply with the same. These Policies are updated / modified on a periodic basis and new Policies may be introduced and notified to employees/trainees from time to time and you will be required to comply with the same. Any matter or situation or incident that may arise that could potentially result, or has resulted, in any violation of the Policies or the terms of your employment, shall immediately be brought to the notice of Wipro and appropriate disciplinary action will be initiated.

b. During the training period, if you conceive any new or advanced method of improving processes / formulae / systems in relation to the Business or Trade of Wipro, such developments will be fully communicated to Wipro and will be the sole property of Wipro. In consideration of the opportunities, training and access to new techniques and know-how that will be made available to you, you will be required to comply with the Confidentiality Policy of Wipro. Therefore, please maintain all Confidential Information as defined from time to time in the Confidentiality Policy of Wipro, as secret and confidential and do not use or disclose any such Confidential Information except as may be required under obligation of law or as may be required by Wipro and in the course of your training. This covenant shall endure during your training and beyond the cessation of your training with Wipro.

SHREE SAMARTH FABRICATORS & ENGINEERING WORKS

A/p – Ramanandnagar, Tal – Palus, Dist – Sangli. Pin code - 416308
Mob- 9075096365 / 8975616365 E-mail – shreesamarthfab1@gmail.com

Certificate

This is certify that **Mr. Sohel Humayun Shikalgar** (Roll no.- **2019032500221305**) pursuing **B.Tech (Mechanical Engineering)** from **SVERI'S College of Engineering Pandharpur**, has undergone Internship at M/S - **Shree Samarth Fabricators & Engineering Work's**, during the period from **10th March to 30th Jun 2022.**

During the above period his conduct & character were found **Very Good**. We wish him all success in all future endeavors.

DATE: - 30/06/2022

PLACE: - RAMANANDNAGAR

Authorised

Shree Samarth Fabricators & Engg. Works • Ramanandnagar

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V. M. INDUSTRIES

(A Manufacturing ,Training & Consulting Division)

Address : H-3,Near Patel Petro Pump, M.I.D.C. Gokul Shirgaon,Kolhapur - 416 234
Mob : 7387808018 / 9588672913 / 7875860400
Email: vm.industrieskop@gmail.com

Ref : VM/HR/00256

Date : 30-6-2022

TO WHOM SO EVER IT CONCERN

This is to certify that **Mr Pravin Dilip Somadale** pursuing Bachelor of technology in SVERI'S College Of Engineering, Pandharpur He has done internship in trainee in production department VM industries, Kolhapur from **10 March 2022** to **24 June 2022**

During this internship he has demonstrated his skills with self motivation to learn new skills. His performance exceeded our expectation and he was able to complete the internship in time.

We wish him all the very best for his upcoming career

For VM industries, kolhapur

INDUSTRIES & TRAINING CENTER KOLHAPUR

M.D. Mane

Date : 22th June 2022

TO WHOM SO EVER IT MAY CONCERN

This is to certify that Mr. Shashikant Dadarao Thorat pursuing Bachelor of Technology from SVERI's College of Engineering is undergoing internship from 16th March,2022 and the internship activity includes training and implementation Manual Testing, Java, SQL and Automation, and same is ongoing.

For **QSpiders Pune Wakad, Unit of Test Yantra Software Solutions Pvt. Ltd.**

QSPIDERS WAKAD JSPIDERS

Thanks & Regards

QSpiders Wakad

Qspiders JSpiders
Training & Development Center

www.qspiders.com

Date : 22th June 2022

TO WHOM SO EVER IT MAY CONCERN

This is to certify that Mr. Shashikant Dadarao Thorat pursuing Bachelor of Technology from SVERI's College of Engineering is undergoing internship from 16th March,2022 and the internship activity includes training and implementation Manual Testing, Java, SQL and Automation, and same is ongoing.

For **QSpiders Pune Wakad, Unit of Test Yantra Software Solutions Pvt. Ltd.**

QSPIDERS WAKAD JSPIDERS

Thanks & Regards

QSpiders Wakad

Spiders JSpiders
Training & Development Center

www.qspiders.com

Spiders

JSpiders

Date : 22th June 2022

TO WHOM SO EVER IT MAY CONCERN

This is to certify that Mr. Kanhaiya Sudarshan Vairagkar pursuing Bachelor of Technology from SVERI's College of Engineering is undergoing internship from 16th March,2022 and the internship activity includes training and implementation Java, SQL, Web Technology and Advance java, and same is ongoing.

For **QSpiders Pune Wakad, Unit of Test Yantra Software Solutions Pvt. Ltd.**

Thanks & Regards

QSpiders Wakad

Spiders JSpiders

Training & Development Center

www.qspiders.com

Scanned with CamScanner

AARNA ENGINEERING

Address :- **Shivraj industrial premises , spine city road, Bhosari industrial estate**
Pune - 411026

Email :- **info@aarnaengg.com**

Date- / /

Certificate

This is to certify that **Mr. Chaitanya Wadekar** student **of Bachelor of Technology** of **SVERI's College of engineering pandharpur** has completed a 'VIII' Semester Internship at **AARNA ENGINEERING"** from 15th March 2022 to 1st June 2022, in partial fulfilment of the requirements for the degree of **Bachelor of Technology** in **Mechanical Engineering**, under my guidance and supervision during the academic year 2021-2022.

Place-PUNE

FOR AARNA ENGINEERING.

(Shivaraj industrial premisesVishweshwar chowk bhosari)

AUTHORISED SIGNATORY

V. M. INDUSTRIES

(A Manufacturing ,Training & Consulting Division)

Address : H-3,Near Patel Petro Pump, M.I.D.C. Gokul Shirgaon,Kolhapur - 416 234
Mob : 7387808018 / 9588672913 / 7875860400
Email: vm.industrieskop@gmail.com

Ref : VM/RH00256 Date : 30-6-2022

TO WHOM SO EVER IT CONCER

This is to certify that **Mr Omkar Sanjay Patil** pursuing Bachelor of technology in SVERI'S College Of Engineering, Pandharpur He has done internship in trainee in production department VM industries, Kolhapur from **10 March 2022** to **24 June 2022**

During this internship he has demonstrated his skills with self motivation to learn new skills. His performance exceeded our expectation and he was able to complete the internship in time.

We wish him all the very best for his upcoming career

For VM industries, kolhapur

M.D Name

INDUSTRIES & TRAINING CENTER KOLHAPUR

Softtech Cloud Technologies

Regd. Office: SHOP NO-01, SHALAN HEIGHTS, S NO. 84/2B
NEAR SAI PARK, DIGHI, PUNE-411015. PUNE MH 411015 IN
Email: hr@softtechcloud.com
Tel: +91 9021184002
Website: softtechcloud.com

REF: INT- STC154-2022 Date: 29/06/2022

INTERNSHIP LETTER

This is to certify that **Mr. Pavan Ankush Gavali-Parit** has completed Internship program in **"Salesforce"** as apartial fulfillment of requirement towards of his Internship Project.

Duration: - 05th March 2022 to 30th June 2022.

Technology: - Salesforce.

During the period of internship with us he was found punctual, hardworking and inquisitive. As abided byintellectual property and confidentiality policy of Softtech Solutions Pune. He is unable to produce the source code of above-mentioned project.

We wish him every success in life.

Yours sincerely,

SOFTTECH SOLUTIONS PUNE.

Human Resource Manager.

Company Confidential - This communication is confidential between you and Softtech Solutions.

PARC

TO WHOM SOEVER IT MAY CONCERN

This is to certify that Mr.Vinayak S. Gawali (BE Mechanical) a BE student college of Engineering Pandharpur (SVERI) has successfully completed industrial training in our organization for the period from 23/03/2022 to 23/06/2022

During training he has gone through our all manufacturing processes viz fixture design fixture assembly project execution control design and robot teaching.

We wish him grand success in his future career.

For PARC Robotic Systems Pvt. Ltd

PARC Robotic Systems Pvt. Ltd. Pune

Ajay Bhosale

HR

PARC Robotic Systems Pvt. Ltd.

Gat No. 116, Jyotibanagar, Infront of Hotel Pandurang, Talawade, Pune - 411 062
E-mail :info@parcrobotics.in Website : www.parcrobotics.in
CIN : U29308PN2016PTC176000

DRUIDIC ENERGY PVT. LTD.
1st Floor, Moothedath Thekkunthala Bldg
Podipara Junction, Eraviperoor P.O.,
Pathanamthitta, Kerala-689542,India.
Tel. : +91 9048348069
: +91 7977367951
Email : sales@druidicenergy.com
Web. : www.druidicenergy.com

Druidic Energy
Nature Provides, We Deliver

Date:30/06/2022

To Whom So Ever It May Concern

This is to certify that **Thomas Ashley A** of **SVERI's College Of Engineering, Pandharpur** has completed Four months of In Plant Training or Internship Training Program at **Druidic Energy Pvt Ltd, Kerala from 01/03/2022 To 30/06/2022.**

Date:30/06/2022

Druidic Energy Pvt Ltd

Authorized Signatory

Druidic Energy
Nature provides, we deliver
Pathanamthitta, Kerala-689542, India.
+91 9946355550 | admin@druidicenergy.com
www.druidicenergy.com

Reg.No S.U.R.(P.R.R.)/P.R.G.(A)-7(5)88-89/dt.12-8-88

श्री पांडुरंग सहकारी साखर कारखाना लि;
श्रीपूर-४१३ ११२,ता.माळशिरस,जि.सोलापूर
फोन:(०२१८५)२५५२३३/२५५३४४,फॅक्स:२५५४३५
E-mail :- spssk_sugar@yahoo.com
Website:- www.pandurangsugar.com

AN ISO 9001-2008

Shree Pandurang Sahakari Sakhar Karkhana Ltd;
Shreepur-413 112,Tal.Malshiras,Dist.Solapur
Ph.(02185)255233/255344, Fax.255435
E-mail :- spssk_sugar@rediffmail.com
Website:- www.pandurangsugar.com

Date- 20/06/2022

To Whom It May Concern

This is to certify that **Mr. Ravikiran Tukaram Shinde** has satisfactorily completed the Internship of three months in **SPSSK**, Shreepur from **15/03/2022** to **15/06/2022**.

So, On his request, this certificate is given to him.

Managing Director

INTERNSHIP CERTIFICATE

June 20, 2022

Newton School

To whom it may concern,

This is certify that Mr. Ashutosh Ganesh Vardole pursuing Bachelor of Technology from SVERI's College of Engineering is undergoing internship from 20th December,2021 and the internship activity includes training and implementation of Java, HTML, CSS, Javascript, React JS, Node JS, Express JS, Mongo DB and same is ongoing.

Sincerely,

Siddharth Maheshwari

Director, Newton School

Newton School

June 20, 2022

www.newtonschool.co

INTERNSHIP CERTIFICATE

June 20, 2022

To whom it may concern,

This is certify that **Mr. Siddhanath Shahaji Shendage** pursuing Bachelor of Technology from SVERI's College of Engineering is undergoing internship from 20th December,2021 and the internship activity includes training and implementation of Java, HTML, CSS, Javascript, React JS, Node JS, Express JS, Mongo DB and same is ongoing.

Sincerely,

Siddharth Maheshwari

Director, Newton School

Newton School

June 20, 2022

www.newtonschool.co

DocuSign Envelope ID: 4DB66E1B-5C88-45DE-90AA-11BB078D7238

RAJA SOFTWARE LABS
peace of mind

30 June 2022

Internship certificate

This is to certify that the following person worked as an intern at Raja Software Labs Pvt. Ltd . Pune

Name:	Raj Vikas Waghmare
Intern id:	2021b119
Start Date:	March 21, 2022
End Date:	June 21, 2022

We wish him the best in his future endeavours.

Warm Regards,

For Raja Software Labs Pvt. Ltd.

DocuSigned by
Amit Agarwal
D35C185937924C0

Amit Agarwal
Director

Floor TowerB, Hongasandra
Village, Bommanahalli Hosur Road
Bangalore – 560068
(M): +917022374614
www.intellipaat.com

Date: 27th June 2022

To Whomsoever It May Concern

This is to certify that **Ms. Samruddhi Deshpande,** is pursuing her internship from **24th January 2022 to 25th June 2022.** She has completed **5 months** of Internship and the duration of the internship is of **6 months** from then. However, as requested by the college to confirm their Internship for their Final Viva. We hope this email assists with the same**.**

Yours Sincerely,
Intellipaat Software Solutions Pvt. Ltd.

Dewaker Singh Bisht
Director – Human Resources

SHUBHANGAD INDUSTRIES

Advani Orlicon Road, S. No. 64, Opp. Aishwaram Complex, Pune-411019. Cell No. : 9763720374
E-mail : shubhangadind@gmail.com | Website : http://shubhangad.in

Date: - 30-06-2022

To whomsoever it may concern

This is to certify that Miss. PRERANA SHRIRANG EKATPURE from SVERI's college of Engineering, Pandharpur, has successfully completed her 4-month (from 01st March 2022 to 30th June 2022) internship from Shubhangad Industries in the department of development, quality control, production and packaging as per her curriculum requirement.

She bears a good morale conduct and fine behaviour, she has been found sincere and hardworking to the best of our knowledge & satisfaction during her tenure over here.

We wish her all the best for her future endeavours.

Regards,

Your's faithfully,

For Shubhangad Industries Ltd,

Proprietary, Mr. Mukund Gadgil

Kakade Agro Equipments
(Manufacturer of All Kinds of Modern, Agro Sprayers and Equipments)
An ISO 9001: 2015 certified company
A/P: Near Shivaji Staschu Tandulwadi, Tah: Malshiras Dist: Solapur,
Contact: +917709685151,9503836313 Email:
kakadetoofanblowers@gmail.com

Date :30/06/2021

Certificate

This is certify that **Miss. Arati Gajanan Lale student** of **SVERI's COLLEGE OF ENGG, PANDHARPUR** has done training of Manufacturing, assembling and testing of agro sprayers equipment's at our company from02/03/2022 to 30/06/2022.

During training her involvements was good, and we wish best luck to her for bright future....

Er. Subhash N Kakade, M. Tech Agril Engg. FMPE

M/s. KAKADE AGRO EQUIPMENTS

PROPRIETOR

Founder

SHUBHANGAD INDUSTRIES

ISO 9001:2015
Quality Management System
Cert No. 14785

Advani Orlicon Road, S. No. 64, Opp. Aishwaram Complex, Pune-411019. Cell No. : 9763720374
E-mail : shubhangadind@gmail.com | Website : http://shubhangad.in

Date: - 30-06-2022

To whomsoever it may concern

This is to certify that Miss. VAISHALI DILIP MORE from SVERI's college of Engineering, Pandharpur, has successfully completed her 4-month (from 01st March 2022 to 30th June 2022) internship from Shubhangad Industries in the department of development, quality control, production and packaging as per her curriculum requirement.

She bears a good morale conduct and fine behaviour, she has been found sincere and hardworking to the best of our knowledge & satisfaction during her tenure over here.

We wish her all the best for her future endeavours.

Regards,

For Shubhangad Industries

For Smkulkarni

Proprietor

Your's faithfully,

For Shubhangad Industries Ltd,

Proprietary, Mr. Mukund Gadgil

Scanned by TapScanner

MOB.: 9527236319
9960771100

SAMRUDDHI ENGINEERS

Gat No. 532/1, Plot No.2, Vijaynagar , Nerli , M.I.D.C. Gokul Shirgaon,
Kolhapur - 416 234, Email - smrudhi.3@gmail.com

Date : 30/06/2022

INTERNSHIP CERTIFICATE

This is to certify that Karuna Sunil Saravade of SVERI'S College Engineering Pandharpur has completed Four week online in Plant Training or Internship Training Program at Samruddhi Engineers, Kolhapur form 01/03/2022 to 30/06/2022 . During the Period of his internship Program with us she was Found Punctual Hard Working Inquisitive.

SAMRUDDHI ENGINEERS
Gat No. 532/1, Plot No. 2 Vijay Nagar,
Nerli, Gokul Shirgaon, Kolhapur-416234

For, **SAMRUDDHI ENGINEERS**

Proprietor

KOTHARI
GROUP
Let's Fly High... Beyond Horizons !

Date: - 19-11-2021

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Miss. PRAJAKTA DHARMARAJ SURVE,** B.E. (Mechanic) final year student of **"Shri Vitthal Education & Research Institue College of Engineer, Pandharpur"** has completed project work in our company on **"Production"** under the guidance of **H. R. Department** of KOTHARI AGRITECH PVT. LTD. MOHOL during the period of 12-Aug-21 to 12-Sep-21.

During the tenure of the project, her conduct was good and satisfactory.

We wish her all the best in her future endeavors.

For Kothari Agritech Pvt. Ltd.

Authorized Signatory

KOTHARI®
www.kotharigroupindia.com

KOTHARI AGRITECH PVT. LTD.
FACTORY : 185 to 193, Chandramauli Industrial Co-Operative Estate, Mohol - 413 213, Solapur (MH).
REGISTERED OFFICE : Sun Plaza, Level 3, 8516/11, Subhash Chowk, Murarji Peth, Solapur - 413 001 (MH). Ph.: 0217- 2721490.
Email : info@kotharigroupindia.com, CIN : U25203PN2009PTC135094

skolar
BE A STEP AHEAD

CERTIFICATE OF INTERNSHIP COMPLETION

THIS IS PRESENTED TO

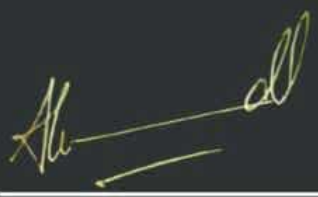
Adesh Gorakh Bankar

for successfully completing 4 month internship as

Business Development Intern

From: *20-02-2022* ***To:*** *20-06-2022*

and generously sharing his time and expertise with SKOLAR team.



TAUFIQUE AHMAD
Co-Founder

CooperStandard

Date 15/06/2022

TO WHOM SO EVER IT MAY CONCERN

This is to certify that ***Aniket Annasaheb Bansode*** of SVERIS College of Engineering Pandharpur has completed Three Months in Plant training or internship training program at COOPER STNDARD INDIA PVT. LTD.PUNE from 10/03/2022 to 10/06/2022

Date 15/06/2022

Authorized Signatory

COOPER-STANDARD INDIA PVT. LTD.
(Formerly known as METZELER Automotive Profiles India Pvt. Ltd.)
Plot No. 1, Sector 8, Growth Centre
Bawal - 123 501 (HARYANA) INDIA
Tel.: +91-1284-268509
E-mail : CSIndiaSealinginfo@cooperstandaru.com
Internet: www.cooperstandard.com

Registered Office :
301-302, Tolstoy House, 15, Tolstoy Marg
New Delhi - 10 001
CIN : U34102DL1963PTC004019

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Dr. Babasaheb Ambedkar Sahkari Sakhar Karkhana Ltd. Arvindnagar
Keshegaon, Tq. & Dist. Osmanabad- 413506

BASSK/ENGG/CER / 122 / 2022-23 DATE:-28/06/2022

CERTIFICATE

This is to certify that **Shri.Hritik Ramesh Bhosale student** of **Sveri's College of Engineering Pundharpur having Branch Mechanical Engineering** has been completed the industrial training in our Sugar Factory, during the period 25 February 2022 to 25 Jun 2022.

He is regular, hard worker and honest. This certificate is issued on his own request.

28/06/2022

Co-Gen Engineer

Chief Engineer

www.ambedkarsugar.com Email: ambedkarssk@gmail.com
Phone : 02472-245075/76/78, Fax : 02472-245077

रजि.नं.(एस.यू.आर.(पी.आर.आर.)/पी.आर.जी.(ए.)-७(एस)८८-८९ दि.१२/८/८८

Reg.No.S.U.R.(P.R.R.)/P.R.G.(A)-7(S)88-89/dt.12-8-88

'श्री पांडुरंग सहकारी साखर कारखाना लि;

श्रीपूर-४१३ ११२,ता.माळशिरस,जि.सोलापूर

फोन:(०२१८५)२५५२३३/२५५३४४,फॅक्स:२५५४३५

E-mail :- spssk_sugar@yahoo.com

Website:- www.pandurangsugar.com

AN ISO 9001-2008

Shree Pandurang Sahakari Sakhar Karkhana Ltd;

Shreepur-413 112,Tal.Malshiras,Dist.Solapur

Ph.(02185)255233/255344, Fax.255435

E-mail :- spssk_sugar@rediffmail.com

Website:- www.pandurangsugar.com

Ref. /Staff-51/ NO 0450 /2022-23 Date – 30 June 2022

To Whom It May Concern

This is to certify that **Mr. Pratik Pravin Deshmukh** has satisfactorily completed Inplant Training at our Engg. Dept. (Sugar Mill & Co-generation) Boling house, Centrifugal, Distillery, Co-gen. His training period was from 01.03.2022 to 30.06.2022. He is successfully completed his Training.

This certificate is being given to him on his request.

Managing Director

S.M.AUTO

S. M. AUTO ENGINEERING PVT. LTD.

GAT NO. 310-B, NANEKARWADI,CHAKAN, PUNE - 410 501

Email: sma.310@smauto.co.in

QUALITY SYSTEM CERTIFICATION DNV·GL ISO 9001

Ref. No : SMA-PIM/CHR/2022

Date : July 9, 2022

TO WHOMS SO EVER IT MAY CONCERN

This is to certify that **Mr. Manthan Milind Dixit** , B Tech (Mechanical)-8th Semister from SVERI's College of Engineering, Pandharpur has undergone his Internship Training in S.M. Auto Engineering Pvt. Ltd; Nanekarwadi, Chakan, Pune from 10th March 2022 to 9th July 2022.

During his training period, we found him sincere and hard working.

We wish all the best for his future assignments.

For S. M. Auto Engineering Pvt. Ltd;

Sr. Manager-Corporate & Admin

Corporate Office : Plot No. B-19 'H' Block, MIDC, Pimpri, Pune 411 018. (INDIA)
Tel. : +91 20 27470178, 65101357 Fax : +91 20 27476539, E-mail : edoffice@smauto.co.in
Regd. Office : 12, Bhosale Nagar, Pune - 411 007, Tel. : +91 (020) 25537649, Fax : +91 (020) 25531960
CIN NO.: CIN : U34300MH1976PTC019348. Email : accounts@smauto.co.in

RSK Cranes & Components

{ Formaly Known as 'RSK Engineering (I) Pvt.Ltd.' }

"Always LIFT Your SUCCESS"

Works / Office : Plot No.A-32, Phase No.II,
Opp. to Hyunadi Construction Equipments,
Village Khalumbre, M.I.D.C., Chakan, Pune-410501
Web : www.rskcranes.com / www.indiamart/rskcranes

E Mail : vitthal@rskcranes.com
vitthal@rsk-engineering.com
info@rskcranes.com
Mob.: +91 9096580702 / 9225604001

Certificate

This is to certify that **Abhinay Rajendra Gaikwad** From SVERI College of Engineering, Pandharpur, has undergone training in the **RSK CRANES & COMPONENTS** , Pune Works for Period of 1 Month From the Date 10/08/2021 To 10/09/2021 under my guidance. His Performance has been satisfactory so as to fullfill all the requirements for successful comletion of the training .This document is a bona fide testimony of the training undergone and works carried out by him in this course.

RSK CRANES & COMPONENTS Pune 410501

Date : 11/09/2021

Mr.S.G .Padawale ,

Plant Manger

RSK CRANES

2.Suraj Rajendra Gavali:

SPARTAN TECHNOLOGIES PVT LTD

An ISO 9001 : 2015Certified Company
Gat No. 468/2 Mundhewadi Road, A-Machnur,P-Bramhpuri,Mangalwedha 413305, Dist-Solapur,Maharashtra.
www.spartansolartechnologies.com E.mail-info@spartansolartechnologies.com

Ref: SST/SL2022/19

Date- 29/06/2022

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. Suraj Rajendra Gavali** of **SVERI's College of Engineering Pandharpur** has done his internship in "Solar Equipment Design And Making" at SPARTAN SOLAR TECHNOLOGIES, Mangalwedha, from 10th March 2022 to 25th June 2022.

During his internship he has demonstrated his skills with self-motivation to learn new skills. His performance exceeded our expectations and he was able to complete the project on time.

We wish him all the best for his upcoming career.

For SPARTAN TECHNOLOGIES PVT. LTD,

Dhiraj Doke
[Chief Product Officer]

Suraj Doke
[Founder-Director]

Spartan Technologies Pvt. Ltd. Machanur.

February 15, 2022

Dear Chetan Waghmode,

Sub: Letter of Engagement as Intern

We are pleased to inform you that you have been selected for undergoing Internship in our organization Wipro Limited (Wipro) as Intern under the following terms and conditions:

1. Nature of Engagement

You will be engaged as an **Intern at Wipro.**

2. Duration of training

The duration of **internship** will be from **February 21, 2022** to **April 30, 2022**. During this period, Wipro shall evaluate your performance. Unless Wipro extends the period of internship, in writing, solely at its discretion, your internship shall automatically stand terminated at the expiry of the internship period.

3. Verification Report

Your engagement with Wipro will be subject to receipt of satisfactory report with regard to verification of the particulars furnished by you in your application and information given at the time of Interview. If any declaration or information furnished to Wipro proves to be false or if you have wilfully suppressed any material information, in such case, you will be liable to removal from training without any notice.

