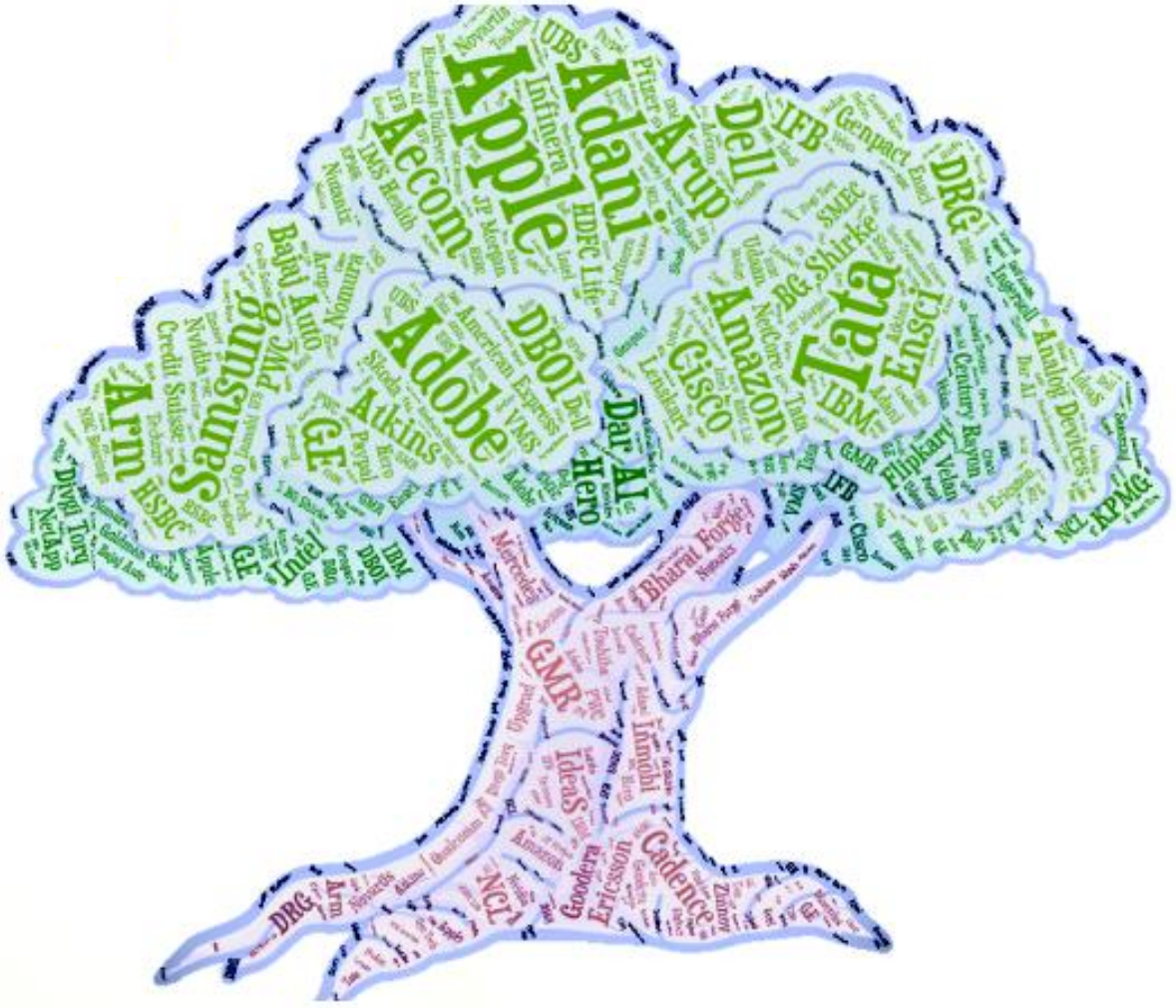
Birla Institute of Technology & Science (BITS), Pilani
Practice School Division
Documentation and Publication Cell
Practice School – I Chronicles (Part 2 – Electronics)
Summer 2022 (May 30 – July 22, 2022)

Date of Release: January 24th, 2023



BITS Pilani
Pilani | Dubai | Goa | Hyderabad | Mumbai

innovate achieve lead

From the Desk of the Editor

It is my great pleasure to bring forth the 4th edition of the PS-I Chronicles. This edition features over 1336 articles from PS-I students sharing their experiences during summer 2022.

The basic premise behind the release of PS-I Chronicles is to document the PS-I learning experience of students keeping the below objectives in view.

- To provide more information on the learning experiences by immediate senior students and PS-I faculty about stations, and thereby enlightening the learning opportunity among the student community.
- To provide the faculty with the enhanced information about the type and nature of work carried out at the organization.
- To transform the knowledge gained at the organization into class room teaching and also to identify the scope of deepening the collaborations with organization.