4. Obligations and Responsibilities

a. During your internship period, Wipro expects you to undergo training in any department / section in which you are placed with high standard of initiative and efficiency. You shall devote yourself exclusively for undergoing training. You shall not take up any other work for remuneration (part-time or otherwise) or work on advisory capacity or be interested directly or indirectly in any other trade or business (except as share-holder or debenture holder) during the training period without obtaining permission in writing from the appointing authority at Wipro. You will be governed by the service rules / standing orders, policies and regulations as may be promulgated by Wipro from time to time in relation to conduct, discipline and other matters. You will not seek membership of any local or public bodies without first attaining specific permission from the appointing authority at Wipro. You are expected to comply with the policies of Wipro including the Code of Business Conduct and other policies of Wipro as they form an integral part of the terms of your training with Wipro.

   Consequently, you are required to understand the scope and intent behind these policies and to comply with the same. These Policies are updated / modified on a periodic basis and new Policies may be introduced and notified to employees/trainees from time to time and you will be required to comply with the same. Any matter or situation or incident that may arise that could potentially result, or has resulted, in any violation of the Policies or the terms of your employment, shall immediately be brought to the notice of Wipro and appropriate disciplinary action will be initiated.

b. During the training period, if you conceive any new or advanced method of improving processes / formulae / systems in relation to the Business or Trade of Wipro, such developments will be fully communicated to Wipro and will be the sole property of Wipro. In consideration of the opportunities, training and access to new techniques and know-how that will be made available to you, you will be required to comply with the Confidentiality Policy of Wipro. Therefore, please maintain all Confidential Information as defined from time to time in the Confidentiality Policy of Wipro, as secret and confidential and do not use or disclose any such Confidential Information except as may be required under obligation of law or as may be required by Wipro and in the course of your training. This covenant shall endure during your training and beyond the cessation of your training with Wipro.

c. During the training period and thereafter, you will not pass onto anyone in writing or by word of mouth or otherwise, particulars or details of work, processes, technical know-how, research carried out, security arrangements, administrative and organization matters of confidential or secret nature, which you may come across during your training period or become known to you by virtue of your undergoing training in Wipro or otherwise.

d. In connection with your internship and during the term of your internship, upon conception or creation, you shall disclose and assign to Wipro as its exclusive property, all inventions, ideas, concepts, discoveries, techniques, and improvements (including without limitation legal documents, training materials, computer software and associated materials) developed or conceived by you solely or jointly with others (whether or not during business hours), and shall comply with the Policies of Wipro in relation to Intellectual Property.

5. Posting

During your training period, you are liable to be transferred or assigned to training in any division / department / establishment or location at which Wipro or its associate companies have their offices or operation and whether at present existing or which may be set up in future at any time and at any place in India, without any increase in stipend. On such posting, you will be governed by the policies, rules and regulations as applicable in that Unit / Branch / Establishment.

6. Travel

You will be required to undertake travel as required by Wipro and you will be paid travel expenses as per Wipro rules.

7. Termination

Notwithstanding any of the clauses of this letter of engagement, Wipro reserves the right in its sole discretion of terminating this agreement during the training period without assigning any reason by giving one week's (7 days) notice or payment of one week's stipend, in lieu of notice.

8. Training Hours and Holidays

As an intern you will be called upon to undergo training during the hours and days as may be fixed by Wipro. Normally all Sundays will be weekly holidays together with all National and Festival Holidays observed by the establishment.

9. After completion / termination of internship

On completion / termination of internship, you will immediately surrender to Wipro all specifications, documents, literature, drawings, records etc. belonging to Wipro or relating to its Businesses and shall not take or retain any copies of the said items.

10. Date of commencement of training

In case the above terms and conditions are acceptable to you, you are required to return the duplicate copy of this letter of engagement within one week, duly signed by you, in token of your acceptance of the offer and report for training on or before the date of commencement of training. While reporting for training, please bring 3 copies of your latest passport size photographs and two copies each of your certificates and testimonials along with the originals. The original certificates will be returned to you after verification.

Yours sincerely,
For Wipro Limited,

Aparna Shailen
General Manager - Human Resources

<u>Endorsement:</u>

1. I accept the terms and conditions stipulated in the above letter of engagement.

2. I shall report for internship on

ANNEXURE I

CONFIRMATION ON SHARING PERSONAL INFORMATION (AS REQUIRED UNDER INFORMATION TECHNOLOGY ACT, 2000)

I Chetan Waghmode, confirm that I am voluntarily sharing my Personal Information with Wipro Limited ('Wipro') for the following purposes:

a. validating my curriculum vitae and retaining records on the same for any future reference/verification;

b. processing my application for internship including background verification checks;

c. Internship related actions including record keeping, processing training stipend and any action required in the context of my training with Wipro.

In this context, I also agree to the retention of such Personal Information by Wipro for any future reference/verification and authorize Wipro to transfer the same to a third party.

I understand that 'Personal Information' means any information, relating to me that is available with Wipro and is capable of identifying me.

ANNEXURE II

CONFIDENTIALITY & NON-DISCLOSURE AGREEMENT

This non-disclosure agreement ("**Agreement**") is made on this the [ ] day of [ ] between

Wipro Limited, a public limited Company incorporated under the Indian Companies Act, 1913, and existing under the Indian Companies Act, 1956, having its registered office at Dodda Kannelli, Sarjapur Road, Bengaluru 560-035.

And

_____[Name of the Intern], S/o / D/o
_____,

Residing at_____
_____

(Hereinafter referred to as "**Intern**" which expression shall mean and include his/her representatives in interest, assurers and guarantors).

WHEREAS:

The Intern has expressed his/her desire to be trained with Wipro for a period of _____ (**"Internship Period"**);

Wipro has accepted the Intern's application subject to the Intern adhering to and complying with certain covenants governing his or her movement within Wipro premises, conduct, and other tasks whatsoever which they may be allotted from time;

During the term of the internship, the Intern may have access to certain information which may be proprietary and/or of confidential nature (**"Confidential Information"**, as more particularly described below).

NOW THEREFORE in consideration of the Agreement herein by the parties hereto and such additional promises and understandings as are hereinafter set forth, the parties agree as follows:

1. For purposes of this Agreement, "**Confidential Information** "means, with respect to Wipro, any and all information in written, representational, electronic, verbal or other form that is disclosed to Intern by Wipro or which Intern becomes aware of in the course of the internship, including without limitation, information relating directly or indirectly to the present or potential business, operation or financial condition, pricing, legal cases pertaining Wipro, marketing plans or strategy, volumes, services rendered, customers' and suppliers' names or lists, any customer information, financial or technical or service matters or data of or relating to Wipro and any information identified as being proprietary and/or confidential and any information which might reasonably be presumed to be proprietary or confidential in nature, excluding any such information which (i) is known to the public (through no act or omission of Intern in violation of this Agreement); (ii) was known to Intern prior to its disclosure under this Agreement; or (iii) is required to be disclosed by governmental or judicial order, in which case Intern shall give Wipro prompt written notice, and use reasonable efforts to ensure that such disclosure is

accorded confidential treatment and also to enable Wipro to seek a protective order or other appropriate remedy.

2. Nothing contained hereunder shall be construed as creating, conveying, transferring, granting or conferring by Wipro on Intern any rights, license or authority in or to the Confidential Information.

3. Intern agrees and undertakes that he/she shall not disclose or make available to any person (including the Institute) reproduce or transmit in any manner, or use (directly or indirectly) for his/her own benefit or the benefit of others, any Confidential Information, including without limitation, the use of the Confidential Information in any thesis or report required to be submitted by Intern under any course. Intern undertakes that he/she will not, without prior written consent of Wipro, use any Confidential Information in any of her future projects or presentations for any person, including the institute, nor shall he/she use any of the Confidential Information in his/her resumes or any application for prospective employment.

4. Intern shall use and/or protect the Confidential Information received by him/her with utmost degree of care and diligence.

5. Intern agrees that upon (i) termination/expiry of Internship Period, or (ii) at any time during its currency, or (iii) on Intern ceasing to be an Intern of Wipro, Intern shall promptly deliver to Wipro the Confidential Information and copies thereof in his/her possession or under his/her direct or indirect control, and shall destroy all memoranda, notes and other writings prepared by him/her or his/her subordinates based on the Confidential Information.

6. Intern acknowledges that the Confidential Information coming to his/her knowledge may relate to and/or have implications regarding the future strategies, plans, business activities, methods, processes and or information of Wipro or its affiliated companies which could afford third parties certain competitive and strategic advantage. Intern shall ensure that the use of such Confidential Information by the Intern shall not jeopardize or adversely affect in any manner such future strategies, plans, business activities, methods, processes, information, and/or competitive and strategic advantage of Wipro.

7. Intern acknowledges the quantum of damages and/or losses that Wipro may suffer as a result of the breach of this Agreement by the Intern and therefore, agrees to indemnify and keep indemnified Wipro against all loss or damage, which Wipro may suffer as a result of any such breach.

8. Intern hereby acknowledges and agrees that in the event of a breach or threatened breach by Intern of the provisions of this Agreement, Wipro shall without prejudice to any of its rights under this Agreement or in law have the right to claim damages and shall also be entitled to injunctive relief against such breach or threatened breach by Intern.

9. No failure or delay by Wipro in exercising or enforcing any right, remedy or power hereunder shall operate as a waiver thereof, nor shall any single or partial exercise or enforcement of any right, remedy or power preclude any further exercise or enforcement thereof or the exercise of enforcement of any other right, remedy or power.

10. This Agreement will be governed exclusively by the laws of India and, jurisdiction shall be vested exclusively in the courts at Bengaluru. This Agreement shall not be amended, assigned or transferred by either party without obtaining the written consent of Wipro.

11. The obligations of confidentiality shall survive the expiry or termination of the internship. Nothing in this Agreement is intended to confer any rights/remedies under or by reason of this Agreement on any third party.

12. If any term or provision of this Agreement is determined to be illegal, unenforceable, or invalid in whole or in part for any reason, such illegal, unenforceable, or invalid provisions or part(s) thereof shall be stricken from this Agreement and such provision shall not affect the legality, enforceability, or validity of the remainder of this Agreement.

IN WITNESS WHEREOF the parties hereto have duly executed this Agreement as of the date and year written above.

Yours sincerely,
For Wipro Limited,

Aparna Shailen
General Manager - Human Resources

☑ Accept ☐ Decline

Intern Name: Chetan Waghmode

☑ **Signature** Chetan Waghmode 15/2/2022 8:23 PM
(checking the checkbox above is equivalent to a handwritten signature)

Registered Office:

Wipro Limited
Doddakannelli
Sarjapur Road
Bengaluru 560 035
India

T :+91 (80) 2844 0011
F :+91 (80) 2844 0054
E :info@wipro.com
W :wipro.com
C :L32102KA1945PLC020800

Sensitivity: Internal & Restricted

23160754

REF:TF/HR/21-22

01.07.2022

Name	Dhondiram Madhu Waghmode
Employee Code	154931
Designation	Associate Trainee
Department	Quality Assurance
Date Of Joining	01.03.2022
Date Of leaving	30.06.2022
Reason Of Leaving	Completion of Internship
Conduct	Good

We wish you all the best for your future endeavors

With Regards

For Tata Ficosa Automotive Systems Pvt.Ltd.

Manager-Human Resource

Head of Department

NPSWD

New Phaltan Sugar Works Distillery Division Ltd.

Plot No. 476/477-1/478-1/479/567-A, A/p. **Surwadi - 415 528**
Tal. Phaltan, Dist. Satara, Telephone : (02160) : 253002
ISO - 9001:2015 Certified Company
E-mail - newphaltandistillery@gmail.com GSTIN - 27AAECN4417F2ZL

Ref No: NPSWD/HR/159/2021-22

Date: 23/06/2022

To Whomsoever It May Concern

This is to certify that, **Mr. Nilesh Sanjay Kadam** a student of B.Tech (Mechanical Engineering) from Shri Vithal Education & Research Institute's College of Engineering, Pandharpur has successfully completed his In-plant training in our Mechanical department from 03/03/2022 to 23/06/2022.

His overall performance during the training period was found satisfactory. We wish him all the best for future.

This certificate is issued to him as per his request.

NEW PHALTAN SUGAR WORKS DISTILLERIES DIVISION LTD.

(Shailendra Pawar)
General Manager

Frame - by - Frame

Now a complete range
of LT Motors
available up to
1000kW / 450 Frame

Lhp
MOTORS DRIVES
Driven by Commitment

REF :- LHPL/P&A/2022

DATE :- **25 MAY 2022**

CERTIFICATE

This is to certify that **MR. LONDHE VAIBHAV ANIL** of **SVERI College of Engineering, Pandharpur (MH)** has successfully completed his/her **Vacational Training** from **25 FEB 2022 TO 25 JUN 2022** in our company. To the best of my knowledge, he/she is sincere, honest & devoted to the work. He/She bears a good moral conduct. I wish him/her for better future.

FOR LAXMI HYDRAULICS PVT. LTD.

KISAN DADAGE

(HEAD -ADMIN.)

Laxmi Hydraulics Pvt. Ltd.
Regd. & Corporate Office : B11 & B16, M.I.D.C. Chicholi, Solapur – 413255 INDIA
Tel.: +91 - 217 2357001(5Lines) Fax: +91 - 217 2357006 email : lhpindia@lhpmotor.com W

Scanned by TapScanner

CooperStandard

Date 15/06/2022

TO WHOM SO EVER IT MAY CONCERN

This is to certify that ***Atharv Makarand Kulkarni*** of SVERIS College of Engineering Pandharpur has completed Three Months in Plant training or internship training program at COOPER STNDARD INDIA PVT. LTD.PUNE from 10/03/2022 to 10/06/2022

Date 15/06/2022

Authorized Signatory

COOPER-STANDARD INDIA PVT. LTD.
(Formerly known as METZELER Automotive Profiles India Pvt. Ltd.)
Plot No. 1, Sector 8, Growth Centre
Bawal - 123 501 (HARYANA) INDIA
Tel.: +91-1284-268509
E-mail : CSIndiaSealinginfo@cooperstandard.com
Internet: www.cooperstandard.com

Registered Office :
301-302, Tolstoy House, 15, Tolstoy Marg
New Delhi - 10 001
CIN : U34102DL1963PTC004019

Internship Training Completion Certificate:

SPARTAN TECHNOLOGIES PVT LTD

An ISO 9001 : 2015Certified Company

Gat No. 468/2 Mundhewadi Road, A-Machnur,P-Bramhpuri,Mangalwedha 413305, Dist-Solapur,Maharashtra.

www.spartansolartechnologies.com E.mail-info@spartansolartechnologies.com

Ref: SST/SL2022/15 **Date- 25/06/2022**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. Avinash Ajinath Madane** of **SVERI's College of Engineering Pandharpur** has done his internship in "Solar Equipment Design And Making" at SPARTAN SOLAR TECHNOLOGIES, Mangalwedha, from 10th March 2022 to 25th June 2022.

During his internship he has demonstrated his skills with self-motivation to learn new skills. His performance exceeded our expectations and he was able to complete the project on time.

We wish him all the best for his upcoming career.

For SPARTAN TECHNOLOGIES PVT LTD.

Dhiraj Doke
[Chief Product Officer]

Suraj Doke
[Founder-Director]

Spartan Technologies Pvt. Ltd.

SPARTAN TECHNOLOGIES PVT LTD

An ISO 9001 : 2015Certified Company
Gat No. 468/2 Mundhewadi Road, A-Machnur,P-Bramhpuri,Mangalwedha 413305, Dist-Solapur,Maharashtra.
www.spartansolartechnologies.com E.mail-info@spartansolartechnologies.com

Ref: SST/SL2022/13 **Date- 25/06/2022**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. Amol Vijay Mali** of **SVERI's College of Engineering Pandharpur** has done his internship in "Solar Equipment Design And Making" at SPARTAN SOLAR TECHNOLOGIES, Mangalwedha, from 10th March 2022 to 25th June 2022.

During his internship he has demonstrated his skills with self-motivation to learn new skills. His performance exceeded our expectations and he was able to complete the project on time.

We wish him all the best for his upcoming career.

For SPARTAN TECHNOLOGIES PVT LTD,

Dhiraj Doke
[Chief Product Officer]

Suraj Doke
[Founder-Director]

Spartan Technologies Pvt.Ltd.
Machnur, Tal. Mangalwedha
Dist. Solapur

CooperStandard

Date 15/06/2022

TO WHOM SO EVER IT MAY CONCERN

This is to certify that **Om Damodar Metkari** of SVERIS College of Engineering Pandharpur has completed Three Months in Plant training or internship training program at COOPER STNDARD INDIA PVT. LTD.PUNE from 10/03/2022 to 10/06/2022

Date 15/06/2022

Authorized Signatory

COOPER-STANDARD INDIA PVT. LTD.
(Formerly known as METZELER Automotive Profiles India Pvt. Ltd.)
Plot No. 1, Sector 8, Growth Centre
Bawal - 123 501 (HARYANA) INDIA
Tel.: +91-1284-268509
E-mail : CSIndiaSealinginfo@cooperstandard.com
Internet: www.cooperstandard.com

Registered Office :
301-302, Tolstoy House, 15, Tolstoy Marg
New Delhi - 10 001
CIN : U34102DL1963PTC004019

CooperStandard

Date 15/06/2022

TO WHOM SO EVER IT MAY CONCERN

This is to certify that ***Aman Allauddin Mulani*** of SVERIS College of Engineering Pandharpur has completed Three Months in Plant training or internship training program at COOPER STNDARD INDIA PVT. LTD.PUNE from 10/03/2022 to 10/06/2022

Date 15/06/2022

Authorized Signatory

COOPER-STANDARD INDIA PVT. LTD.
(Formerly known as METZELER Automotive Profiles India Pvt. Ltd.)
Plot No. 1, Sector 8, Growth Centre
Bawal - 123 501 (HARYANA) INDIA
Tel.: +91-1284-268509
E-mail : CSIndiaSealinginfo@cooperstandard.com
Internet: www.cooperstandard.com

Registered Office :
301-302, Tolstoy House, 15, Tolstoy Marg
New Delhi - 10 001
CIN : U34102DL1963PTC004019

Internship Training Completion Certificate:

CooperStandard

Date 15/06/2022

TO WHOM SO EVER IT MAY CONCERN

This is to certify that *Jaydev Deepak Nanaware* of SVERIS College of Engineering Pandharpur has completed Three Months in Plant training or internship training program at COOPER STNDARD INDIA PVT. LTD.PUNE from 10/03/2022 to 10/06/2022

Date 15/06/2022

Authorized Signatory

COOPER-STANDARD INDIA PVT. LTD.
(Formerly known as METZELER Automotive Profiles India Pvt. Ltd.)
Plot No. 1, Sector 8, Growth Centre
Bawal - 123 501 (HARYANA) INDIA
Tel.: +91-1284-264500
E-mail : CSIndiaEnquiries@cooperstandard.com
Internet: www.cooperstandard.com

Registered Office :
301-302, Tolstoy House, 15, Tolstoy Marg
New Delhi - 110 001
CIN : U34103DL1992PTC049019

ACKNOWLEDGEMENT

NAWD SOFTWARE PVT. LTD.
Pune & Ahmednagar, Maharashtra
Gov.Reg.No.:- MH01D0020483

Date:- 20/06/2022

Internship Certificate

This is to certify **that Mr. Saurabh Sanjay Nikam** has done his internship in Full Stack Web Developer at **NAWD Software Pvt. Ltd**, Ahmednagar from **15 Feb 2022 to 17 June 2022**.

He has worked on a project titled **"Employee Details".** This project has mainly covered information of the customers, In this system have developed all types of CRUD.

During the internship he demonstrated good design skills with a self-motivated attitude to learn new things. His performance exceeded expectations and was able to complete the project successfully on time.

We wish him all the best for his future endeavors.

NAWD SOFTWARE PVT. LTD. AHMEDNAGAR

FOR NAWD SOFTWARE PVT. LTD.

Adm.Assistant

Mob.:- 935 971 6081 Website:- www.nawdsoftware.co.in Email:- info@nawdsoftware.co.in

nawd_software nawdsoftware nawd-software-prv-ltd nawdsoft

Arunoday Enterprises

Address: 1243/35 Shivaji Udyamnagar,
Kolhapur-416008.
Email : info@arunodayenterprises.com
Contact : +91 9028216691 , 7741034774

Authorized Channel Partner for Siemens PLM Softwares

Date : 11/07/2022

TO WHOM SO EVER IT MAY CONCERN

This is to certify that **Mr. Parmar Ridham Girish** of **SVERI's College of Engineering , Pandharpur** has completed 120 days Internship training at **Arunoday Enterprises, Kolhapur** from 10/03/2022 to 10/07/2022. During this internship he has gone through hands on practices on 3D printing as well as 3D modeling.

During the period of internship , we found him sincere and hard working. We wish him all the best for all their future endeavors.

Date : 11/07/2022

Arunoday Enterprises

ARUNODAY ENTERPRISES * KOLHAPUR *

Authorized Signatory

CooperStandard

Date 15/06/2022

TO WHOM SO EVER IT MAY CONCERN

This is to certify that ***Madan Kalyan Patil*** of SVERIS College of Engineering Pandharpur has completed Three Months in Plant training or internship training program at COOPER STNDARD INDIA PVT. LTD.PUNE from 10/03/2022 to 10/06/2022

Date 15/06/2022

Authorized Signatory

COOPER-STANDARD INDIA PVT. LTD.
(Formerly known as METZELER Automotive Profiles India Pvt. Ltd.)
Plot No. 1, Sector 8, Growth Centre
Bawal - 123 501 (HARYANA) INDIA
Tel.: +91-1284-268509
E-mail : CSIndiaSealinginfo@cooperstandard.com
Internet: www.cooperstandard.com

Registered Office :
301-302, Tolstoy House, 15, Tolstoy Marg
New Delhi - 10 001
CIN : U34102DL1963PTC004019

SPARTAN TECHNOLOGIES PVT LTD

An ISO 9001 : 2015Certified Company
Gat No. 468/2 Mundhewadi Road, A-Machnur,P-Bramhpuri,Mangalwedha 413305, Dist-Solapur,Maharashtra.
www.spartansolartechnologies.com E.mail-info@spartansolartechnologies.com

Ref: SST/SL2022/14 **Date- 25/06/2022**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. Yogesh Kumar Patil** of **SVERI's College of Engineering Pandharpur** has done his internship in "Solar Equipment Design And Making" at SPARTAN SOLAR TECHNOLOGIES, Mangalwedha, from 10th March 2022 to 25th June 2022.

During his internship he has demonstrated his skills with self-motivation to learn new skills. His performance exceeded our expectations and he was able to complete the project on time.

We wish him all the best for his upcoming career.

For SPARTAN TECHNOLOGIES PVT. LTD,

Dhiraj Doke
[Chief Product Officer]

Suraj Doke
[Founder-Director]

Spartan Technologies Pvt.Ltd.
Machnur, Tal. Mangalwed
Dist. Sol

31st May 2022

PROJECT COMPLETION CERTIFICATE

This is to certify that Mr Omkar Santosh Pawar Trainee ID 40117575 student of "Shri Vithal Education & Research Institute (SVERI) College of Engineering, Pandharpur" has completed the project entitled "JAVA/ J2EE" under the guidance of "Sureka Rajeshwari" from 10th Mar 2022 to 31st May 2022 at Pune for the academic requirements of his graduation.

We have observed that your work was excellent and we appreciate your sincere learning.
You have performed the project with energy and enthusiasm.
This letter is issued based on your request.

We wish you all the very best in your career ahead!

Yours sincerely,
For **Wipro Limited,**

Aparna Shailen
General Manager - Human Resources

Registered Office:
Wipro Limited
Doddakannelli
Sarjapur Road
Bengaluru 560 035
India

T : +91 (80) 2844 0011
F : +91 (80) 2844 0054
E : info@wipro.com
W : wipro.com
C : L32102KA1945PLC020800

Internship Training Completion Certificates:

1.Shubham Uttam Pawar:

SPARTAN TECHNOLOGIES PVT LTD

An ISO 9001 : 2015Certified Company

Gat No. 468/2 Mundhewadi Road, A-Machnur,P-Bramhpuri,Mangalwedha 413305, Dist-Solapur,Maharashtra.

www.spartansolartechnologies.com E.mail-info@spartansolartechnologies.com

Ref: SST/SL2022/18

Date- 29/06/2022

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. Shubham Uttam Pawar** of **SVERI's College of Engineering Pandharpur** has done his internship in "Solar Equipment Design And Making" at SPARTAN SOLAR TECHNOLOGIES, Mangalwedha, from 10th March 2022 to 25th June 2022.

During his internship he has demonstrated his skills with self-motivation to learn new skills. His performance exceeded our expectations and he was able to complete the project on time.

We wish him all the best for his upcoming career.

For SPARTAN TECHNOLOGIES PVT. LTD,

Dhiraj Doke
[Chief Product Officer]

Spartan Technologies Pvt. Ltd. Machanur.