The articles have been classified into five categories based on the industry domain.

- Chronicle 1: Information Technology
- Chronicle 2: Electronics
- Chronicle 3: Chemical, Mechanical, Cement, Textile, Steel, Infrastructure
- Chronicle 4; Health Care and other
- Chronicle 5: Finance and Management

I also would like to place my sincere thanks to Prof. Anil Gaikwad, who actually spearheaded this entire exercise since 2019 including the current edition. I would like to thank students & faculty for sharing their experiences during their stint at the organization. I would also like to thank Prof. Arun Maity, Prof. M. K. Hamirwasia, and Prof. S. Murugesan for reviewing the articles and providing us the feedback. I would also like to extend my thanks to Mr. Om Prakash Singh Shekhawat and Mr. Varun Singh of the Practice School Division, of BITS, Pilani – Pilani Campus for their help in bringing out this edition of PS-I Chronicles.

I would be happy to receive any feedback regarding the Chronicles. Please feel free to email me at associatedeanpsd@pilani.bits-pilani.ac.in.

Associate Dean

Table of Contents

Domain: Electronics

PS-I station: APC Technologies , Moradabad

Student

Name: PRITHAM RAGHUNATH .(2020A3PS0425P)

Student Write-up:

PS-I Project Title: Antenna Design

Short Summary of work done: We discussed some of the commonly used antennas in the industry such as Microstrip Patch Antenna (which is used in our phones). Then we went onto to design and simulate the said antenna on ANSYS HFSS Software. We then discussed the resulting gain and discussed methods to improve it. We later studied various types of Filters. We designed and simulated Stepped Low Pass Filter in the last week of PS1.

PS-I experience: Inspite of PS-1 being online , the PS station mentor and faculty made all efforts to smoothen the experience for us. We used online resources mainly to learn about the different tools being used in the project . The PS Division also conducted various webinars on different topics by industry experts which were helpful.

Learning Outcome: I learned about the application of Electromagnetic Theory in real world problems. I learned how to use ANSYS HFSS Software for the simulation of antennas and filters. I also learned about the current communication systems in use such as the Microstrip Patch Antenna.

Name: TAARAK SHUKLA .(2020B2AA2530H)

Student Write-up:

PS-I Project Title: ANTENNA DESIGN

Short Summary of work done: We designed different types of antenna and learned about the working. Then we went deep into the topic studied different parameters and characteristics on will the antenna depends .Then by using the ANSYS HFSS software, we designed an inset micro strip patch antenna and after many simulations and analysis, we calculated the return loss, Gain and rE value of antenna.followed by antenna , we also designed a novel low pass filter and calculated the values of different S parameters.

PS-I experience: My overall PS-1 experience was really good. My BITS mentors as well as the industry mentor were really supportive and encouraged me every time to do better. My PS-1 was full of learnings and knowledge.

Learning Outcome: I learned about different types of antenna and their workings . Further, I learned how the HFSS software works and I used the same software to design different antennas and a low pass filter.

PS-I station: Birla Science Centre Pilani , Pilani

Student

Name: ANSH SRIVASTAVA .(2020A3PS2056G)

Student Write-up:

PS-I Project Title: Design and Development of BMI Machine

Short Summary of work done: The project aims to develop a working model of Body Mass Index (BMI) machine which wirelessly senses the height of the user using an Ultrasonic Sensor, reads weight from the connected load cells, calculates BMI and finally displays the height, weight and BMI on different multiplexed seven segment displays.

PS-I experience: The industrial exposure was first of its kind and helped in building an experience, team work, technical and presentation skills.

Learning Outcome: The project helped in understanding Arduino well along with interfacing of 7 segment displays and various other sensors. It helped in getting well versed with various electronic components. We learnt how to work in a team, we had to do extensive research and then come up with a feasible solution.

Name: ASHUTOSH AGARWAL(2020A8PS2013G)

Student Write-up:

PS-I Project Title: Design and Develop Body Mass Index Machine

Short Summary of work done: Developed a working model of Body Mass Index (BMI) machine using only 1 Arduino microcontroller board with connections to ultrasonic sensor, load cells and seven segment displays. The ultrasonic sensor wirelessly senses the height of the user and the load cells detect the weight of the user. These electrical signals are passed on to the Arduino microcontroller which further calculates height, weight and BMI based on the data it has received. The Arduino also finally displays the above mentioned 3 parameters on 9 different multiplexed seven segment displays.
The Arduino has limited pins and thus connecting multiple sensors and displays was made possible by IC 74HC595. This IC used serial communication to facilitate 8 outputs from 3 input pins. Learnt the functioning of various components and applied the same along with coding to design a circuit for the BMI machine. Worked with seven segment displays and coded them in order to function 9 seven segment displays with a single board. Also, successfully simulated the BMI machine on online TINKER Cad software. As a final proof of concept built a working prototype of the BMI machine using actual hardware.