Suraj Doke
[Founder-Director]

Atlas Copco

Date: 29/06/2022

Dear **Hrishav Raj Rai**

In reference to your application we would like to congratulate you on being selected for internship with **Atlas Copco (I) Limited** based at **Dapodi, Pune**. Your training has been scheduled to start effective **12th April to 11th July** for a period of 3 months.

Thanks and Regards,
For Atlas Copco (India) Ltd.

Shruti Devarde
Assistant Manager Human Resources
Product Company, Dapodi.

Frame - by - Frame

Now a complete range
of LT Motors
available up to
1000kW / 450 Frame

LHP MOTORS DRIVES
Driven by Commitment

REF :- LHPL/P&A/2022

DATE :- 25 MAY 2022

CERTIFICATE

This is to certify that MR. CHATAGE ROHIT DATTATRAY of SVERI College of Engineering, Pandharpur (MH) has successfully completed his/her Vacational Training from 25 FEB 2022 TO 25 JUN 2022 in our company.

To the best of my knowledge, he/she is sincere, honest & devoted to the work.

He/She bears a good moral conduct. I wish him/her for better future.

FOR LAXMI HYDRAULICS PVT. LTD.

KISAN DADAGE
(HEAD -ADMIN.)

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Gat No. 468/2 Mundhewadi Road, A-Machnur,P-Bramhpuri,Mangalwedha 413305, Dist-Solapur,Maharashtra.
www.spartansolartechnologies.com E.mail-info@spartansolartechnologies.com

Ref: SST/SL2022/04 **Date- 23/06/2022**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. Yasar Yusuf Khatik** of **SVERI's College Of Engineering Pandharpur** has done his internship in "Solar Equipment Design And Making" at SPARTAN SOLAR TECHNOLOGIES, Mangalwedha, from 19th March 2022 to 23rd June 2022.

During his internship he has demonstrated his skills with self-motivation to learn new skills. His performance exceeded our expectations and he was able to complete the project on time.

We wish him all the best for his upcoming career.

For SPARTAN TECHNOLOGIES PVT. LTD,

Dhiraj Doke
[Chief Product Officer]

Suraj Doke
[Founder-Director]

Spartan Technologies Pvt.Ltd.
Machnur, Tal. Mangalwedha
Dist. Solapur

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www.spartansolartechnologies.com E.mail-info@spartansolartechnologies.com

Ref: SST/SL2022/12 **Date- 25/06/2022**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. Aniket Rajkumar Sarawale** of **SVERI's College of Engineering Pandharpur** has done his internship in "Solar Equipment Design And Making" at SPARTAN SOLAR TECHNOLOGIES, Mangalwedha, from 10th March 2022 to 25th June 2022.

During his internship he has demonstrated his skills with self-motivation to learn new skills. His performance exceeded our expectations and he was able to complete the project on time.

We wish him all the best for his upcoming career.

For SPARTAN TECHNOLOGIES PVT. LTD,

Dhiraj Doke
[Chief Product Officer]

Suraj Doke
[Founder-Director]

Spartan Technologies Pvt.Ltd.
Machnur, Tal. Mangalwedha
Dist. Solapur

RSK Cranes & Components

{ Formaly Known as 'RSK Engineering (I) Pvt.Ltd.' }

Works / Office : Plot No.A-32, Phase No.II,
Opp. to Hyunadi Construction Equipments,
Village Khalumbre, M.I.D.C., Chakan, Pune-410501
Web : www.rskcranes.com / www.indiamart/rskcranes

E Mail : vitthal@rskcranes.com
vitthal@rsk-engineering.com
info@rskcranes.com
Mob.: +91 9096580702 / 9225604001

Certificate

This is to certify that **Aftab Bashir Shaikh** From SVERI College of Engineering, Pandharpur, has undergone training in the **RSK CRANES & COMPONENTS** , Pune Works for Period of 1 Month From the Date 10/08/2021 To 10/09/2021 under my guidance. His Performance has been satisfactory so as to fullfill all the requirements for successful comletion of the training .This document is a bona fide testimony of the training undergone and works carried out by him in this course.

Date : 11/09/21

Mr.S.G .Padawale ,

Plant Manger

RSK CRANES

SPARTAN TECHNOLOGIES PVT LTD

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Gat No. 468/2 Mundhewadi Road, A-Machnur,P-Bramhpuri,Mangalwedha 413305, Dist-Solapur,Maharashtra.
www.spartansolartechnologies.com E.mail-info@spartansolartechnologies.com

Ref: SST/SL2022/16 **Date- 25/06/2022**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. Salim Husen Shaikh** of **SVERI's College of Engineering Pandharpur** has done his internship in "Solar Equipment Design And Making" at SPARTAN SOLAR TECHNOLOGIES, Mangalwedha, from 10th March 2022 to 25th June 2022.

During his internship he has demonstrated his skills with self-motivation to learn new skills. His performance exceeded our expectations and he was able to complete the project on time.

We wish him all the best for his upcoming career.

For SPARTAN TECHNOLOGIES PVT. LTD,

Dhiraj Doke
[Chief Product Officer]

Suraj Doke
[Founder-Director]

Spartan Technologies Pvt.Ltd.
Machnur, Tal. Mangalwed
Dist. Sola

RANE INDUSTRIES PVT. LTD.

Manufacturing and Supply of Welded Assemblies
Sheet Metal and Machined Components.

Work & Office : Gat No. 52, Dehu-Alandi Road, Talawade, Pune - 411 062.
E-mail : raneindustries@rediffmail.com

This is certify that, **Mr. Dipak Pandurang shinde** a student of B.Tech (Mechanical Engineering) from Shri Vitthal Education & Research Institute's College of Engineering, Pandharpur has successfully completed his In-plant training in our Mechanical Department from 10/03/2022 to 30/06/2022.

His overall performance during the training period was found satisfactory. We wish him all the best for future.

This certificate is issued to him as per his request..

Shivaji Survase

(Development Head)

RANE INDUSTRIES PVT. LTD. PUNE 410 501. CHAKAN

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CIN - U74110PN2012PLC141952

LOKNETE SUGAR

LOKNETE BABURAO PATIL
AGRO INDUSTRIES LIMITED

◆ Founder : Rajan Baburao Patil (Ex. MLA) ◆ Chairman : Vikrant (Balraje) Rajan Patil

30/06/2022

To Whom SO EVER It May Concern

This is certify that, **Mr.Shinde Nanasaheb Siddheshwar of SVERI's Collage of Engineering Pandharpur** has completed four months internship training program at M/s Loknete Baburao Patil Agro Industries Limited, Laxminagar, Angar Tal. Mohol Dist. Solapur.

During his 02/03/2022 to 30/06/2022 training period he take knowledge about Distillery & Boiler section mechanical equipment satisfactorily & sincerely.

This certificate is issued on his interest.

Chief Executive Officer

Loknete Baburao Patil Agro Industries ★ Laxminagar, Angar, Tal. Mohol ★
Reg. No. CIN-U15400PN 2012PLC141952 Dt.17-1-2012

Laxminagar, Angar, Tal. Mohol, Dist. Solapur, Maharashtra, Pin-413214.
Tel. : 9022667777 E-mail: loknetesugar@gmail.com

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Kakade Agro Equipments
(Manufacturer of All Kinds of Modern, Agro Sprayers and Equipments)
An ISO 9001: 2015 certified company
A/P: Near Shivaji Staschu Tandulwadi, Tah: Malshiras Dist: Solapur,
Contact: +917709685151,9503836313 Email:
kakadetoofanblowers@gmail.com

Date :30/06/2021

Certificate

This is certify that **Mr. Vishwajit Ashok Shinde** student of **SVERI's COLLEGE OF ENGG, PANDHARPUR** has done training of Manufacturing, assembling and testing of agro sprayers equipment's at our company from02/03/2022 to 30/06/2022.

During training his involvements was good, and we wish best luck to his for bright future....

Er. Subhash N Kakade, M. Tech Agril Engg. FMPE
M/s. KAKADE AGRO EQUIPMENTS

PROPRIETOR Founder

Sai Engineering Works

Work's S No 40, Keshav Nagar, Pawar Vasti, Mundhwa Pune - 411 036
Mob. : 9665371272 / 7385521604
Email : saienggworks01aug@gmail.com

Ref. No

Date : 30th June 2022

TO WHOM IT MAY CONCERN

This is to certify that Mr.Dnyaneshwar Ganpat Shitole a student of SVERI'S Collage of Engineering, Pandharpur did 4 months internship training at Sai Engineering Works from 1st March 2022 to 30th June 2022

During his internship he has demonstrated his skills with self-motivation to learn new skills .His performance exceeded our Expectations.

We wish him all the best for his upcoming career.

Sai Engineering Works

Mr.Rajendra Shinde

Partner

Signature.

SAI ENGINEERING WORKS
S.No.40,Keshav Nagar,
Pawar Vasti,Mundhwa,
PUNE - 411 036

SPARTAN TECHNOLOGIES PVT LTD

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Gat No. 468/2 Mundhewadi Road, A-Machnur,P-Bramhpuri,Mangalwedha 413305, Dist-Solapur,Maharashtra.
www.spartansolartechnologies.com E.mail-info@spartansolartechnologies.com

Ref: SST/SL2022/09 **Date- 25/06/2022**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. Harshvardhan Sudhir Ubale** of **SVERI's College of Engineering Pandharpur** has done his internship in "Solar Equipment Design And Making" at SPARTAN SOLAR TECHNOLOGIES, Mangalwedha, from 10th March 2022 to 25th June 2022.

During his internship he has demonstrated his skills with self-motivation to learn new skills. His performance exceeded our expectations and he was able to complete the project on time.

We wish him all the best for his upcoming career.

For SPARTAN TECHNOLOGIES PVT. LTD,

Dhiraj Doke
[Chief Product Officer]

Suraj Doke
[Founder-Director]

Spartan Technologies Pvt.Ltd.
Machnur, Tal. Mangalwedha
Dist. Solapur

Phadtare GROUP

|| Shri Datta Krupa ||

Phadtare Fabtech Pvt. Ltd.

ISO 9001 : 2015 CERTIFIED COMPANY

Ref No.: PFPL/07/2022-23/01

Date: 01.07.2022

TO WHOM IT MAY CONCERN

This is to certify that **Mr. Mohit Nagesh Taur** a student of B. Tech (Mechanical Engineering) from **SVERI'S College Of Engineering, Pandharpur** (Solapur University) successfully completed four months (From 1st March, 2022 to 29th June, 2022) internship at this **Phadtare Fabtech Pvt Ltd.** His internship activity includes familiarizations to all the departments and there operations and processes and there management overview involved with the production process of the company. He had majorly involved in ant activity of **Project management and Inventory management.**

During the period of his internship program with us he had been exposed to different process was found punctual, hardworking and inquisitive. We wish him every success in his life and career.

Phadtare Fabtech Pvt Ltd.

PHADTARE FABTECH PVT.LTD. Gokhali

Signature of Authorized Officer

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BHAIRAVNATH SUGAR WORKS LTD. (UNIT-4)
A/P - Alegaon (Bk), Post – Adhegaon, Tal - Madha,
Dist – Solapur, PIN – 413 212
Email- bswlalegaon@gmail.com

Out.No/BSWL Alegaon/Time office/321 /2021-22 Date: 26/6/2022

To Whom It May be Concern

This is certify that Mr.Sachin Uttam Kengar had successfully completed summer training project from 10/03/2022 to 25/6/2022 in our organization at Bhairavnath Sugar Works Ltd., Unit -4 Alegaon Bk Tal.Madha Dist.Solapur.

He is sincere,hardworking and technically sound and result oriented candidate. He has good sense of humour, works well as part of team.

Wish he success in he future endeavors.

For Bhairavnath Sugar Works Ltd.,

General Manager

SPARTAN TECHNOLOGIES PVT LTD

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www.spartansolartechnologies.com E.mail-info@spartansolartechnologies.com

Ref: SST/SL2022/17 **Date- 29/06/2022**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. Rohit Dattatraya Vidhate** of **SVERI's College of Engineering Pandharpur** has done his internship in "Solar Equipment Design And Making" at SPARTAN SOLAR TECHNOLOGIES, Mangalwedha, from 10th March 2022 to 25th June 2022.

During his internship he has demonstrated his skills with self-motivation to learn new skills. His performance exceeded our expectations and he was able to complete the project on time.

We wish him all the best for his upcoming career.

For SPARTAN TECHNOLOGIES PVT. LTD,

Dhiraj Doke
[Chief Product Officer]

Suraj Doke
[Founder-Director]

Spartan Technologies
Pvt. Ltd. Machanur.

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Utopian Sugars Ltd.
"Pantnagar", Kacharewadi,
Tal- Mangalwedha, Dist- Solapur 413 305
T : 02188-247221/222/225, F : 02188-247255
E : utopiansugars@rediffmail.com

O/N:USL/LWO/Exp.Certi./16//2022-23

Date- 27/06/2022

CERTIFICATE

This is to certify that Mr.Sourabh Ganesh Wadekar Student of SVERI, College of Engineering, Pandharpur Studying in Final Year of B.Tech. (Mechanical Engineering).

He has successfully completed industrial training at our organization during 10/03/2022 to 27/06/2022 very successively.

During this industrial training period his work is found satisfactory.We wish him all the best for future.

This Certificate is issued as per his own request for the personal use.

For Utopian Sugars Ltd.,

General Manager (Tech)

Utopian Sugars Ltd. Kacharewadi

CLASSIC DIE TOOLS
क्लासिक डाय टुल्स

Design & Mfg. of Dies, Moulds, Jig & Fixtures And Engg. Job Works

SOUTH ASIA
AN ISO 9001 : 2015 COMPANY

Ref:- 0019 / 2022-23

Date: - 26/06/2022

CERTIFICATE OF IN PLANT TRAINING

This is to certify that **Mr.AKASH PRASAD AJGAR** student of SVERI'S COE, Pandharpur (B.Tech. Mechanical engineering, Div.-B, Roll no. 56) has completed his 90 days industrial training in our company. He attended the duty for In plant training from **23/03/2022 to 23/06/2022** at **"CLASSIC DIE TOOLS"** Chakan MIDC, Pune 410501.

We found him sincere, hardworking, technically sound and result oriented. He completed his training work well with our team during his tenure. We take this opportunity to wish him all the best for his future.

For Classic Die Tools,

M/s. CLASSIC DIE TOOLS * Chakan, Pune - 410501 *

Authorized Signatory

Regd. Office : Capital City, S. No. A7/2, Plot No. C- 21, opp. to Mahindra & Mahindra Gate No.-1, Talawade-Mahalunge Road, Village Nighoje, MIDC Chakan, Phase IV, Pune - 410501

E-mail : navnath.solanke@classicdietools.com, milind.ajgar@classicdietools.com, classicdietools@gmail.com, website : www.classicdietools.com

Contact No. 9860758437 / 9146413672 / 9822883570 / 9404169272

Vertex TECHNOSYS

- Web Development
- Mobile Development
- Desktop Development
- IT Enabled Services

Date : 29/6/22

Ref No.:

Certificate

Industrial Internship

This is to certify that Mrs. *Yogesh Samrat Autade* has undergone the industrial implant training programme for SQL using Oracle for 4 Months at Vertex Technosys, Solapur from March 28th, 2022 to June 25th, 2022.

We wish her good luck for her upcoming future.

Vertex Technosys

Authorized Signature

(Narendra Mergu, Director)

VERTEX TECHNOSYS SOLAPUR

Address: 9/4, Shri Markandeya Yantramag Dharak Society, Near WIT College, Solapur.
Email: info@vertextechnosys.com / naren1405@gmail.com Mobile No.: +91 - 9422781840 / +91 - 9403046045

Date: 24 June 2022

TO WHOM SO EVER IT MAY CONCERN

This is to certify that **Mr. Sandip Bagul** pursuing Bachelor of Technology from **SVERI's College of Engineering**.

He is undergoing internship from **20th March 2022** and internship activity includes training and implementation of all **Dot Net Full Stack Web Development** including MVC, WEB API, C#, SQL, JavaScript and same is ongoing.

He is successfully able complete the training and all tasks assigned to him.

During his tenure, we found he is highly receptive and hardworking.

Rathod

VHaaSh Technologies Private Limited, Pune

For VHaaSh Technologies Pvt Ltd

CIN NO:
U72200KA2007PTC044701

7TH MARCH, 2022

DEAR PRANAV BHANDARE,

ON BEHALF OF TEST YANTRA SOFTWARE SOLUTIONS, IT IS MY PLEASURE TO CONFIRM OUR OFFER OF APPRENTICE TRAINEE FOR 6 MONTH AT OUR PUNE DECCAN - MAHARASHTRA. WE EXTEND THIS OFFER, AND THE OPPORTUNITY IT REPRESENTS, WITH GREAT CONFIDENCE IN YOUR ABILITIES.

THE DURATION OF APPRENTICESHIP WILL BE ONE YEAR AND DURING THIS TRAINING PROBATION PERIOD, YOU WILL BE EXPECTED TO FULFILL ALL THE DUTIES AND RESPONSIBILITIES ASSIGNED TO YOU BY THE TEAM LEAD, MR. KEDARNATH WHO WILL ALSO BE THE PERSON WHOM YOU WILL BE REPORTING.

AS A SOFTWARE TRAINEE, YOU WILL NOT BE ENTITLED FOR ANY OTHER KIND OF MONETARY BENEFITS OTHER THAN ONE CASUAL LEAVE A MONTH DURING THE TRAINING PERIOD. IN CASE YOU PLAN TO LEAVE THE COMPANY DURING THE PERIOD OF ONE YEAR, YOU WILL BE REQUIRED TO SERVE A NOTICE PERIOD OF TWO WEEKS.

TESTYANTRA

YOU WILL ABIDE BY THE RULES AND REGULATIONS OF THE COMPANY WHICH ARE IN FORCE FROM TIME TO TIME AND THE COMPANY SHALL HAVE THE RIGHT TO VARY OR MODIFY ANY OR ALL OF THE ABOVE TERMS AND CONDITIONS IN SERVICE WHICH SHALL BE BINDING ON YOU.

ANY ACT OF DISHONESTY, DISOBEDIENCE, INSUBORDINATION, INCIVILITY, INTEMPERANCE, IRREGULARITY IN ATTENDANCE OR OTHER MISCONDUCT OR NEGLECT OF DUTY, OR INCOMPETENCE IN THE DISCHARGE OF DUTY ON YOUR PART OR THE BREACH OF ANY OF THE TERMS, CONDITIONS AND STIPULATIONS CONTAINED HEREIN WILL RENDER YOU LIABLE TO TERMINATION OF YOUR EMPLOYMENT WITHOUT NOTICE OR COMPENSATION THEREOF.

IT IS OUR HOPE THAT YOUR ACCEPTANCE OF OUR OFFER WILL BE JUST THE BEGINNING OF A MUTUALLY BENEFICIAL RELATIONSHIP WITH OUR ORGANIZATION. WE TAKE GREAT PLEASURE IN WELCOMING YOU TO OUR ORGANIZATION AND SINCERELY HOPE THAT YOU'R PERIOD OF SERVICE WITH US WILL BE LONG, PLEASANT AND OF MUTUAL BENEFIT.

SINCERELY,

FOR

TEST YANTRA SOFTWARE SOLUTIONS (I) PVT. LTD.

EXECUTIVE HR

I AGREE TO ACCEPT THE CONDITIONAL OFFER AND EMPLOYMENT ON THE ABOVE-MENTIONED TERMS AND CONDITIONS. I'LL REPORT FOR DUTY TENTATIVELY IN MONTH ON 7TH MARCH, 2022.

Edit with WPS Office

CORPORATE OFFICE: 88, 3RD FLOOR, BRIGADE CHAMBERS, BASAVANAGUDI, BENGALURU, KARNATAKA 560004

TESTYANTRA

Edit with WPS Office

संतकृपा इंजिनिअरींग वर्क्स
SHED NO. W-14, Chincholi, M.I.D.C., Solapur
Mob.: 9960147989 Email : skengg234@gmail.com

Certificate

This is certify that **Mr.Avinash Basavraj Dhabade** (PRN No:2019032500221271)pursuing **B.Tech (MechanicalEngineering)**from SVERI's College of Engineering Pandharpur,has undergone Internship at M/S**Santkrupa Engineering Works**,during the period from **10th March 2022 to 30th June 2022.**

During the above period his conduct and character were found **Very Good**.We wish him all success in all endeavors.

DATE: 30/06/2022

PLACE: SOLAPUR

Authorised
M/S. SANT KRUPA ENGINEERING WORKS
SHED W-14,M.I.D.C. CHINCHOLI,
SOLPAUR

SPARK MINDA VAST

MINDA VAST ACCESS SYSTEMS

Date: 24/06/2022

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. DHERE RUPESH AMBARUSHI,** student of **Mechanical Engineering of SEVERI'S College of Engineering, Pandharpur** has successfully undergone the Internship in **Operation Department (Assembly)** of our organization **from 10/03/2022 to 24/06/2022**.

During the tenure of his training, his overall performance was good, enthusiastic attitude of learning with good performance.

Minda Vast Access Systems Pvt. Ltd.,

Yuvraj Thorat

Lead – HR, IR & Admin

MINDA VAST ACCESS SYSTEMS PRIVATE LIMITED

CIN: U34300DL2007PTC157344

Corporate Office: B-21, M. I. D. C., Chakan, At Nighoje, Post Kuruli, Tal. Khed, Dist. Pune - 410501. Maharashtra, India.

TEL: +91-02135-668400 FAX: +91-02135-668501

Registered Office: A-15, Ashok Vihar, Phase-I, Delhi - 110052, Website: www.minda.co.in

संतकृपा इंजिनिअरींग वर्क्स
SHED NO. W-14, Chincholi, M.I.D.C., Solapur
Mob.: 9960147989 Email : skengg234@gmail.com

Certificate

This is certify that **Mr.Nitin Tatya Ekmalli(PRNNo:2019032500221031)**pursuing **B.Tech (Mechanical Engineering)**from SVERI's College of Engineering Pandharpur,has undergone Internship at M/S **Santkrupa Engineering Works**,during the period from **10th March 2022 to 30th June 2022.**

During the above period his conduct and character were found **Very Good**.We wish him all success in all endeavors.

DATE: 30/06/2022

PLACE: SOLAPUR

Authorised

M/S. SANT KRUPA ENGINEERING WORKS
SHED W-14,M.I.D.C. CHINCHOLI,
SOLPAUR

Scanned with CamScanner

KAIZEN
ENGINEERING (INDIA) PVT. LTD.

Date: 18th April 2022

To,

Mr. Saurabh Shahaji Gaikwad ,

Sub: Appointment Letter

Dear Mr. Saurabh Shahaji Gaikwad ,

This has reference to your interview for the post of Trainee Engineer on 10.04.2022

We are pleased to inform you that you're being appointed as **Trainee Engineer –Quality** for Training period of one year, starting from 20.04.2022 to 20.04.2023.

Upon successful completion of the Training period, your services will be confirmed or terminated, depending on your performance. The management reserves the right to extend or curtail the period of Training.

Your stipend during this period will be Rs. 12000 PM (in words Rs. Twelve Thousand only per month) + Staying arrangement + Canteen facility.

Please return the signed copy of this letter to acknowledgement & acceptance.

We wish you all the best.

Thanking you,

For Kaizen Engineering (India) Pvt. Ltd.

KAIZEN ENGINEERING (I) PVT. LTD. CHAKAN

Geeta Patil ,

Section Head –HR

SHREE SAMARTH FABRICATORS & ENGINEERING WORKS

A/p – Ramanandnagar, Tal – Palus, Dist – Sangli. Pin code - 416308
Mob- 9075096365 / 8975616365 E-mail – shreesamarthfab1@gmail.com

Certificate

This is certify that **Mr. Vishal Ankush Gangthade** (Roll no.- 2019032500221375) pursuing **B.Tech (Mechanical Engineering)** from **SVERI'S College of Engineering Pandharpur**, has undergone Internship at M/S - **Shree Samarth Fabricators & Engineering Work's**, during the period from **10th March to 30th Jun 2022.**

During the above period his conduct & character were found **Very Good**. We wish him all success in all future endeavors.

DATE: - 30/06/2022

PLACE: - RAMANANDNAGAR

Authorised

Shree Samarth Fabricators & Engineering Works

Internship Training Completion Certificate:

Date : 22th June 2022

TO WHOM SO EVER IT MAY CONCERN

This is to certify that Mr. Sushant Bhausaheb Jadhav pursuing Bachelor of Technology from SVERI's College of Engineering is undergoing internship from 16th March,2022 and the internship activity includes training and implementation Manual Testing, Java, SQL and Automation, and same is ongoing.

For **QSpiders Pune Wakad, Unit of Test Yantra Software Solutions Pvt. Ltd.**

QSPIDERS WAKAD JSPIDERS

Thanks & Regards

QSpiders Wakad

Training & Development Center

www.qspiders.com

TECHNIP
ENGINEERING AND SERVICES , PUNE.
TECHNIP- The Integration of Technologies for Perfection
Registered office : Chartered Coworks 303 , Metropolis , Balewadi High Street , Dasar, Laxman Nagar, Balewadi, Pune - 411045 , Maharashtra, India
Contact No : +91-9112671239 , +91-9657711506
E-mail ID : marketing@technipengg.com

Date : 29/06/2022

TO WHOM SO EVER IT MAY CONCERN

This is to certify that **Onkar Chandrakant Jagtap of SVERI's College of Engineering**, Pandharpur has completed four months Implant Training or Internship Training program at TECHNIP ENGINEERING AND SERVICES from 01/03/2022 to 28/06/2022

Date :29/06/ 2022

Technip Engineering And Services Pune

Authorized Signatory

SAI Enterprises

B-11/12, Survey No. 670/71, Lower Indiranagar, Bibavewadi, Pune - 411037.
Email ID : saienterprises278@gmail.com, M. 9657195951.

Date -24/06/2022

TO WHOM SO EVER IT CONCERN

This is to certify that **Mr. Akash Revappa Koli** pursuing Bachelor of Technology in **SVERI's College of Engineering, Pandharpur.** He has done his internship in "Natural Ventilation and Air Conditioning" at **Sai Enterprises, Bibavevadi, Pune** from 10th March 2022 to 24th June 2022.

During this internship he has demonstrated his skills with self motivation to learn new skill. His performance exceeded our expectation and he was able to complete the project in time.

we wish him all the very best for his upcoming career.

For Sai Enterpriaes,Pune

24/06/2022
SAI ENTERPRISES
S.No.670/71-B 11/12,
Loar Indiranagar. Bibwewadi
Pune-37, Mo.-9657195951

SAI ENTERPRISES PUNE-37

Chand Y. Fulari

[Founder and Director]

Mahadeo Fabricators & Engineering Works

PEB Structural Manufacturing

M.I.D.C Plot No.D-47,Tembhurni(MS) Dist:Solapur- 413 211

Mobile: +91- 9307594319

E-Mail: mahadeo.fabricators9155@gmail.com

DATE: 21/06/2022

TO WHOM IT MAY CONCERN

this is to certify that Mr. AVINASH SANDIPAN LONDHE . A student of B-TECH in mechanical engineering in institute of. SVERI'S COLLEGE OF ENGINEERING, PANDHARPUR. Under the university of PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY. has successfully completed his internship programme during date: 10/03/2022 TO 20/06/2022 . during the period of his internship programme with us he was found punctual, hardworking and inquisitive.

Date;21/06/2022

Aouthorised By:

MANAGER

(DIGVIJAY WAGHMARE)

KAIZEN
ENGINEERING (INDIA) PVT. LTD.

Date: 30th April 2022

To,

Mr. Akash Sambhaji Mane,

Sub: Appointment Letter

Dear Mr. Akash Sambhaji Mane,

This has reference to your interview for the post of Trainee Engineer on 08.04.2022

We are pleased to inform you that you're being appointed as **Trainee Engineer – Development** for Training period of one year, starting from 2.05.2022 to 2.05.2023.

Upon successful completion of the Training period, your services will be confirmed or terminated, depending on your performance. The management reserves the right to extend or curtail the period of Training.

Your stipend during this period will be Rs. 12000 PM (in words Rs. Twelve Thousand only per month) + Staying arrangement + Canteen facility.

Please return the signed copy of this letter to acknowledgement & acceptance.

We wish you all the best.

Thanking you,

For Kaizen Engineering (India) Pvt. Ltd.

Geeta Patil ,

Section Head –HR

Our Inspiration
Rajubapu Patil

Baliram Y. Patil
Director
Mob. 9822454654
Email-shekharpatilppr@gmail.com

Ganesh P. Patil
Director
Mob. +91 9011111202
Email-adv.patilganesh@gmail.com

Ref No. KSL/Adm/HR/2022-23/0014.

Date: 25/06/2022.

CERTIFICATE

This is to certify that **Mr. Onkar Mohan Kale** who is Student of B.Tech (Mechanical Engineering) 2021-2022, From Shri Vitthal Education & Research Institute's, Collage of Engineering Pandharpur. Has successfully undergone Internship Project under guidance of Mr. Shaikh S.S. (Chief Engineer), Mr. Tarale A.V. (Dy.Chief Chemist) during the period of 02.03.2022 to 25.06.2022.

He has been acquainted with the work and functioning of our Organization.

We wish him success in his career...

For Krushiraj Sugar Ltd, Bhose.

Krushiraj Sugar Ltd. U15421 PN 2012 PLC 142596 Dt.20/6/2012 Bhose (K) Tal Pandharpur Dist Solapur

Managing Director

Date : 22th June 2022

TO WHOM SO EVER IT MAY CONCERN

This is to certify that Mr. Shubham Bandu Deokar pursuing Bachelor of Technology from SVERI's College of Engineering is undergoing internship from 16th March,2022 and the internship activity includes training and implementation Manual Testing, Java, SQL and Automation, and same is ongoing.

For **QSpiders Pune Wakad, Unit of Test Yantra Software Solutions Pvt. Ltd.**

Thanks & Regards

QSpiders Wakad

Training & Development Center

Softtech Cloud Technologies

Regd. Office: SHOP NO-01, SHALAN HEIGHTS, S NO. 84/2B
NEAR SAI PARK, DIGHI, PUNE-411015. PUNE MH 411015 IN
Email: hr@softtechcloud.com
Tel: +91 9021184002
Website: softtechcloud.com

REF: INT- STC153-2022 Date: 29/06/2022

INTERNSHIP LETTER

This is to certify that **Mr. Vaibhav Sambhaji Jagtap** has completed Internship program in **"Salesforce"** as apartial fulfillment of requirement towards of his Internship Project.

Duration: - 05th March 2022 to 30th June 2022.

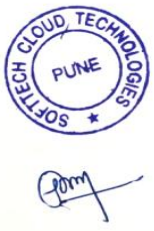
Technology: - Salesforce.

During the period of internship with us he was found punctual, hardworking and inquisitive. As abided byintellectual property and confidentiality policy of Softtech Solutions Pune. He is unable to produce the source code of above-mentioned project.

We wish him every success in life.

Yours sincerely,

SOFTTECH SOLUTIONS PUNE.



Human Resource Manager.

Company Confidential - This communication is confidential between you and Softtech Solutions.

INTERNSHIP CERTIFICATE

June 20, 2022

To whom it may concern,

This is certify that Mr. Rohit Adinath Salgar pursuing Bachelor of Technology from SVERI's College of Engineering is undergoing internship from 20th December,2021 and the internship activity includes training and implementation of Java, HTML, CSS, Javascript, React JS, Node JS, Express JS, Mongo DB and same is ongoing.

Sincerely,

Siddharth Maheshwari

Director, Newton School

Newton School

June 20, 2022

www.newtonschool.co

INTERNSHIP CERTIFICATE

June 20, 2022

To whom it may concern,

This is certify that Mr. Hrushikesh Santosh Walujkar pursuing Bachelor of Technology from SVERI's College of Engineering is undergoing internship from 20th December,2021 and the internship activity includes training and implementation of Java, HTML, CSS, Javascript, React JS, Node JS, Express JS, Mongo DB and same is ongoing.

Sincerely,

Siddharth Maheshwari

Director, Newton School

Newton School

June 20, 2022

www.newtonschool.co

INTERNSHIP CERTIFICATE

June 20, 2022

To whom it may concern,

This is certify that Mr. Amit Mallhari Yele pursuing Bachelor of Technology from SVERI's College of Engineering is undergoing internship from 20th December,2021 and the internship activity includes training and implementation of Java, HTML, CSS, Javascript, React JS, Node JS, Express JS, Mongo DB and same is ongoing.

Sincerely,

Siddharth Maheshwari

Director, Newton School

Newton School

June 20, 2022

www.newtonschool.co

GANRAJ ENGINEERING

S.NO. 94/95,03, Vighnahar, Bhusari Colony, Poud Road, Kothrud, Pune, Maharastra- 411029

Email ID- Ajay.sharma.ganraj@gmail.com

INTERNSHIP CERTIFICATE

Date-09/03/2022

To Whomsoever It May Concern This is Certify That
Miss Harshada Bhausaheb Patil Has complited Her Internship In Mechanical Filed (Machinical, Project & Machinary Maintenance) Since 09/03/2022 - 06/07/2022 Long Internship Programme At This Branch Company.During The Period of His Internship Programme With us She Was Found Punctual Hard working Inquisitive.

We wish him every success in life.

for ,GANRAJ ENGINEERING PVT.LTD

FOR ,GANRAJ ENGINEERING PVT.LTD

NAWD SOFTWARE PVT. LTD.
Pune & Ahmednagar, Maharashtra
Gov.Reg.No.:- MH01D0020483

Date:- 20/06/2022

Internship Certificate

This is to certify **that Mr. Nitinand Manohar Khandare** has done his internship in Full Stack Web Developer at **NAWD Software Pvt. Ltd**, Ahmednagar from **15 Feb 2022 to 17 June 2022**.

He had worked on a project titled **"Employee Details".** This project has mainly covered information of the customers, In this system have developed all types of CRUD.

During the internship he demonstrated good design skills with a self-motivated attitude to learn new things. His performance exceeded expectations and was able to complete the project successfully on time.

We wish him all the best for his future endeavors.

NAWD SOFTWARE PVT. LTD. AHMEDNAGAR

FOR NAWD SOFTWARE PVT. LTD.

Adm.Assistant

Mob.:- 935 971 6081 Website:- www.nawdsoftware.co.in Email:- info@nawdsoftware.co.in

7. Industrial Visit of Faculty

SHRI VITHAL EDUCATION & RESEARCH INSTITUTE's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Tal.- Pandharpur- 413 304,Dist.- Solapur (Maharashtra)
Tel.: 02186-216063, 9503103757, E-mail : coe@sveri.ac.in, Website: www.sveri.ac.in
(Approved by A.I.C.T.E., New Delhi and affiliated to P. A. H. Solapur University, Solapur)
NBA Accredited all Eligible UG Programmes and , **NAAC**, Accredited Institute,
Accredited by The Institution of Engineers (India), Kolkata and TCS, Pune ISO 9001-2015 Certified Institute

Date-28/06/2022

Notice

All the students and teachers of ENTC department are here by informed to note that consider the following points at the time of industrial visits.

1. Industrial visit is compulsory to all the students
2. Industrial visit record will be considered at the time of submission and each student has to take remark of industrial visit coordinator on submission form.
3. Those who are fail to do the industrial visit at college level, those students has to visit two companies personally and submit the certificate to your respective class coordinators, defaulter's submission will not be considered.
4. Those who are not going to industrial visit with all students; these students have to report to college according to regular time table.

Mr. R.B Pawar
Industrial Visit Coordinator

Mr.S.A Inamdar
H. O. D

SHRI VITHAL EDUCATION & RESEARCH INSTITUT
COLLEGE OF ENGINEERING, PANDH
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Tal.- Pandharpur- 413 304,Dist.- Solapur (Maharashtra
Tel.: 02186-216063, 9503103757, E-mail : coe@sveri.ac.in, Website: www.sveri.ac.in
(Approved by A.I.C.T.E., New Delhi and affiliated to P. A. H. Solapur University, Solapur)
NBA Accredited all Eligible UG Programmes and , **NAAC**, Accredited Institute,
Accredited by The Institution of Engineers (India), Kolkata and TCS, Pune ISO 9001-2015 Certified Institu

Ref: COEPR/ENTC/2021-22/426

Date: 22/06/2022

To:-
Mr. R .V. Dhekale
CEO, Perfect Electronics Wai

Dear sir/madam,

Hope you find this mail in good mood!!!!!

With reference to above subject I undersigned Mr.S.A Inamdar Head of Electronics and Telecommunication Engineering department SVERI's COE Pandharpur would like to have permission for industrial visit on 01/07/2022.

Details are tabulated below table-

Date	Class	Approximate strength of students	No. of faculty of accompanying
01/07/2022	S.E. (ENTC)	100	04

Please give us concent for the same as early as possible.

Thank you!!!

Your's sincerely,

(Mr.R.B Pawar)
I.V .Co-ordinator
ENTC Department

(SAI)
HOD
ENTC Department

Head
Dept. of Electronics & Telecomm
Engg. SVERI'S C.O.E. P

SHRI VITHAL EDUCATION & RESEARCH INSTITUT
COLLEGE OF ENGINEERING, PANDH
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Tal.- Pandharpur- 413 304,Dist.- Solapur (Maharashtra
Tel.: 02186-216063, 9503103757, E-mail : coe@sveri.ac.in, Website: www.sveri.ac.in
(Approved by A.I.C.T.E., New Delhi and affiliated to P. A. H. Solapur University, Solapur)
NBA Accredited all Eligible UG Programmes and , **NAAC**, Accredited Institute,
Accredited by The Institution of Engineers (India), Kolkata and TCS, Pune ISO 9001-2015 Certified Instit

Ref: COEPR/ENTC/2021-22/425

Date: 22/06/2022

To:-
Mr. Pravin Mohite
APTRON Tech Pvt. Ltd Satara

Dear sir/madam,

Hope you find this mail in good mood!!!!!

With reference to above subject I undersigned Mr.S.A Inamdar Head of Electronics and Telecommunication Engineering department SVERI's COE Pandharpur would like to have permission for industrial visit on 02/07/2022.

Details are tabulated below table-

Date	Class	Approximate strength of students	No. of faculty of accompanying
02/07/2022	S.E. (ENTC)	100	04

Please give us concent for the same as early as possible.

Thank you!!!

Your's sincerely,

(Mr.R.B Pawar)
I.V .Co-ordinator
ENTC Department

(SAI)
HOD
ENTC Department
Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. P...

Gmail

Search all conversations

Compose

Mail

Scheduled

All Mail

Spam 22

Trash

Categories

Chat

No conversations
Start a chat

Spaces

No spaces yet

About Permission to conduct industrial visit at your Company. Exter

Rahul Pawar
Dear Sir, On behalf of Department of E&TC Engineering SVERI's COE,Pandharpur where I serve as the Indus

Pravin Mohite
to me

Received your mail.

we give permission to you for 1 day only.

thank you

regard's
pravin mohite
aptron technology, satara

Thank you for your response. | Thanks a lot. | Thank you for your mail.

Reply | Forward

1/1

https://mail.google.com/mail/u/0/#all/QgrcJHsNqMKKfRdhtSSGsZzZdNRKDWlwZBB

Gmail in:sent

Compose

Mail

Inbox 1,164
Starred
Snoozed
Sent
Drafts 22
More

Chat

No conversations
Start a chat

Spaces

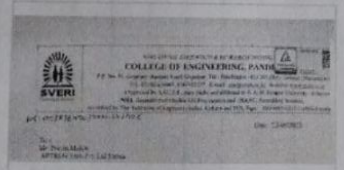
No spaces yet

About Permission to conduct industrial visit at your Company.

Rahul Pawar
Dear Sir, On behalf of Department of E&TC Engineering SVERI's COE,Pandharpur where I serve as the Indus

Rahul Pawar <rbpawar@coe.sveri.ac.in>
to pravinmohite

Thanks and Regards
Mr. Rahul B Pawar
Assistant Professor
Department of Electronics and Telecommunication Engineering
SVERI's College of Engineering, Pandharpur 413304
Contact No. 9665227585



PDF Permission for co...

Reply Forward

Date: - 29/06/2022

To,
The principal,
SVERI's C.O.E. Pandharpur.

Subject: - Regarding permission for 2 days industrial visit at Satara on 01/07/2022 and 02/07/2022.

Respected sir,

We the student of S.Y. (ENTC) would like to have permission for 2 days industrial visit at Satara on 01/07/2022 and 02/07/2022. We have enclosed herewith tentative budget, schedule and route for two days with permission received from industries.

Plase permit us to visit said industries on above mentioned dates we will assure you that, we will follow all instruction given by our faculty during industrial visit and we will be in utmost discipline throughout industrial visit.

Thanking you!

Yours faithfully
Students of S.E (ENTC)-A&B

Industrial Visit Student Coordinator	Class and Division	Sign
Ruturaj Tarapurkar	SY BTECH-A	
Mrunal Choundawar	SY BTECH-A	
Shivraj Magar	SY BTECH-B	
Disha Bhattad	SY BTECH-B	

Class Co-ordinator:-	Remark	Sign
Ms.S.A Atole (SY-A)	—	
Mr.S.P Swami(SY-B)	—	
Industrial Visit Coordinator		
Mr.R.B Pawar	Planning has done by me	
Head of Department		
Mr.S.A Inamdar	I.V. Planned for 2 days 1 sunday compensation	
Dean Student		
Dr.M.S Mathpati	Permitted for Visit as per the plans attached on 01/07/22 to 02/07/22.	

SHRI VITHAL EDUCATION & RESEARCH INSTITUTE's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Tal.- Pandharpur- 413 304,Dist.- Solapur (Maharashtra)
Tel.: 02186-216063, 9503103757, E-mail : coe@sveri.ac.in, Website: www.sveri.ac.in
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Accredited by The Institution of Engineers (India), Kolkata and TCS, Pune ISO 9001-2015 Certified Institute

Department of Electronics and Telecommunication Engineering

A.Y.-2021-22 Class SY A

Sr.NO	Name of student	Sign	Sr.NO	Name of student	Sign
1	Annadate Disha Sham		31	Ranadive Vanita Manohar	
2	Atkale Shivani Ramchandra		32	Sakhare Samruddhi Santosh	
3	Barale Kajal Satyavan		33	Sayyad Ayesha Faiyyaj	
4	Bhingare Sayali Dhanaji		34	Tamboli Asma Javed	
5	Bhosale Aishwarya Mohan		35	Tamboli Ayesha Jabbar	
6	Bhusnar Shilpa Bhau		36	Bagal Yash Deepak	
7	Chaugule Jyoti Ramchandra		37	Barate Aniket Shahu	
8	Chavan Ashwini Kiran		38	Chormale Yuvraj Madhukar	
9	Chavan Ashwini Sudhir		39	Chougule Rohan Kakasaheb	
10	Chougule Sakhare Srushti Dattatray		40	Dakavale Ranjit Revan	
11	Choundawar Mrunal Vivek		41	Dalavi Shreyas Kishore	
12	Deshmukh Sangita Shivaji		42	Dukare Dnyaneshwar Bharat	
13	Deshmukh Shubhada Raju		43	Gaikwad Nikhil Nagnath	
14	Dhole Pranali Mahadev		44	Goykar Tukaram Anna	
15	Doifode Amruta Ashok		45	Jadhav Harsh Prashant	
16	Kadam Aishwarya Dattatray		46	Kamble Ritesh Gundiba	
17	Kamble Snehal Navnath		47	Kudage Onkar Atmaram	
18	Kangale Anuradha Ramdas		48	Kulkarni Adesh Atmaram	
19	Kavade Vrushali Dilip		49	Linge Aniket Nagesh	
20	Koli Prerana Anil		50	Mane Shriniwas Sukhadev	
21	Koli Surekha Sidraya		51	Mhetre Dnyaneshwar Narayan	
22	Kore Snehal Sanjay		52	Patil Satnappa Shivaji	
23	Lokhande Vaishnavi Nitin		53	Patole Shubham Dhanagi	
24	Maske Sandhyarani Khandu		54	Pawar Sanket Kusharam	
25	Misal Pranali Ravindra		55	Sayyad Sohel Mansub	
26	Mohite Megha Maruti		56	Shinde Aniket Ankush	
27	More Rutuja Rajendra		57	Sonar Ganesh Gautam	
28	Patole Sakshi Navnath		58	Swami Shivraj Mallikarjun	
29	Pawar Dipti Dattatray		59	Tarapurkar Ruturaj Suresh	
30	Pawar Priyanka Shivaji		60	Yadav Abhishek Mohan	

(Mr.R.B.Pawar)
Iindustrial Co-ordinatr

(Mrs.Dr.M.M.Pawar)
HoD E&TC

Students went to

SHRI VITHAL EDUCATION & RESEARCH INSTITUTE's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Tal.- Pandharpur- 413 304,Dist.- Solapur (Maharashtra)
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(Approved by A.I.C.T.E., New Delhi and affiliated to P. A. H. Solapur University, Solapur)
NBA Accredited all Eligible UG Programmes and , NAAC, Accredited Institute,
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Department of Electronics and Telecommunication Engineering
A.Y.2021-22 **Class SY B**

Sr.NO	Name of student	Sign	Sr.NO	Name of student	Sign
1	Babar Pragati Digambar		33	Tawashe Priti Yashwant	
2	Bhattad Disha Dineshkumar		34	Utpat Pranjali Milind	
3	Birajdar Shraddha Appasaheb		35	Vyavahare Kanchan Rajkumar	
4	Deshmukh Shivbhakti Sunil		36	Adsul Abhishek Shrikant	
5	Garad Sharayu Shekhar		37	Atar Sahil Nasir	
6	Ingale Kajal Vijaykumar		38	Bagewadikar Yash Rajesh	
7	Janagawali Vrushali Kishor		39	Badave Vinayak Uday	
8	Joshi Swarali Shrirang		40	Bulbule Jay Santosh	
9	Kadam Snehal Shivaji		41	Chavan Prathmesh Santosh	
10	Kadam Rutuja Arun		42	Chavan Ritesh Ganesh	
11	Kadlaskar Shruti Vitthal		43	Chavan Shubham Laxman	
12	Kala Shruti Mukesh		44	Diwane Saurabh Dagdu	
13	Santani Kenny Deepak		45	Lawate Shivaji Chintamani	
14	Kulkarni Vaibhavi Mahesh		46	Ghavate Aditya Abasaheb	
15	Kulkarni Vaishnavi Avinash		47	Ghongade Prathamesh Rajesh	
16	Manakoji Anjali Mallinath		48	Jadhav Ganesh Sambhaji	
17	Misal Pranali Kalyan		49	Shreyash Pramod Kamble	
18	Misal Sonali Ramesh		50	Kasabe Anmol Ashok	
19	More Dipti Dilip		51	Khatake Sandip Hanumant	
20	Muchlambe Vaishnavi Sharanappa		52	Khule Abhijeet Vikas	
21	Mulani Heena Tayyab		53	Korade Kunal Kakasaheb	
22	Naiknaware Pranoti Ganesh		54	Gawali Om Anil	
23	Patil Harshada Sanjay		55	Magar Shivraj Tanaji	
24	Patil Kanchan Kishor		56	Mali Tanmay Shivaji	
25	Patil Pratiksha Tukaram		57	Misal Rohit Pandurang	
26	Rananavare Sakshi Sandip		58	More Aniket Govardhan	
27	Shinde Aishwarya Raghu		59	More Shubham Balasaheb	
28	Shinde Anisha Anil		60	More Tushar Dhananjay	
29	Shinde Ankita Shankar		61	Patil Arjun Vijaykumar	
30	Shinde Siddhi Dattatraya		62	Patil Deepak Rajkumar	
31	Shinde Vaishnavi Bandu		63	Ubale Avishkar Gorakh	
32	Shirkande Sakshi Balasaheb		64	Vadaje Mahadev Bhimashankar	
			65	Yadav Pratik Anil	

(Mr.R.B.Pawar)
Iindustrial Co-ordinatr

(Mrs.Dr.M.M.Pawar)
HoD E&TC

SHRI VITHAL EDUCATION & RESEARCH INSTITUTE's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Tal.- Pandharpur- 413 304,Dist.- Solapur (Maharashtra)
Tel.: 02186-216063, 9503103757, E-mail : coe@sveri.ac.in, Website: www.sveri.ac.in
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Date: 28/ 6 /2022

Undertaking

To,
Principal,
SVERI's COE, Pandharpur.

Sub: Undertaking about industrial visit.

Respected sir,

I am undersigned student Yash Rajesh Bagewadikar of Class S.Y. Division: B having Roll No. 44 giving the undertaking about the industrial visit.

Sir, in industrial visit I will not do any misbehavior. During industrial visit I will follow our rules and regulation very strictly. While visiting in company I will not wondering here and there and also I will not make noise in company. I will behave such like our behavior will not become their problematic.

During industrial visit whatever days are required that will be covered by co-ordination of our staff members have already given assured about that. Our syllabus will cover within desired time. I will give assured that our result will be 100% Think on it.

Thanking You!!

Y. R. Bagewadikar.

Yours Faithfully

Name:- Yash Rajesh Bagewadikar

Parent contact:- 7499099194

UNDERTAKING BY THE STUDE
VISIT/ MENTOR TOUR/EX]

SHRI VITHAL EDUCATION & RESEARCH INSTITUTE's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Tal.- Pandharpur- 413 304,Dist.- Solapur (Maharashtra)
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Date: 29/6/2022

Undertaking

To,
Principal,
SVERI's COE, Pandharpur.

Sub: Undertaking about industrial visit.

Respected sir,

I am undersigned student Badave Vinayak Vday. of Class SY Division: B having Roll No. 45 giving the undertaking about the industrial visit.

Sir, in industrial visit I will not do any misbehavior. During industrial visit I will follow our rules and regulation very strictly. While visiting in company I will not wondering here and there and also I will not make noise in company. I will behave such like our behavior will not become their problematic.

During industrial visit whatever days are required that will be covered by co-ordination of our staff members have already given assured about that. Our syllabus will cover within desired time. I will give assured that our result will be 100% Think on it.

Thanking You!!

Viny

Yours Faithfully

Name:- Badave Vinayak Vday

Parent contact:- 9075021951.

SHRI VITHAL EDUCATION & RESEARCH INSTITUTE's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Tal.- Pandharpur- 413 304,Dist.- Solapur (Maharashtra)
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Date: 28/ 6/2022

Undertaking

To,
Principal,
SVERI's COE, Pandharpur.

Sub: Undertaking about industrial visit.

Respected sir,

I am undersigned student Jay Santosh Bulbule of Class SY Division: B having Roll No. 46 giving the undertaking about the industrial visit.

Sir, in industrial visit I will not do any misbehavior. During industrial visit I will follow our rules and regulation very strictly. While visiting in company I will not wondering here and there and also I will not make noise in company. I will behave such like our behavior will not become their problematic.

During industrial visit whatever days are required that will be covered by co-ordination of our staff members have already given assured about that. Our syllabus will cover within desired time. I will give assured that our result will be 100% Think on it.

Thanking You!!

Yours Faithfully

Name:- Jay Santosh Bulbule

Parent contact:- 9552125501

Perfect Electronics

PERFECT

OFFICE : Datta nagar, Behind S.T.Stand, Wai, Dist.Satara. Maharashtra Phone: 02167-220606, Fax:02167-220606,
Mobile : 09822241255 Email:perfectelectronics@usa.com. Support@iperfect.net, Website: www.perfectelectronics.net
FACTORY : Plot No. B-115, M.I.D.C., Wai, Dist.- Satara, (Maharashtra)

Ref: PE/107

Date: 01-07-2022

CERTIFICATE

This is to certify that 120 numbers of students (S.E.) of Electronics & Telecommunication department with trip co-ordinator Prof. Mr. R. B. Pawar & 3 faculties from **College Of Engineering, Pandharpur Dist- Solapur** visited our company on **1-07-2022**.

We have explained them our following products.

1) Details of Electronics Training Programme.
2) Automatic National Anthem Player.
3) Single Phase Programmable Load Driver.
4) Three Phase Programmable Load Driver Motor.
5) Bell Cum Rashtrageet Player.(IOT Based)
6) Temp. Controlled Soldering & De-soldering Machine.
7) Demo of Alexa.
8) Demo of Digital Storage Oscilloscope.
9) Demo of Dip Soldering Machine.
10) Demo of Express PCB Software.
11) Demo of Circuit Diagram Software.
12) Demo of Motion Sensor with Flud Lamp.
13) Demo of Motion Sensor with Siren.
14) Demo of Automatic Lecture Bell System for College.
15) Demo of Automatic Lecture Bell System for School.
16) Demo of Transformer Winding Machine.
17) IOT Based Product 4 channel Remote Control.
18) IOT Based Wi-Fi Camera

CEO

Dr. R. V. Dhekale

PERFECT ELECTRONICS
Behind S. T. Stand, Dattanagar,
Plot No. 77, Galli No. 4,
Wai - 412 803. Dist. Satara.
Mobile : 9822241255

Shri Vithal Education & Research Institute's
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Summary of Industrial Visit

Sr. No.	Event : Industrial Visit	
1.	**SY BTECH ENTC**	
2.	**Industry Visit dates:** 01/07/2022 & 02/07/2022	
3.	**Industry details:-**	
	APTRON Tech Pvt. Ltd Satara **Address:** P-6,near DIC Office, Old MIDC, Satara, Maharashtra 415004, Maharashtra, India **Contact Person: Mr.** Pravin Mohite **Email Id: pravinmohite@gmail.com**	Perfect Electronics, Wai Satara **Address:** Survey No. 7/10E, Near Naikwadi Classes, Near Naikwadi Classes, Wai, Satara-412803, Maharashtra, India **Contact Person: Dr. R V Dhekale** Email id: rvdhekale@gmail.com

4) Visit Report:

a) On 1st July 2022: Perfect Electronics, Wai Satara

Perfect Electronics has been established in 1985. It is well-known for educational electronics kits like FM transmitter, Power line Transmitter and receiver, IR transmitter and receiver, Video signal Transmitter, Remote control circuits Inverter, UPS etc. Presently there are 5 workers. They are always trying introduced new products which are not available in the market. This website has been developed to provide details of our product instant to visitor. This website contents all products which are first in world like Auto Lecture Bell system, Electronics Experimental Boards using double sided PTH boards, electronics projects for engineering students. Perfect Electronics is also undertaken the development of website of college.

b) On 2nd July 2022: APTRON Tech Pvt. Ltd Satara

Since our commencement in the year 2013, we, Aptron Tech, are acknowledged in the industry as one of the eminent organizations, engaged in manufacturing a comprehensive range of Electronic Laboratory Trainer, DC Tubelight, Integrated Circuit and much more. High strength, fine finish, lightweight, easy installation and low maintenance are some of the highlighting features of our offered range of products. To suit the demands of customers, we are offering these products in different specifications at market leading prices. Under the guidance of our mentor Mr. Pravin Mohite (Proprietor), our organization is moving ahead in this cutting-edge competition.

5)	**Outcome :**	**Mapping of POs**
	1. Students acquired the knowledge about PCB Design	1,2,34,5
	2. Students acquired the knowledge about manufacturing processes involved for manufacturing of electronic products such as electronic bell, LED Lamp	1,2,3,4,5

Name of Faculty

1) **Mr.S.P Swami**
2) **Mr.R.B Pawar**
3) **Ms.S.A Atole**
4) **Ms.S.S Gawade**

Shri Vithal Education & Research Institute's
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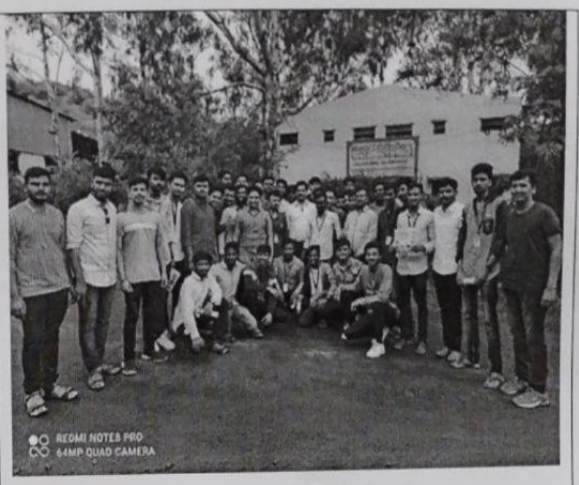

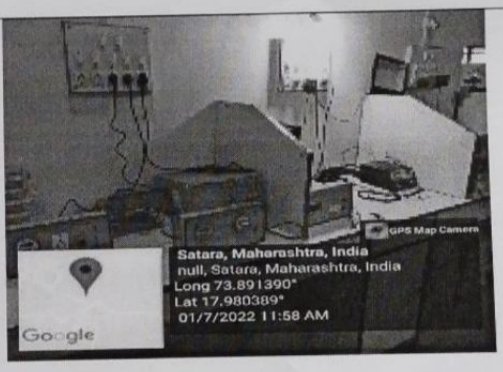

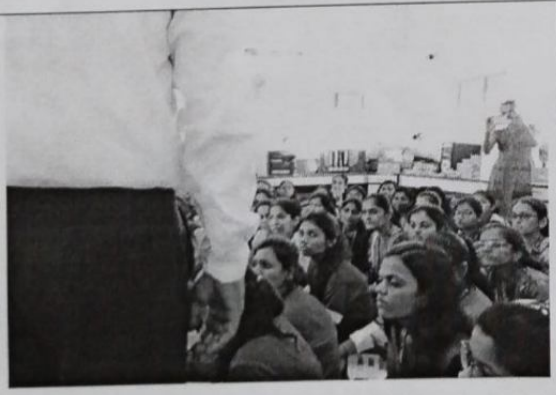

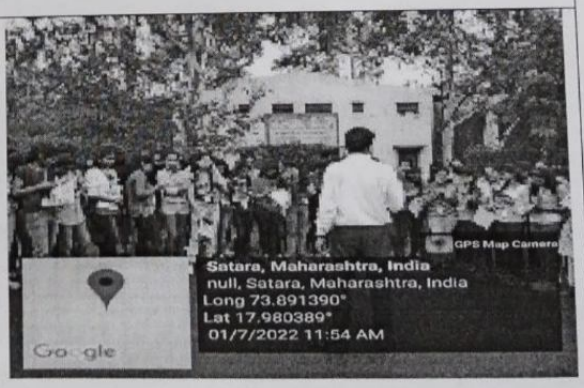

(Mr.R.B.Pawar)
Industrial Visit Co-ordinator

(Dr. Mrs.M.M.Pawar)
HoD E&TC

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

Arunoday Enterprises

Address: 1243/35 Shivaji Udyamnagar,
Kolhapur-416008.
Email : info@arunodayenterprises.com
Contact : +91 9028216691 , 7741034774

Authorized Channel Partner for Siemens PLM Softwares

Date : 26/04/2022

TO WHOM SO EVER IT MAY CONCERN

This is to certify that **Prof. K. S. Pukale** from Department of Mechanical Engineering, SVERI's College of Engineering, Pandharpur have visited on **25/04/2022** to Arunoday Enterprises, Kolhapur. He has given session on "Facilities available at Department of Mechanical Engineering, SVERI's College of Engineering, Pandharpur and Scope for Research Collaboration" is nicely delivered by him. We found this activity is helpful to strengthen the industry-institute relationship.

We express our sincere gratitude towards Prof. K. S. Pukale for their visit to our industry.

Our industry is ready to extend help in following regard:

1. Industrial visit
2. Sponsored projects
3. Research Collaboration

Arunoday Enterprises

Authorized Signatory

ARUNODAY ENTERPRISES KOLHAPUR

8. Industrial Training of Faculty

SVERI's COLLEGE OF ENGINEERING, PANDHARPUR. Gopalpur-Ranjani Road, Gopalpur, P.B. No. 54, Tal - Pandharpur- 413 304, Dist. Solapur (Maharashtra) (Approved by AICTE, New Delhi and affiliated to PAH Solapur University, Solapur)Year -2019-20

Department of Electronics and Telecommunication Engineering

Industrial Training by Faculty Action Taken AY: 2021-22

Sr. No.	Name of Industry	Name of Faculty	Duration (Days)	Date	Brief Discription
1	Perfect Electronics, Satara	Mr.A.A.Kadam	1 Month	15/07/2022 to 14/08/2022	Design of PCB, Design of Educational Electronics Kits for practical
2		Mr.R.B.Pawar			

Dr.Mrs.M.M.Pawar
HOD, E&TC Department

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

SVERI's COLLEGE OF ENGINEERING, PANDHARPUR.
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Department of Electronics and Telecommunication Engineering

Industrial Training by Faculty Plan AY: 2021-22

Sr. No.	Name of Industry	Name of Faculty	Duration (Days)	Date	Brief Discription
1	Perfect Electronics, Satara	Mr.A.A.Kadam	1 Month	July	Design of PCB, Design of Educational Electronics Kits for practical
2		Mr.R.B.Pawar		July	

Dr.Mrs.M.M.Pawar
HOD, E&TC Department

Head
Dept. of Electronics & Telecomm
Engg. SVERI'S C.O.E. Pandharpur

SHRI VITHAL EDUCATION & RESEARCH INSTITUTE's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Tal.- Pandharpur- 413 304,Dist.- Solapur (Maharashtra)
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Ref.: COEPR/ENTC/2022-23/436 Date: 14/07/2022

To,
Dr.R.V Dhekale
CEO
Perfect Electronics
Survey No. 7/10E,
Near Naikwadi Classes,Wai,
Satara-412803,
Maharashtra, India

Sub: -About In-Plant Training from 15/07/2022 to 14/08/2022

Dear Sir/Madam,

Hope this letter finds you in good health and pleasant mood.

First of all, we wish to put forth few words regarding our College. Ours is NBA and NAAC accredited Engineering College located in Pandharpur, the "South Kashi" of India and "Spiritual capital" of Maharashtra. "Shri Vitthal Education & Research Institute", Pandharpur, is the trust established by group of qualified and experienced Technocrats in 1998. We offer the following four-year degree courses in engineering viz. Electronics & Telecommunication Engineering, Mechanical Engineering, Civil Engineering, Computer Science & Engineering and Electrical Engineering.

Our College always promotes the Industry Institute Interaction activities. As a part of the same, we are sending our faculty members to Industries for One Month Training. This training will help to understand recent trends in industry, which will further percolate among the students. So, I request you to permit **Prof .R.B Pawar** to undergo one month training in your esteemed organization form 15/07/2022 to 14/08/2022.

We will be grateful to you always.

Thanking you.

Yours faithfully,

Head
Department of E&TC Engineering,
SVERI's COE, Pandharpur

Received
22.7.22
Attended
Training
Completed

PERFECT ELECTRONICS
Behind S. T. Stand, Dattanagar,
Plot No. 77, Galli No. 4,
Wai - 412 803. Dist. Satara.
Mobile : 9822241255

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandha

SHRI VITHAL EDUCATION & RESEARCH INSTITUTE's
COLLEGE OF ENGINEERING, PANDHARPUR
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Ref.: COEPR/ENTC/2022-23/437

Date: 14/07/2022

To,
Dr.R.V Dhekale
CEO
Perfect Electronics
Survey No. 7/10E,
Near Naikwadi Classes, Wai.
Satara-412803,
Maharashtra, India

Sub: -About In-Plant Training from 15/07/2022 to 14/08/2022

Dear Sir/Madam,

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Our College always promotes the Industry Institute Interaction activities. As a part of the same, we are sending our faculty members to Industries for One Month Training. This training will help to understand recent trends in industry, which will further percolate among the students. So, I request you to permit **Prof .A.A Kadam** to undergo one month training in your esteemed organization form 15/07/2022 to 14/08/2022.

We will be grateful to you always.

Thanking you,

Yours faithfully,

Received
22.7.22
Attended Training accordingly

PERFECT ELECTRONICS
Behind S. T. Stand, Bawdhan,
Plot No. 77, Galli No. 4,
Wai - 412 803. Dist. Satara.
Mobile : 9822241255

Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

Head
Department of E&TC Engineering,
SVERI's COE, Pandharpur

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Summary of Industrial Training

Sr. No.	Event : Faculty Inplant Industrial Training	
1.	**Faculty Name-Mr.A.A Kadam,Mr.R.B Pawar**	
2.	**Industrial Training Duration:** 15/07/2022 & 14/08/2022	
3.	**Industry details:-**	
	Perfect Electronics, Wai Satara **Address:** Survey No. 7/10E, Near Naikwadi Classes, Near Naikwadi Classes, Wai, Satara-412803, Maharashtra, India **Contact Person: Dr. R V Dhekale** Email id: rvdhekale@gmail.com	
4)	**Visit Report:** ***a) On 1st July 2022: Perfect Electronics, Wai Satara*** Perfect Electronics has been established in 1985. It is well-known for educational electronics kits like FM transmitter, Power line Transmitter and receiver, IR transmitter and receiver, Video signal Transmitter, Remote control circuits Inverter, UPS etc. Presently there are 5 workers. We are always trying introduced new products which are not available in the market.Welcome to Perfect Electronics. This website has been developed to provide details of our product instant to visitor. This website contents all products which are first in world like Auto Lecture Bell system, Electronics Experimental Boards using double sided PTH boards, electronics projects for engineering students. Perfect Electronics is also undertaken the development of website of college.	
5)	**Outcome :**	**Mapping of POs**
	1. The knowledge about PCB Design	1,2,34,5
	2. The knowledge about manufacturing processes involved for manufacturing of electronic products such as electronic bell, LED Lamp	1,2,3,4,5

Name of Faculty

1) **Mr.A.A Kadam**
2) **Mr.R.B Pawar**

Shri Vithal Education & Research Institute's
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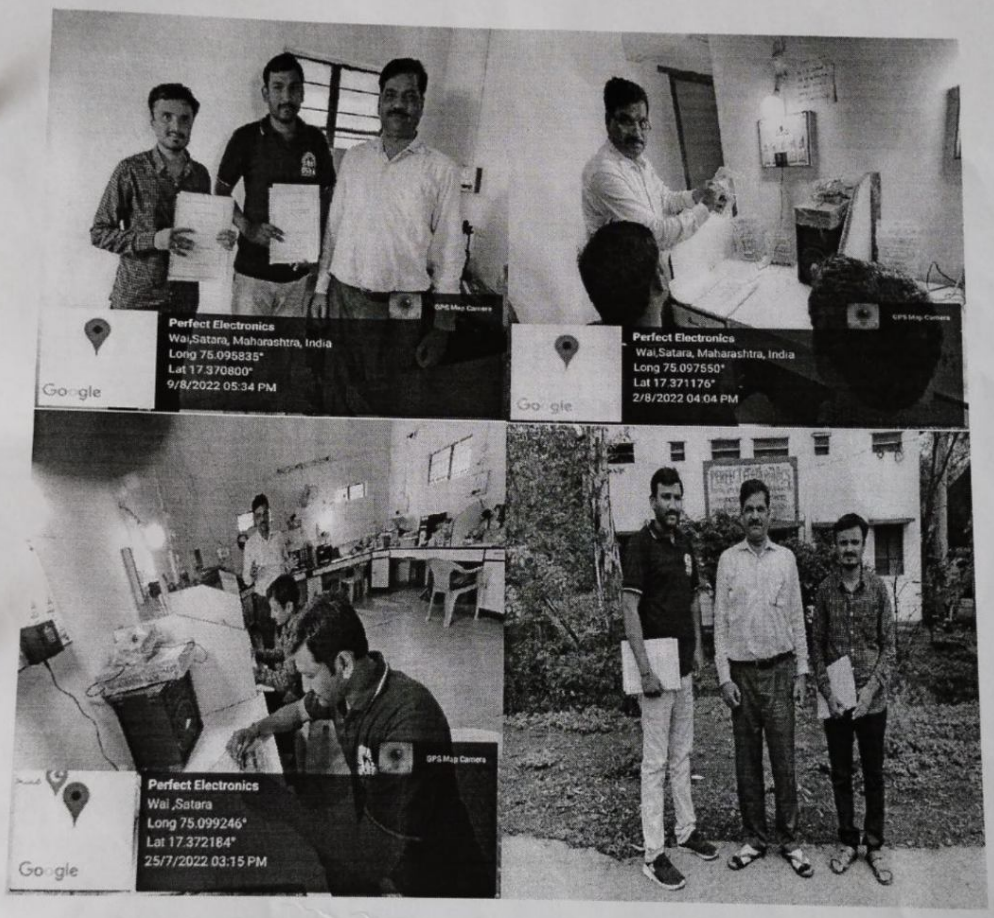


HOD
(Dr.Mrs.M.M Pawar)
Head
Dept. of Electronics & Telecomm.
Engg. SVERI'S C.O.E. Pandharpur

SVERI
Engineering for Excellence

SVERI's College Of Engineering, Pandharpur

Inplant Industrial Training

BY

Mr. Amol A.Kadam
Mr. Rahul B.Pawar
Assistant Professor
Department Of E&TC Engg.

SVERI
Engineering for Excellence

SVERI's College Of Engineering, Pandharpur

Inplant Industrial Training

BY

Mr. Amol A.Kadam
Mr. Rahul B.Pawar
Assistant Professor
Department Of E&TC Engg.

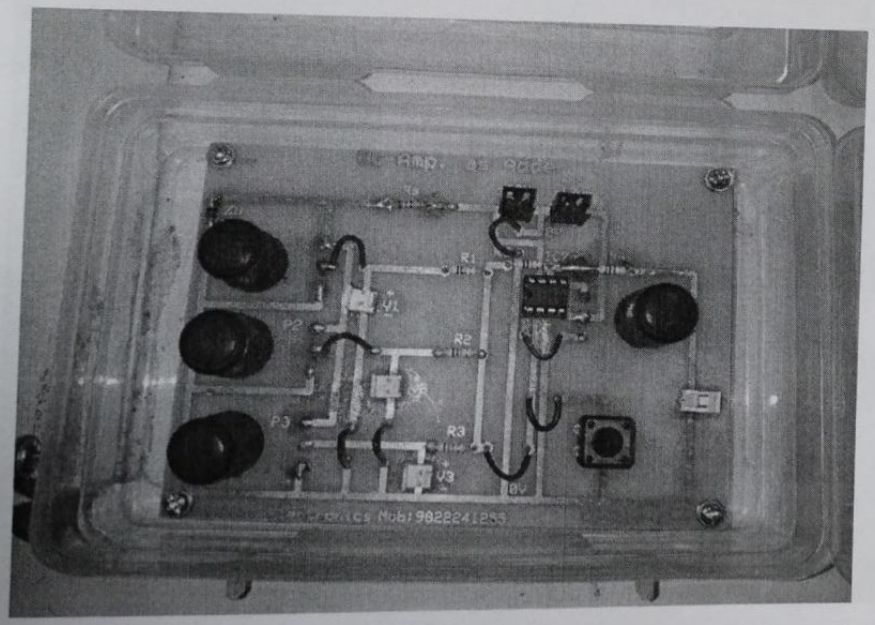
Introduction of Industry

Perfect Electronics has been established in 1985. It is well-known for educational electronics kits like FM transmitter, Power line Transmitter and receiver, IR transmitter and receiver, Video signal Transmitter, Remote control circuits Inverter, UPS etc.

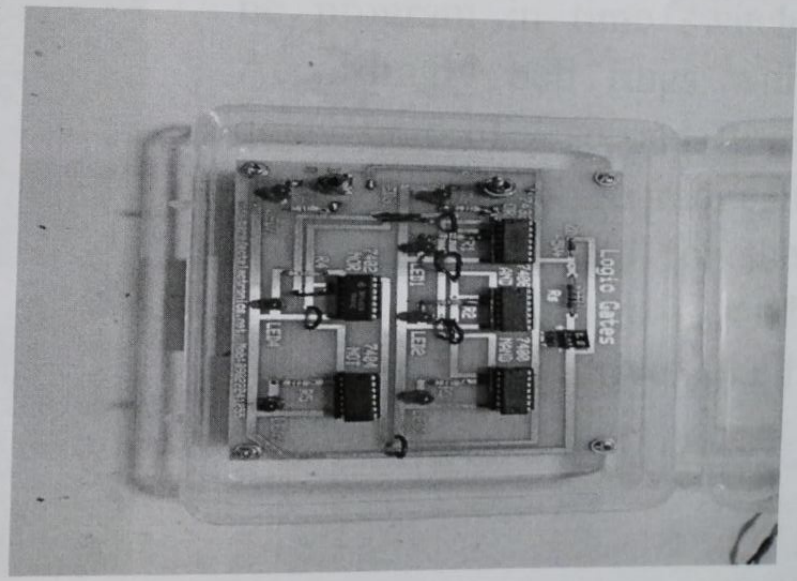
Nature of Business	Manufacturer
Company CEO	R V Dhekale
Total Number of Employees	Upto 10 People
Legal Status of Firm	Individual - Proprietor
Annual Turnover	Upto Rs. 50 Lakh

Products & Services

This Company are Manufacturer of Bridge Rectifier Experimental Boards, Theorem Experimental Boards, RC Oscillators, Transistor Characteristics Experimental Boards, Voltage Regulator Experimental Boards and Analog and Digital Experimental Boards



Opamp experimental board

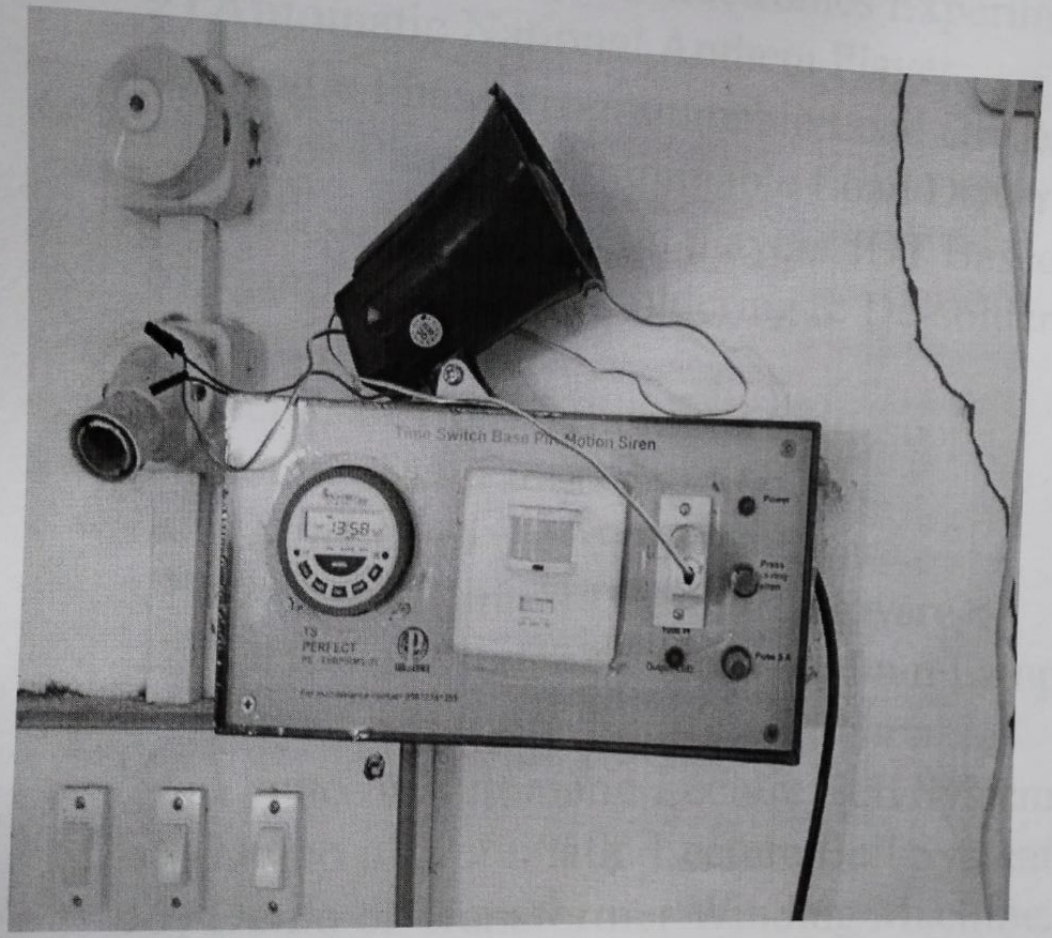


Basic logic Gates experimental board

Automatic Lecture Bell Driver

It consist bell driver and electrical bell along with programmable time switch. Various timings in a day can be program in time switch. Accordingly bell rings with delay time of 4 seconds to 8 seconds. Weekly program can be done. It can be for the schools, colleges and industries to drive bell automatically.

Time Switch Security System



It consist time switch along with the siren and electronics circuit. Reed switches can be connected to doors and windows. The operation of the time based security system is programmed by the time switch. For particular duration system works automatically. For example if one of the window or door is opened by the unauthorized person siren produces the big sound for one minute.

Demos of the following products have been shown in Industrial Training

1) Analog and Digital Electronics Experimental kits
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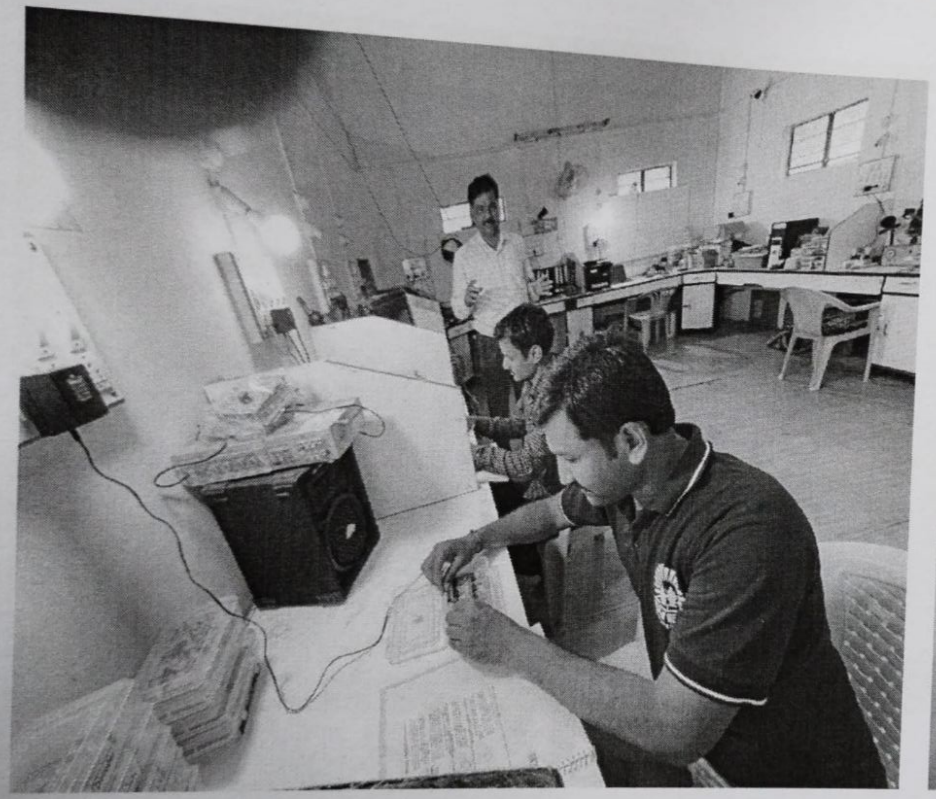
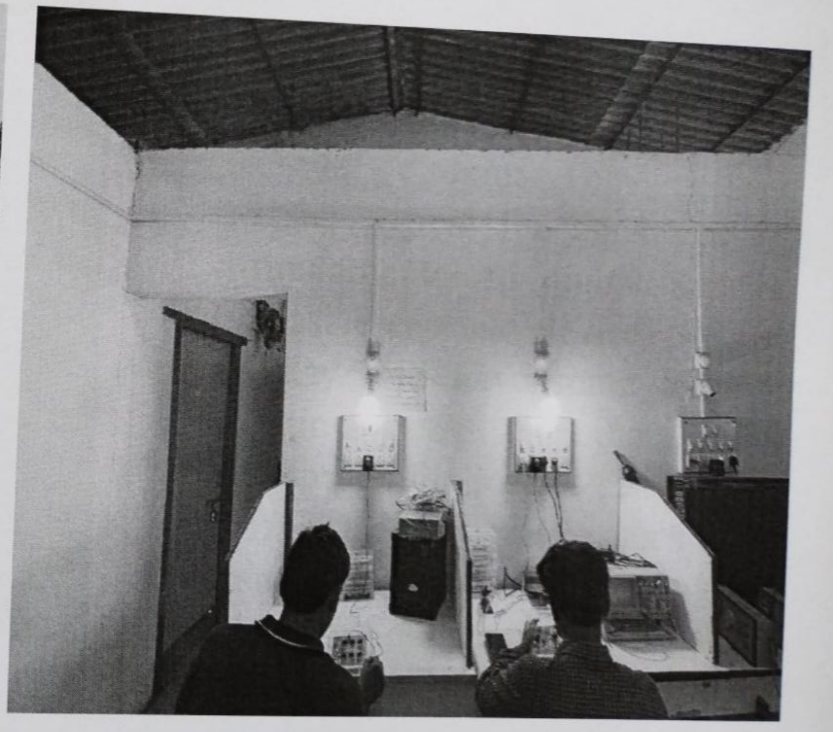
17) IOT Based Product: Four Channels Remote Control.
18) IOT based Camera.

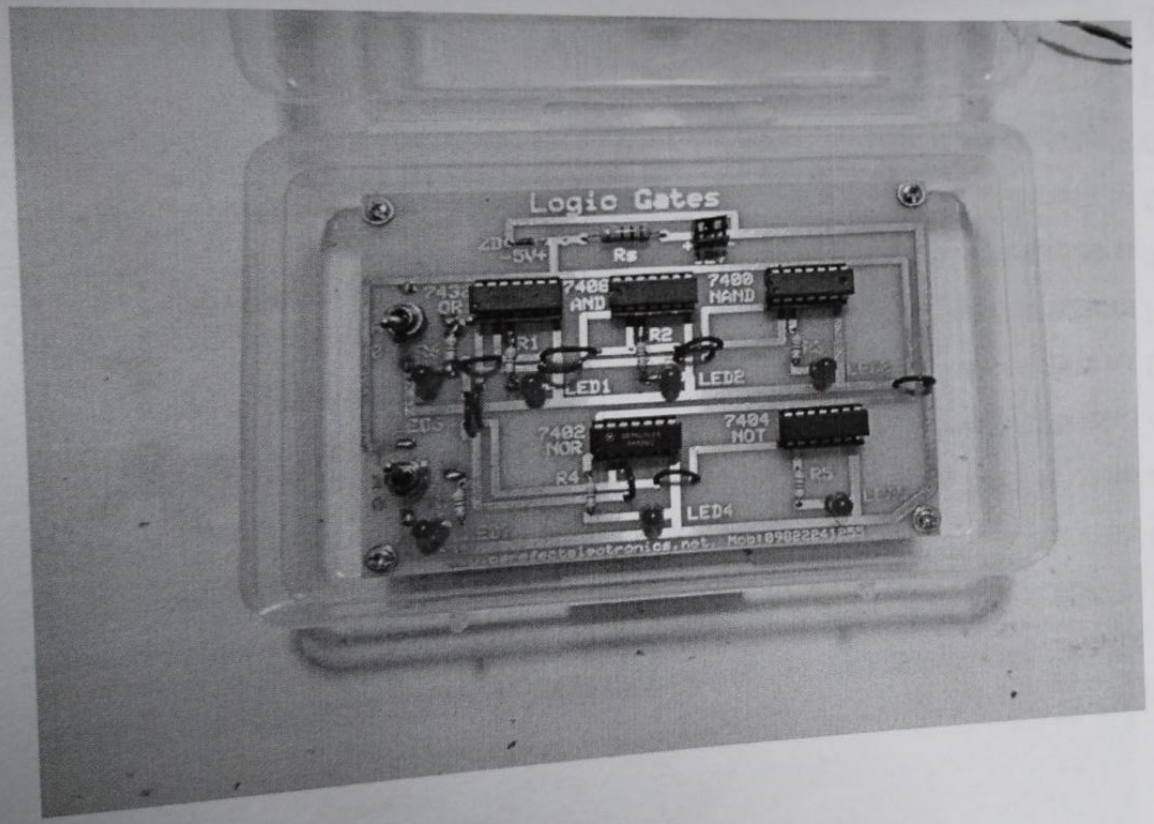
Industrial Training Registration Process

Demonstration of various Product of industry



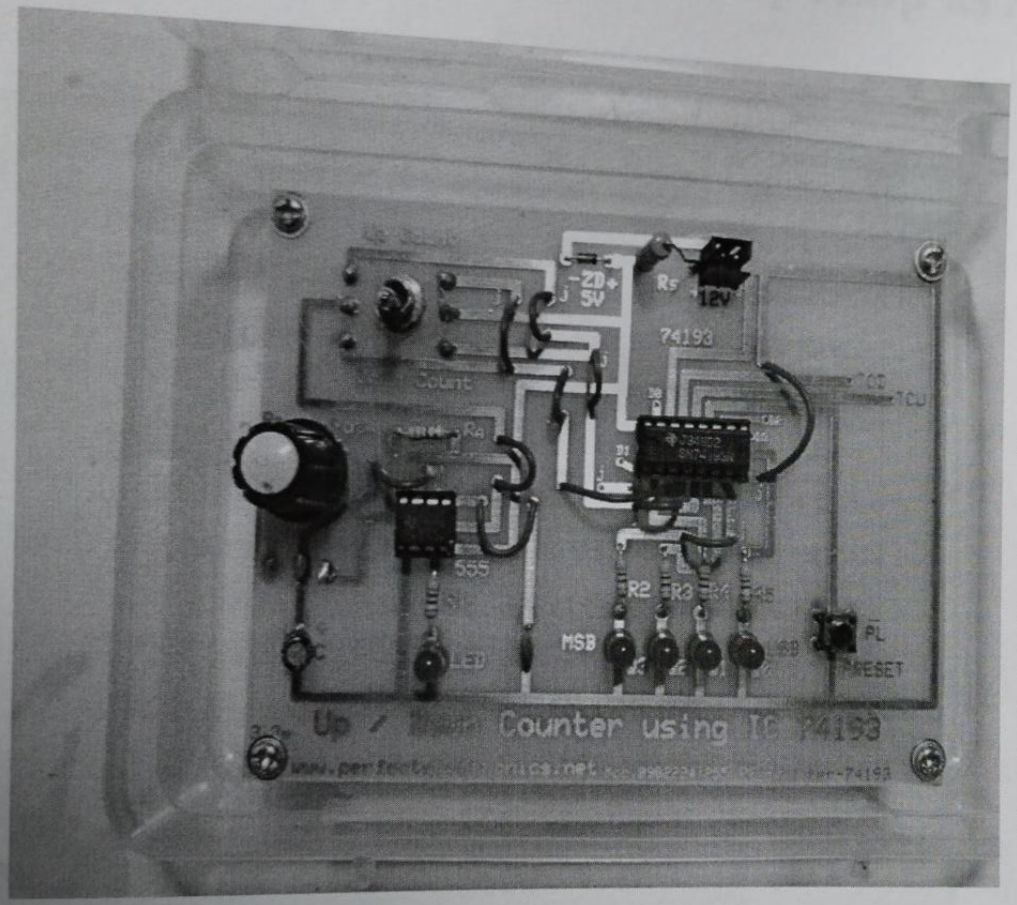


Digital Electronics Experiments
1.Logic Gates



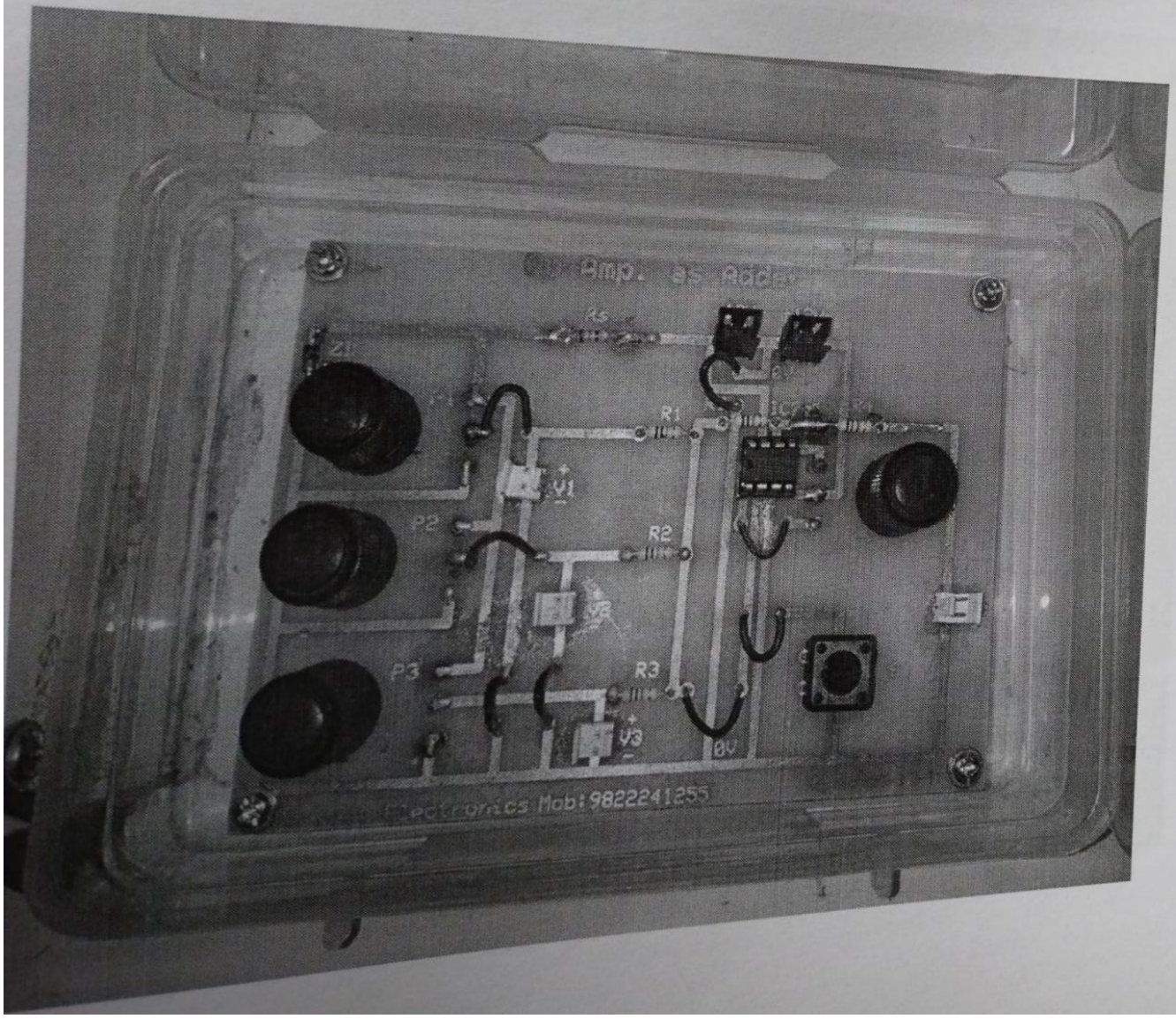
A logic gate is a device that acts as a building block for digital circuits. They perform basic logical functions that are fundamental to digital circuits. Most electronic devices we use today will have some form of logic gates in them. For example, logic gates can be used in technologies such as smartphones, tablets or within memory devices

2.Up/Down Counter using IC 74193



The up/Down counter is also known as the bidirectional counter which is used to count in any direction based on the condition of the input control pin. These are used in different applications to count up from zero to provide a change within the output condition on attaining a fixed value & others count down from a fixed value to zero to give an output condition change. There are some types of counters like TTL 74LS190 & 75LS191 which can function in both up & down count mode based on the condition of an input pin of up/down count mode.

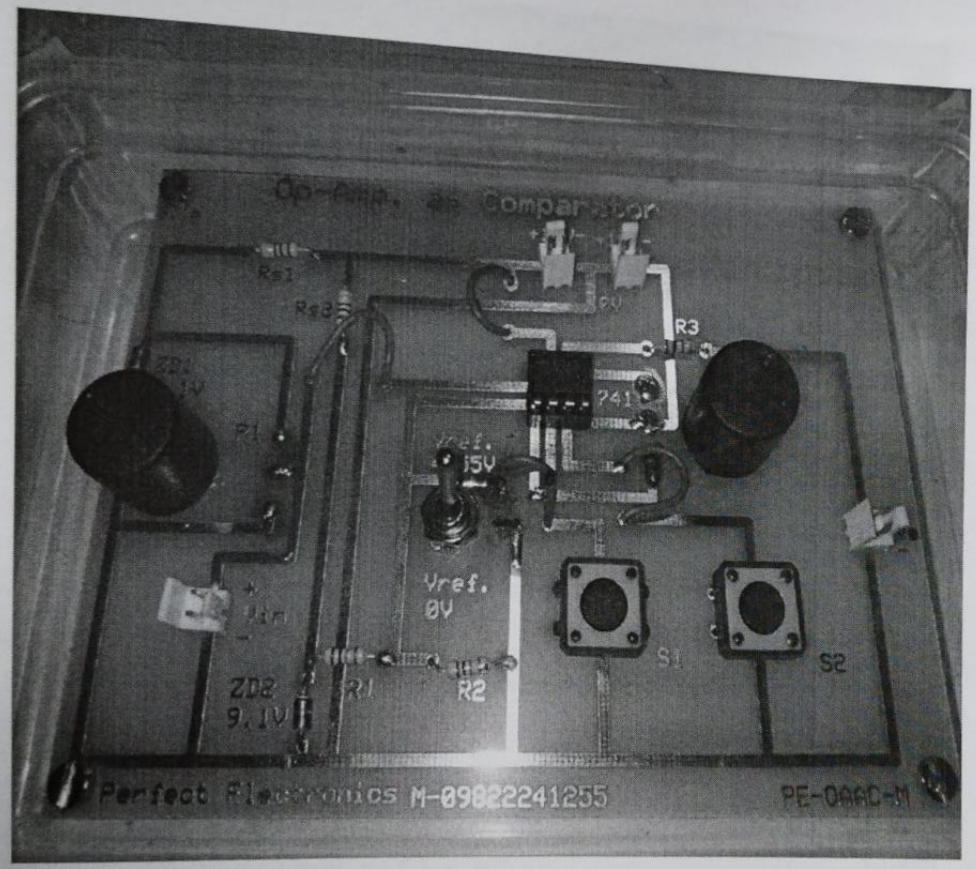
Experiments on Operational Amplifier
1.Op Amp as Adder



The electronic circuits, which perform arithmetic operations are called as **arithmetic circuits**. Using op-amps you can build basic arithmetic circuits such as an **adder** and a **subtractor**

An adder is an electronic circuit that produces an output, which is equal to the sum of the applied inputs. An op-amp based adder produces an output equal to the sum of the input voltages applied at its inverting terminal. It is also called as a **summing amplifier**, since the output is an amplified one.

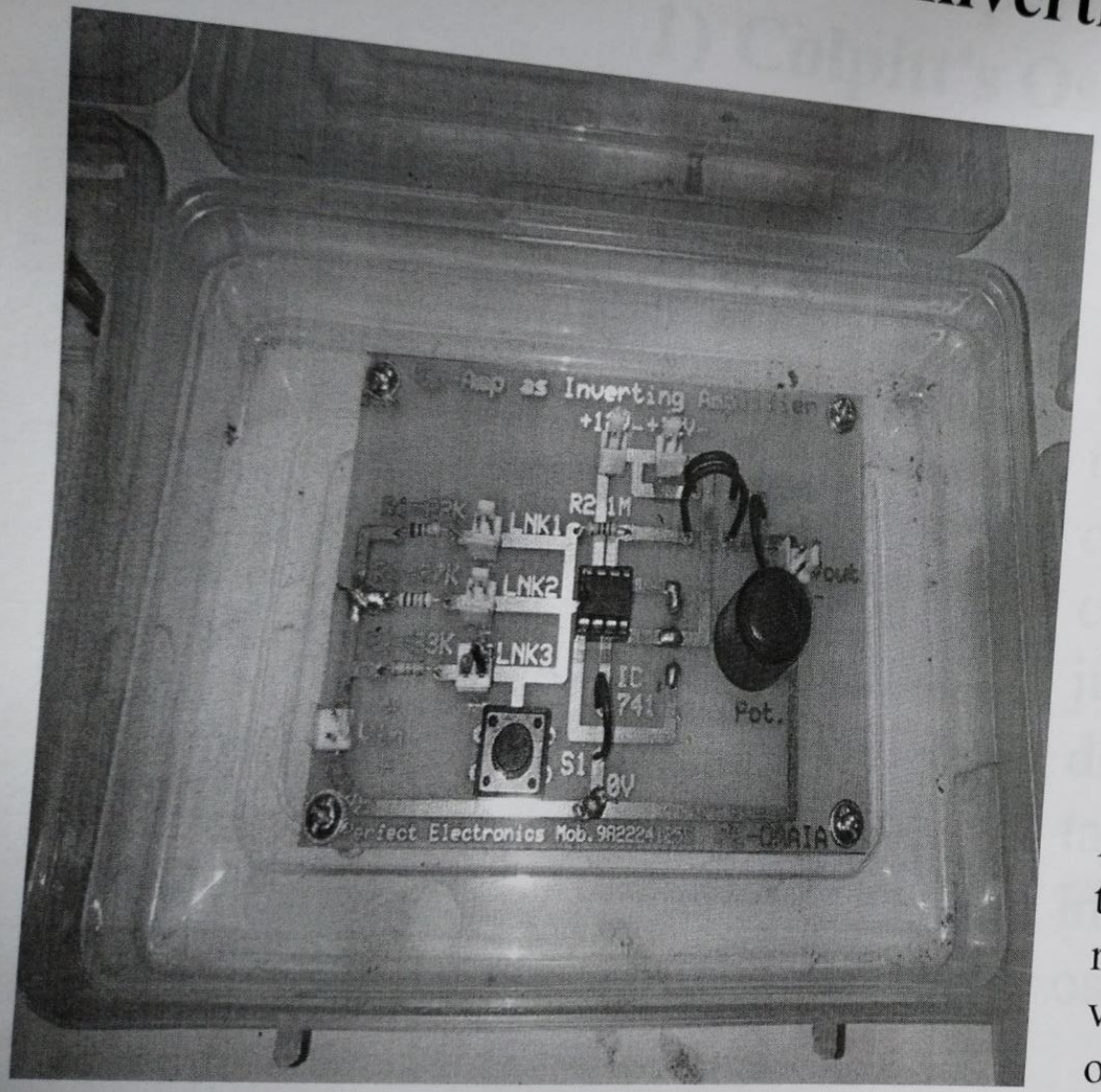
2.Op-Amp as Comparator



A **comparator** is an electronic circuit, which compares the two inputs that are applied to it and produces an output. The output value of the comparator indicates which of the inputs is greater or lesser.

The comparator falls under non-linear applications of ICs.An op-amp consists of two input terminals and hence an op-amp based comparator compares the two inputs that are applied to it and produces the result of comparison as the output.

3.Op-Amp as inverting Amplifier



A circuit is said to be **linear**, if there exists a linear relationship between its input and the output. Similarly, a circuit is said to be **non-linear**, if there exists a non-linear relationship between its input and output.

Op-amps can be used in both linear and non-linear applications. The following are the basic applications of op-amp –

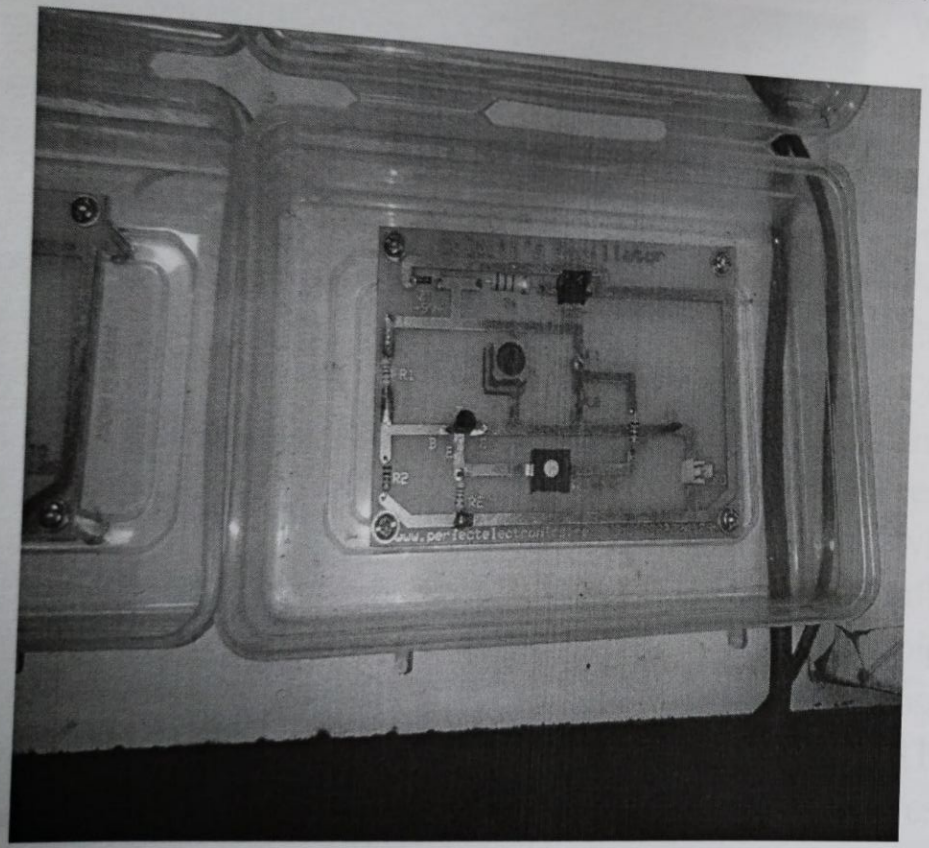
Inverting Amplifier

Non-inverting Amplifier

Voltage follower

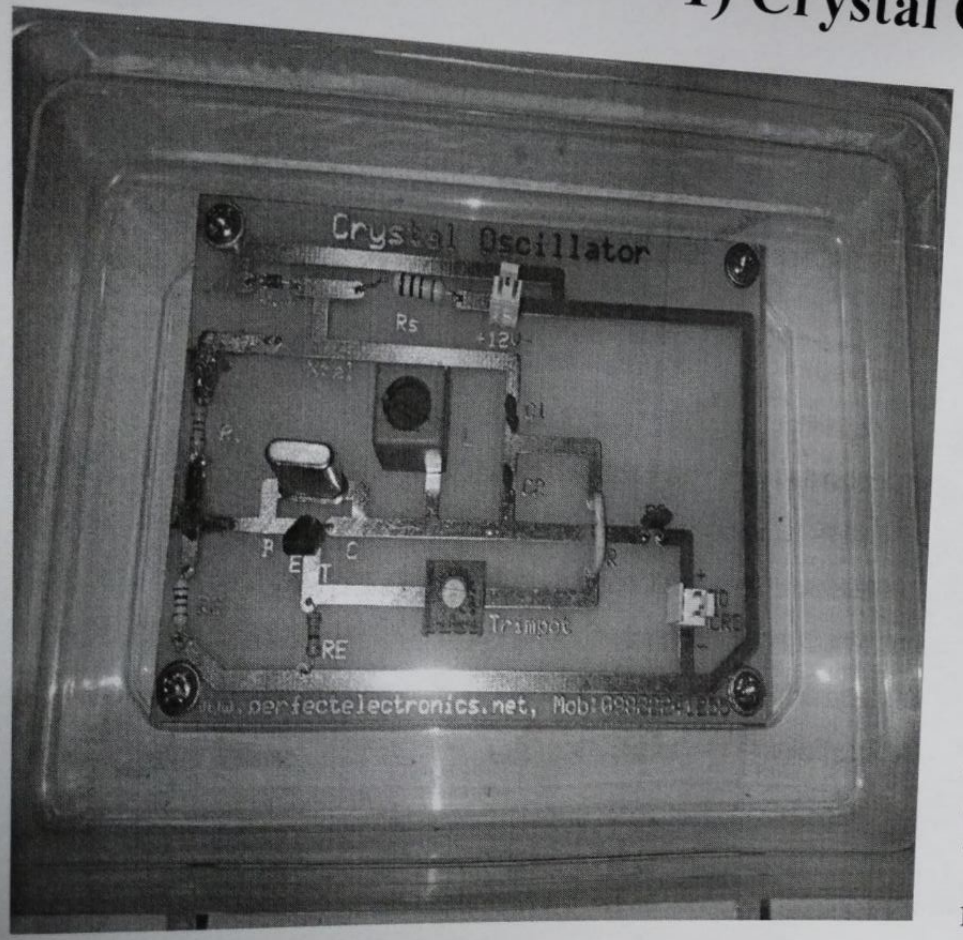
An inverting amplifier takes the input through its inverting terminal through a resistor and produces its amplified version as the output. This amplifier not only amplifies the input but also inverts it (changes its sign).

Electronic Experimental Kit
1) Colpitt's Oscillator



The basic configuration of the **Colpitts Oscillator** resembles that of the *Hartley Oscillator* but the difference this time is that the centre tapping of the tank sub-circuit is now made at the junction of a "capacitive voltage divider" network instead of a tapped autotransformer type inductor as in the Hartley oscillator.

Electronics Experimental Kit
1) Crystal Oscillator



Whenever an oscillator is under continuous operation, its **frequency stability** gets affected. There occur changes in its frequency. The main factors that affect the frequency of an oscillator are

Power supply variations

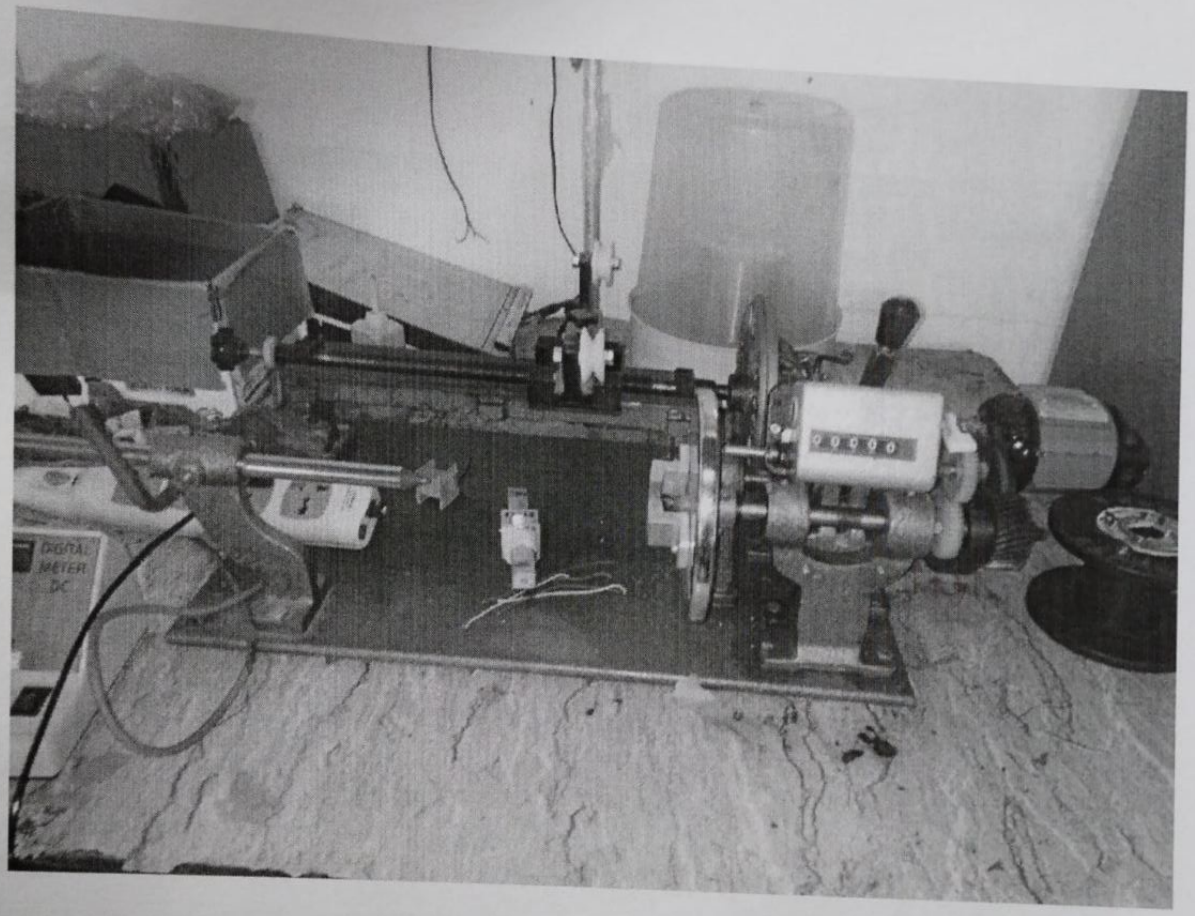
Changes in temperature

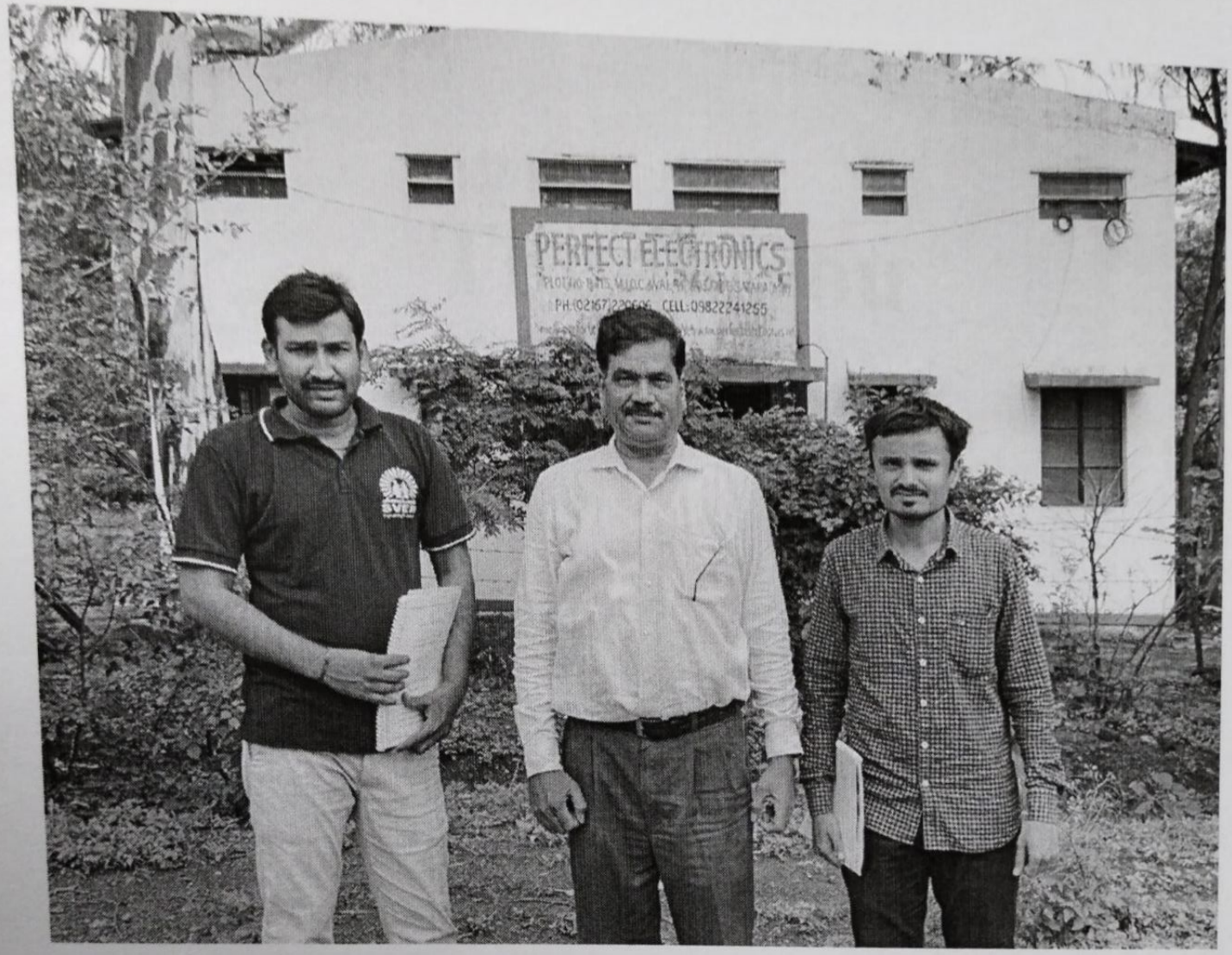
Changes in load or output resistance

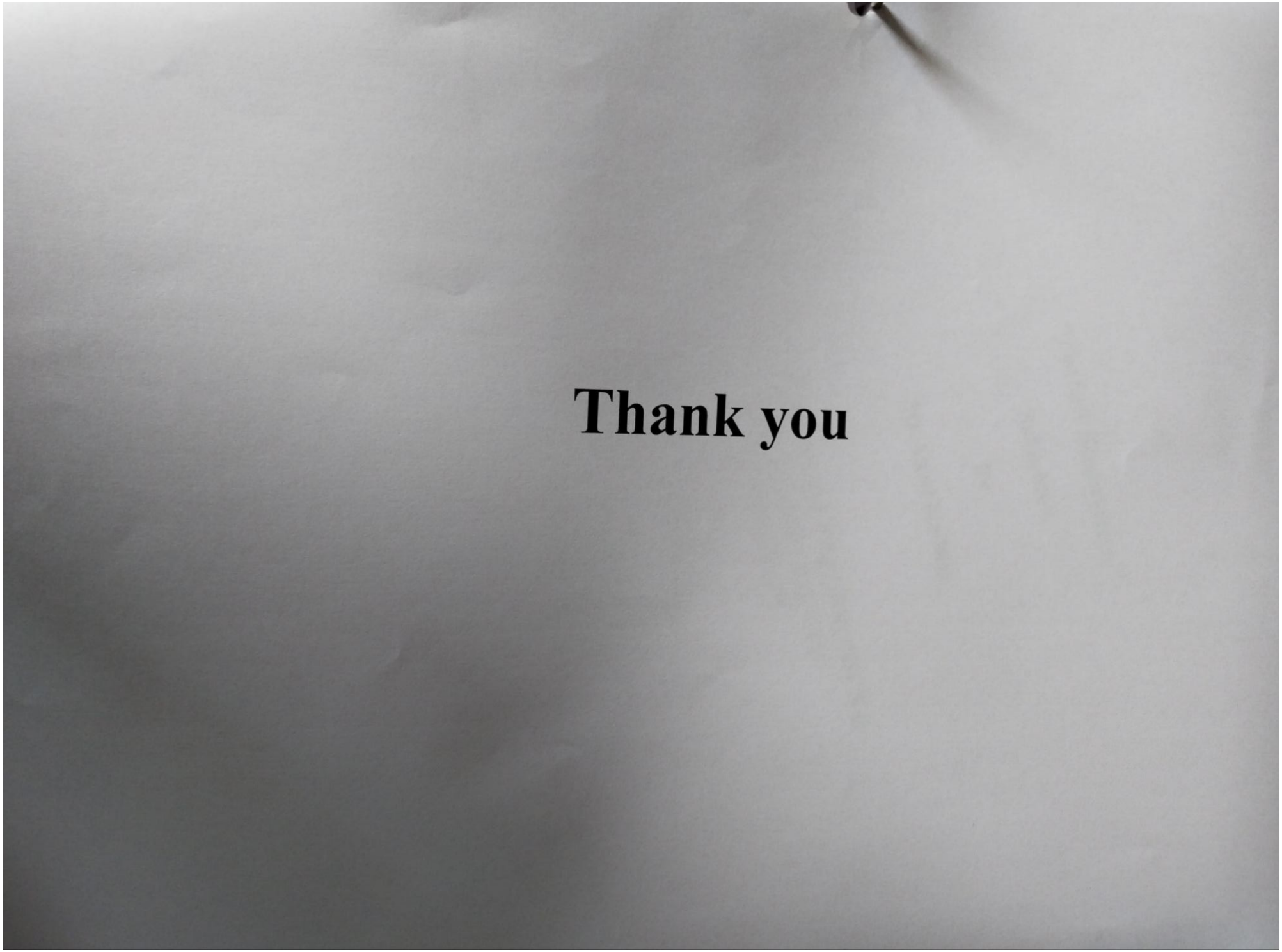
In RC and LC oscillators the values of resistance, capacitance and inductance vary with temperature and hence the frequency gets affected. In order to avoid this problem, the piezo electric crystals are being used in oscillators.

The use of piezo electric crystals in parallel resonant circuits provide high frequency stability in oscillators. Such oscillators are called as **Crystal Oscillators**.

Transformer Making Machine




PERFECT ELECTRONICS
CELL:09822241255


Thank you

A

FACULTY INDUSTRIAL TRAINING REPORT

ON

"Perfect Electronics "

Submitted

By

Mr.Amol Kadam

DEPARTMENT OF ELECTRONICS & TELECOMMUNICATION ENGINEERING

SVERI

COLLEGE OF ENGINEERING, PANDHARPUR.

Academic Year: 2022-23

ACKNOWLEDGEMENT

It is with a great sense of gratitude that I acknowledge the support given to me by number of individuals in the preparation of this report.

I thank to the Director of company Dr.R.V Dhekale & staff of the company for their kind support and help which proved to be a source of knowledge and addition to the learning of Engineering in a better way

I would like to thank to Dr.Mrs.M.M Pawar Head, Department of E&TC Engineering and the other teachers whose unending efforts, advice, motivation and encouragement at every step made this work possible.

I take this opportunity to also thank Principal of the college for being a source of inspiration for me.

Lastly I thank my all friends who have helped directly or indirectly to bring this report to stage of completion.

(Mr.Amol Kadam)

CHAPTER NO. 1

INTRODUCTION

Perfect Electronics has been established in 1985. It is well-known for educational electronics kits like FM transmitter, Power line Transmitter and receiver, IR transmitter and receiver, Video signal Transmitter, Remote control circuits Inverter, UPS etc.

Nature of Business	Manufacturer
Company CEO	R V Dhekale
Total Number of Employees	Upto 10 People
Legal Status of Firm	Individual - Proprietor
Annual Turnover	Upto Rs. 50 Lakh

Entrepreneurs Details:

Perfect Electronics, Wai Satara
Address: Survey No. 7/10E, Near Naikwadi Classes, Near Naikwadi Classes, Wai, Satara-412803, Maharashtra, India
Contact Person: Dr. R V Dhekale

Email id: rvdhekale@gmail.com

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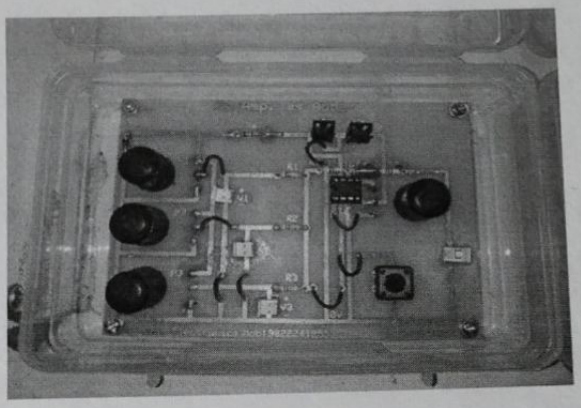
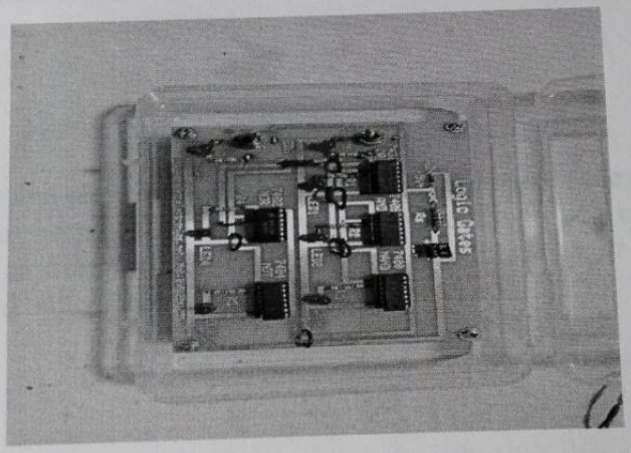


Opamp experimental board



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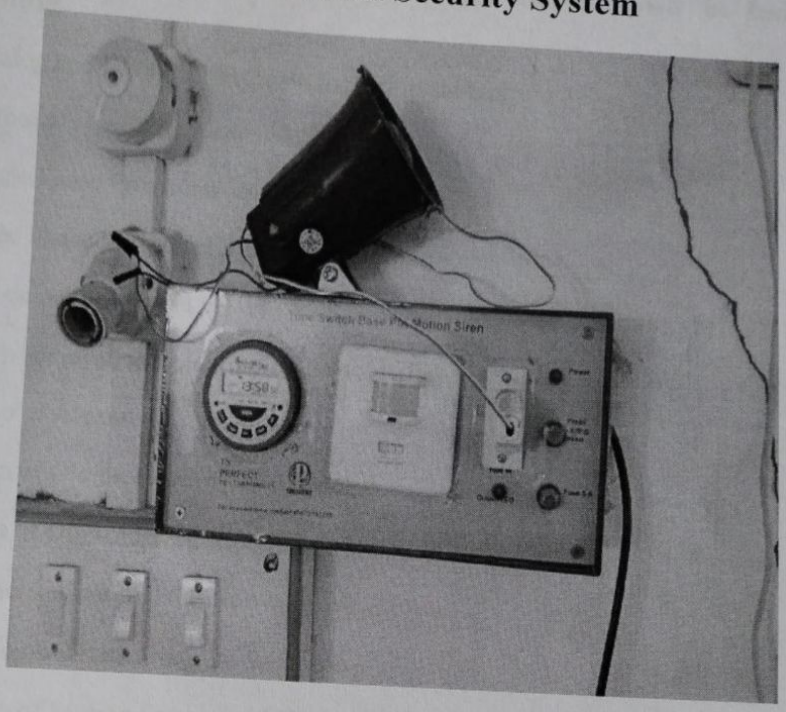

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Demonstration of various Product of industry

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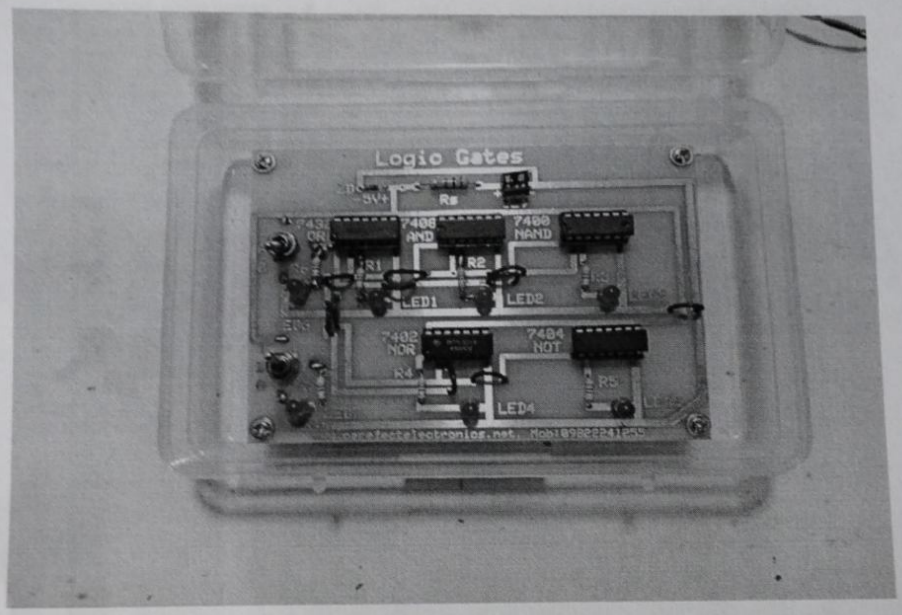

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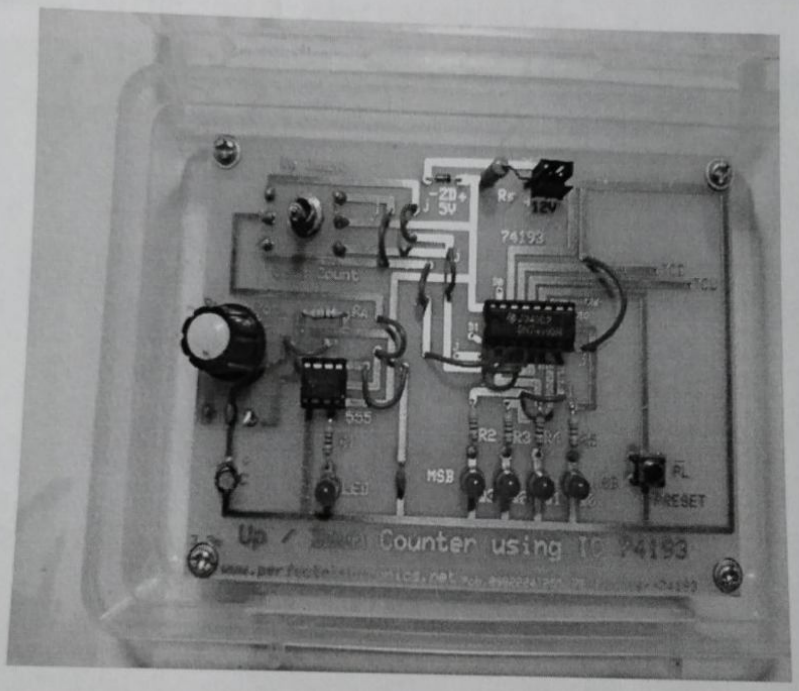

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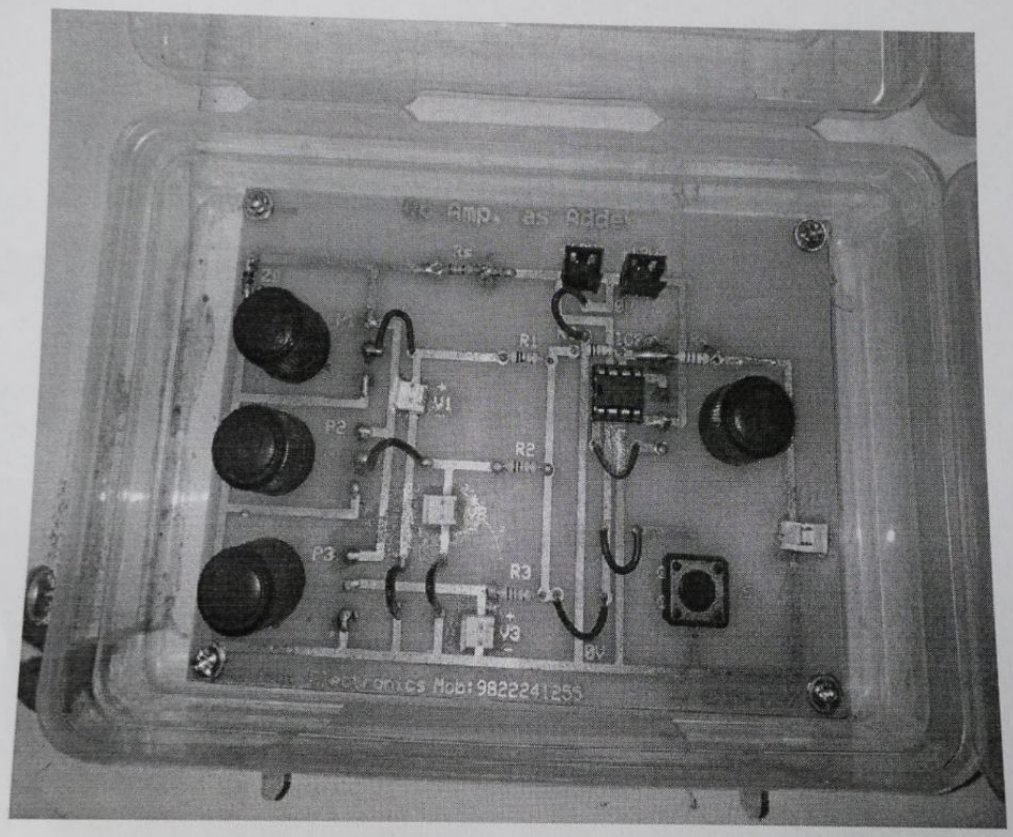

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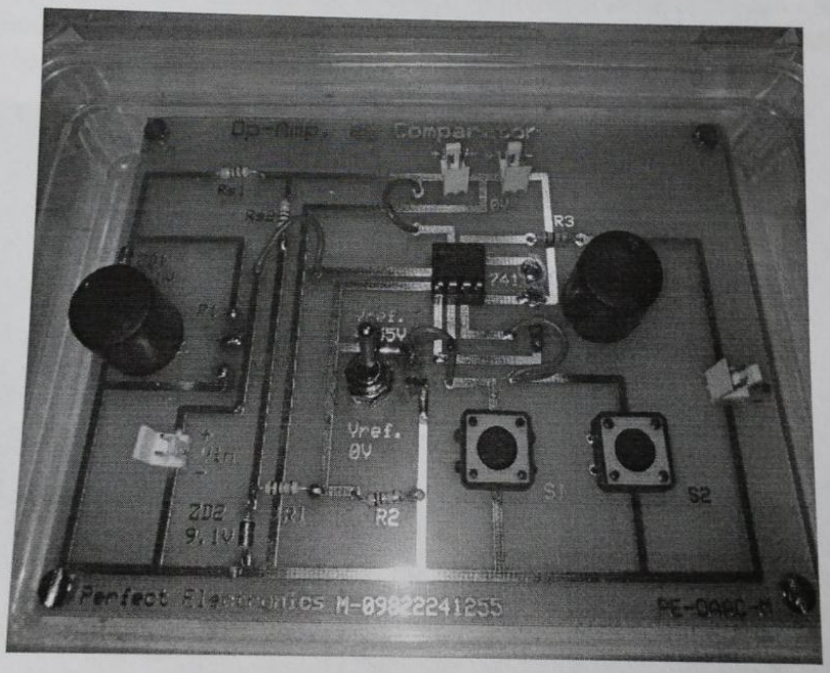

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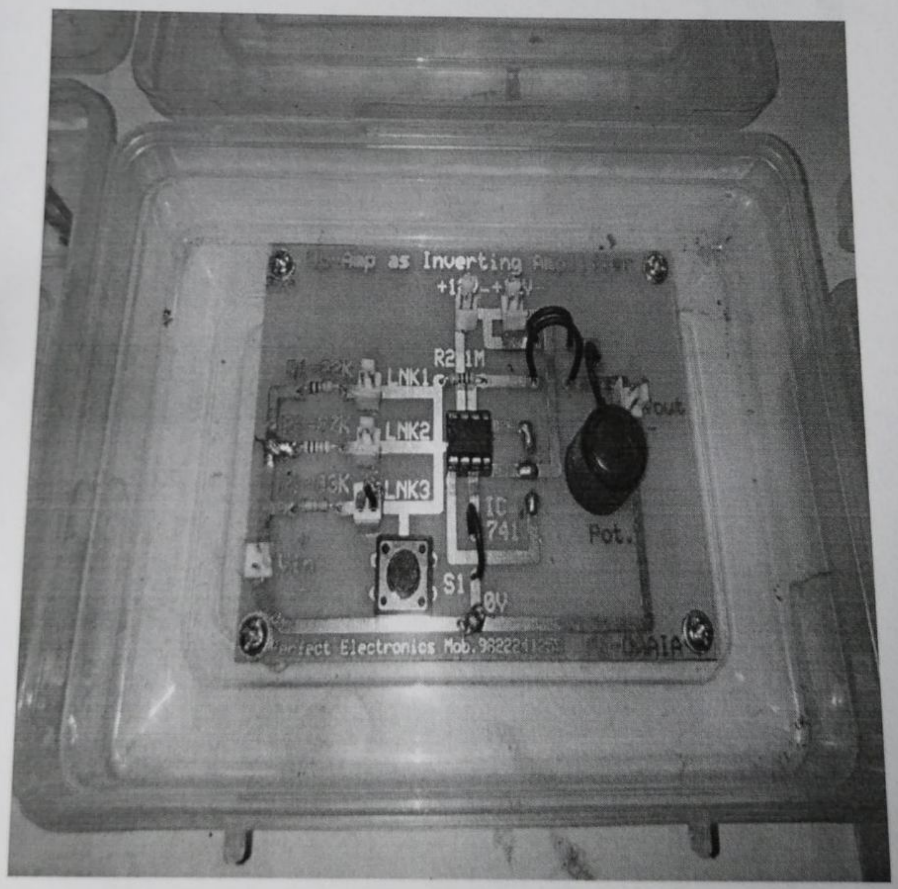

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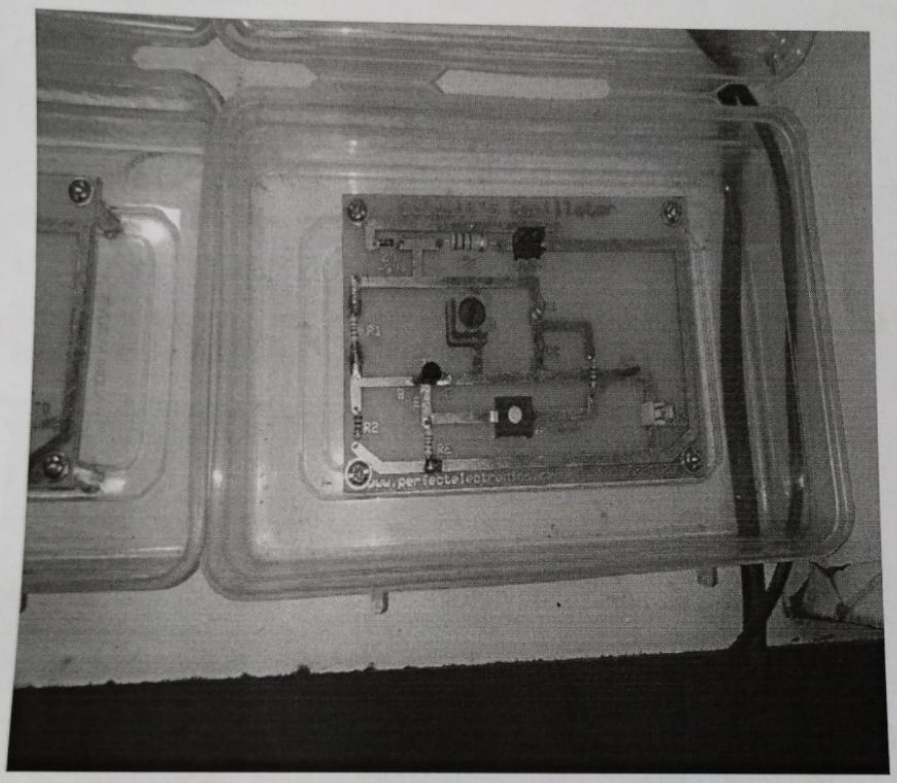

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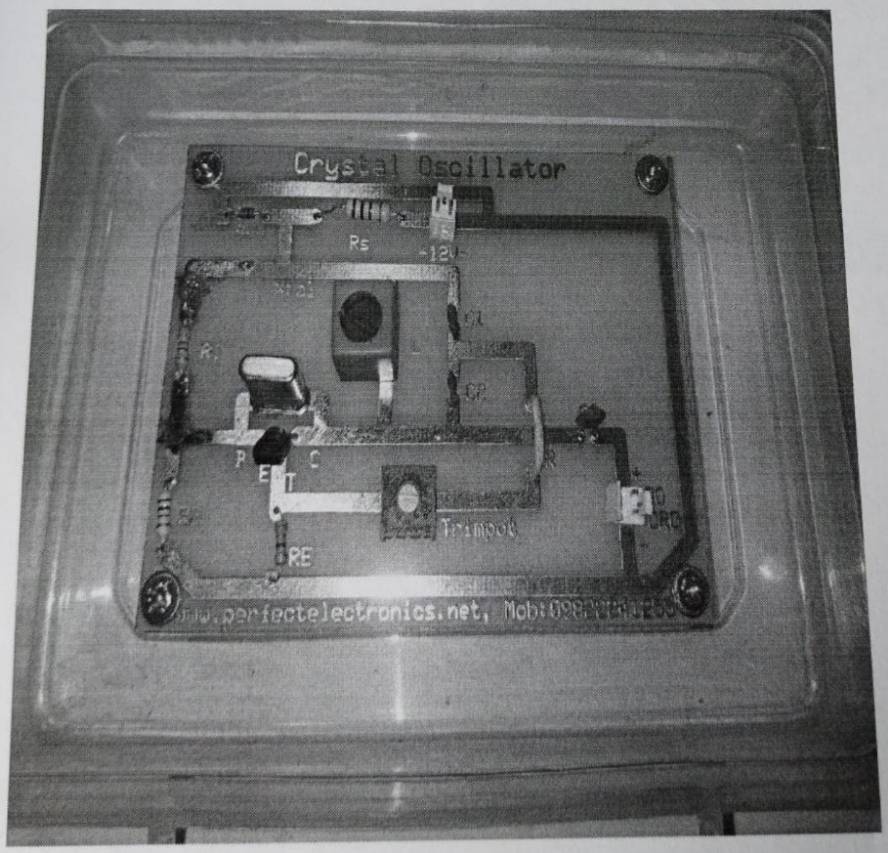
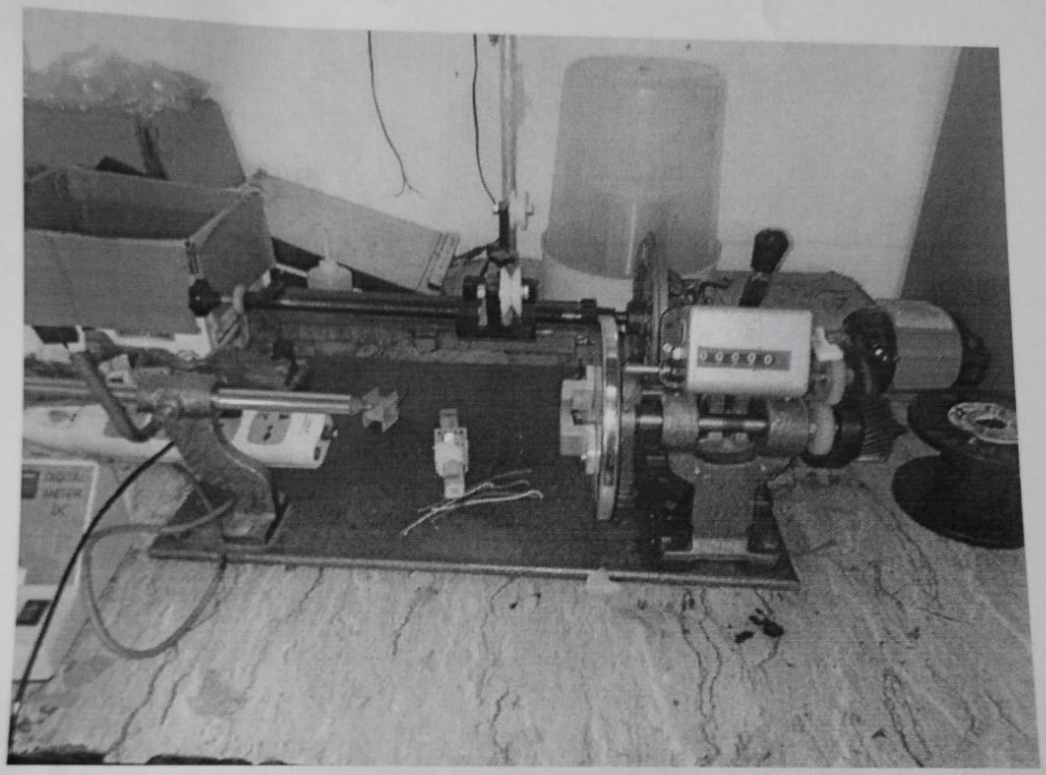


Transformer Making Machine



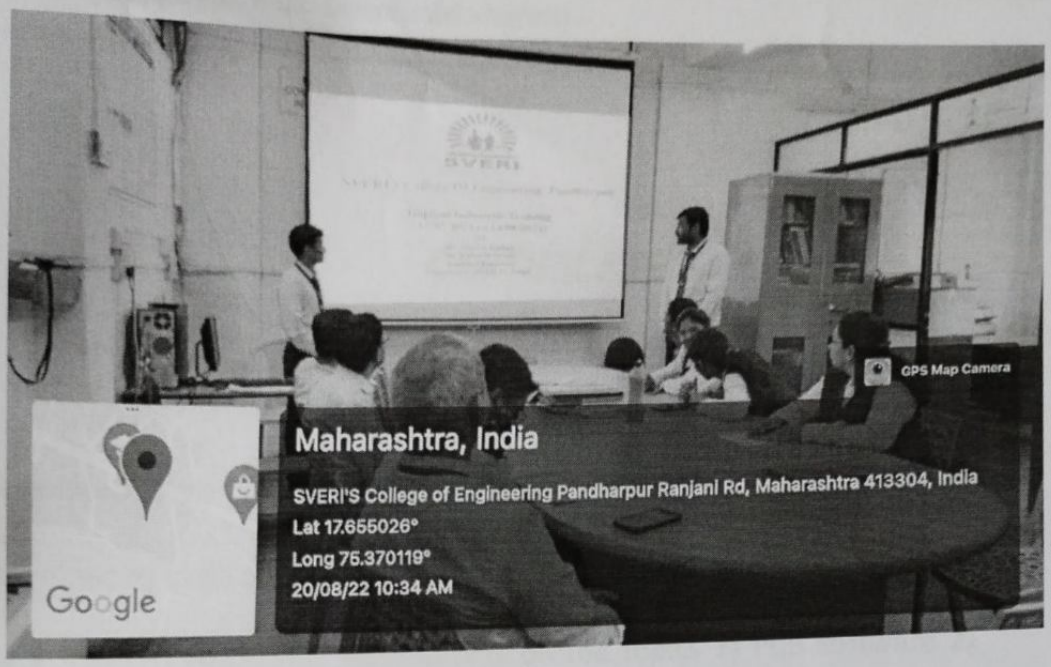
Registration Process of inplant Faculty industrial Training

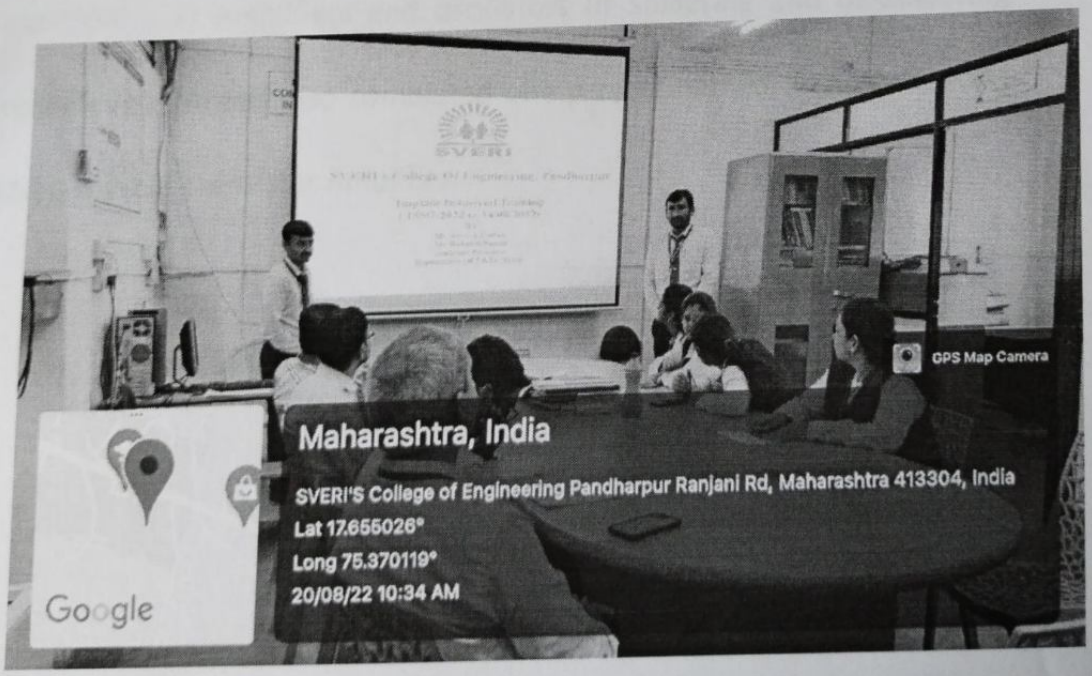
Completion of Training

Outcome of Training

1. The knowledge about PCB Design
2. The knowledge about manufacturing processes involved for manufacturing of electronic products such as electronic bell, LED Lamp

Presentation on industrial training in Department of E&TC Engineering SVERI's College of Engineering Pandharpur





Perfect Electronics

PERFECT

OFFICE : Datta nagar, Behind S.T.Stand, Wai, Dist.Satara. Maharashtra Phone: 02167-220606, Fax:02167-220606,
Mobile : 09822241255 Email:perfectelectronics@usa.com. Support@iperfect.net, Website: www.perfectelectronics.net
FACTORY : Plot No. B-115, M.I.D.C., Wai, Dist.- Satara, (Maharashtra)

Ref: PE/140

Date: 14-08-22

CERTIFICATE

This is to certify that Mr. Amol A. Kadam has successfully completed "Fast Track Practical Based Electronics Training Programme" organized by us at our company during 15-07-2022 to 14-08-2022. He has done total 30 electronics experiments on the topics 1) PCB software 2) Schematic (Circuit diagrams) software 3) Operational amplifiers 4) Digital electronics 5) Amplifiers and oscillators 6) Soldering and de-soldering techniques. He has also completed one project named as Amplification Using Simple Transistor Amplifier.

Dr. R. V. Dhekale

Technical Director

PERFECT ELECTRONICS
Behind S. T. Stand, Dattanagar,
Plot No. 77, Galli No. 4,
Wai - 412 803. Dist. Satara.
Mobile : 9822241255

Perfect Electronics

PERFECT

OFFICE : Datta nagar, Behind S.T.Stand, Wai, Dist.Satara. Maharashtra Phone: 02167-220606, Fax:02167-220606,
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Mobile : 9822241255

Manufacture : Automatic lecture bell system and RASHTRAGEET player, Electronics project, Electrical and Electronics experimental boards. (Fast track electronic traning course for engineering students)

ASIANEQUIPMENTS

ASIAN COMPRESSOR
True Worth

Date: 03rd Aug , 2022

TO WHOM SO EVER IT MAY CONCERN

This is to certify that Dr. S. S. Wangikar , Associate Professor, Head of Mechanical Engineering Department of SVERI's College of Engineering, Pandharpur has completed 30 days Industrial Training at **ASIAN EQUIPMENTS**, **at Koregaon** from **04/07/2022 to 03/08/2022.** During this Industrial Training he has gone through hands on practices on advanced manufacturing processes.

We found this activity is helpful to strengthen the industry-institute relationship.

We express our sincere gratitude towards Prof. Dr. S. S. Wangikar for their Industrial Training to our industry.

Our industry is ready to extend help in following regard:

1. Industrial visit
2. Sponsored projects
3. Research Collaboration

Swapnil Chavan.

ASIAN EQUIPMENTS SATARA

Asian Equipment

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Arunoday Enterprises

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Kolhapur-416008.
Email : info@arunodayenterprises.com
Contact : +91 9028216691 , 7741034774

Authorized Channel Partner for Siemens PLM Softwares

Date : 03/08/2022

TO WHOM SO EVER IT MAY CONCERN

This is to certify that **Prof. Chetan Chandrakant Jadhav**, Assistant Professor, Mechanical Engineering Department of SVERI's College of Engineering, Pandharpur has completed 30 days Industrial Training at **Arunoday Enterprises, Kolhapur** from **04/07/2022 to 03/08/2022.** During this Industrial Training he has gone through hands on practices on 3D printing as well as 3D modeling.

We found this activity is helpful to strengthen the industry-institute relationship.

We express our sincere gratitude towards **Prof. Chetan Chandrakant Jadhav** for their Industrial Training to our industry.

Our industry is ready to extend help in following regard:

1. Industrial visit
2. Sponsored projects
3. Research Collaboration

Arunoday Enterprises

Authorized Signatory

ARUNODAY ENTERPRISES KOLHAPUR

Arunoday Enterprises

Address: 1243/35 Shivaji Udyamnagar,
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Authorized Channel Partner for Siemens PLM Softwares

Date : 26/04/2022

TO WHOM SO EVER IT MAY CONCERN

This is to certify that **Prof. K. S. Pukale** from Department of Mechanical Engineering, SVERI's College of Engineering, Pandharpur have visited on **25/04/2022** to Arunoday Enterprises, Kolhapur. He has given session on "Facilities available at Department of Mechanical Engineering, SVERI's College of Engineering, Pandharpur and Scope for Research Collaboration" is nicely delivered by him. We found this activity is helpful to strengthen the industry-institute relationship.

We express our sincere gratitude towards Prof. K. S. Pukale for their visit to our industry.

Our industry is ready to extend help in following regard:

1. Industrial visit
2. Sponsored projects
3. Research Collaboration

Arunoday Enterprises

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ARUNODAY ENTERPRISES KOLHAPUR

Autade Group
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CIN No. U45200PN2014PTC151170

Ref.

Date :

Date-:22/2/2021

To whomsoever it may concern

This is to certify that Prof. **Sonali Pandurang Patil** from **SVERI's College of Engineering Pandharpur** has visited to our organization on 22/2/2021. We find this activity is helpful to strengthen the industry-institute relationship there by providing a necessary infrastructure and exposure to the students. This also provides our organization a concentrated platform to grab fresh talent without much effort.

We express our sincere gratitude towards Prof. **Sonali Pandurang Patil** for her visit to our organization.

Our organization is ready to extend help in following regards...

1. Inplant training for student and staff
2. Industrial Visits
3. Sponsored Project.

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