PS-I experience: I learnt the professional approach of working. How to optimise and how industries take decisions by group discussions, and how to gather and analyse information to form the final product. Also learnt how to write a professional report.

Learning Outcome: Learnt to operate the Arduino Technology and its various applications. Also, became adept at coding in Arduino IDE to program the various electronic components. Learnt functioning of many chips and microcontrollers which was a practical experience and an extension to the microprocessors course. Implemented the simulation on hardware to make a prototype as well.

Name: PATIL SHREYAS SAMUDRAVIJAY .(2020AAPS0385G)

Student Write-up:

PS-I Project Title: Visitor Counter System

Short Summary of work done: My project was related to the Internet of Things domain. I had to design a visitor counter system with the help of microcontroller like Arduino UNO, some sensors, displays, etc. which will keep track of number of people entering the Birla Science Center and displays the output value on a big display. At initial stages I read a lot of research papers, then went with the designing of the circuit on different software. Programming of the whole system was done, simulations were performed. Then the final step was fabrication of this device and further modifications were done to get the desired output.

PS-I experience: To be honest, I would say that my overall experience was amazing. The faculty member allotted to me was very kind and was always ready to help and guided me to go in the right direction. The most fascinating thing was we had to buy the components and assemble them at our home, i.e. to actually fabricate the device, even though the entire PS-1 was online. Because of this, I got some hands-on experience in the same.

Learning Outcome: I got to learn more about the software Eagle (used for designing a circuit), understood functioning of some industry grade sensors, their libraries used for programming them. Also got a concrete idea of how things work at the corporate level, including filing of reports on the project we are working on. Along with this I learnt interfacing of different components with microcontroller.

PS-I station: Central Electronics Engineering Research Institute, Pilani

Student

Name: PRATEEK MUKHERJEE .(2020A3PS0372P)

Student Write-up:

PS-I Project Title: Study and Analysis of LDPC Decoder

Short Summary of work done: Half of my PS(until midsem) was spent in doing the following:

Comprehensively studying the LDPC codes and its applications in 5G communication. Understood and implemented the LDPC encoder using the modified Richard-Urabanke method algorithm and its area-efficient, high throughput architecture.
Simulated the algorithm on MATLAB and verified few of the results mentioned in the paper.
The rest of the PS was spent in studying about decoders.
Focused on Hardware-Efficient and High-Throughput LLRC Segregation Based Binary QC-LDPC Decoding Algorithm and Architecture which is suitable for 5G NR standards.
Successfully ran a workable code doing the LDPC decoding on MATLAB and plotted various graphs to judge the efficacy of this approach. Developed a reference table demonstrating the optimum number of iterations required to achieve a stable BER at a specific expansion-factor value.

PS-I experience: My experience was wonderful, I got to work on a very interesting topic that has its applications in the 5G communication industry. I was lucky enough to be guided and constantly motivated by the scientist as well as my PS-1 mentor under whom I was working.

Learning Outcome: The entire experience taught me a lot. I came to know the best way to go through a research paper and extract the relevant information from it after reading quite a few papers.
Learnt Verilog (HDL) and MATLAB ,which were required in this project.
I got to apply the theoretical concepts in Digital Design in building a real-word application.
I got some exposure in making professional presentations and learnt how to present the content clearly.
By writing various formal reports for the fulfilment of our project, I understood the manner and the style which needs to be followed in writing such reports.

Name: Aryaman Lath(2020A3PS0420P)

Student Write-up:

PS-I Project Title: Non Invasive Glucose sensing using Metamaterials

Short Summary of work done: Worked with an industry mentor to design and simulate a metamaterial Defective Ground Plane Structure microstrip to detect change in blood glucose concentration when a finger is placed above the sensing area. We were able to

successfully reproduce results from an existing paper and create our own design for a sensor.

PS-I experience: My PS experience was largely positive. My mentor was in constant touch with me and tried to help me whenever i had problems. I also learned a lot about how research work is done.

Learning Outcome: I learned how to work in an industrial and professional setup. I also learned a lot about what the requirements and problems faced during research work are.

Name: ADITYA ANANT BHALERAO .(2020A3PS0433P)

Student Write-up:

PS-I Project Title: Ldpc decoder and its hardware implementation

Short Summary of work done: It was mainly reading research papers and understanding hardware architecture to implement LDPC encoder and decoder

PS-I experience: The scientist (Dr Gaurav Purohit) was pretty enthusiastic. Dr. Sandeep Joshi, our mentor was easily reachable and ensured smooth flow.

Learning Outcome: Understood how matrix multiplication is carried out using combinational and sequential logic. Developed an understanding of LDPC encoding and decoding algos.

Name: ROHIT BEVINAHALLY .(2020A3PS1054G)

Student Write-up:

PS-I Project Title: Decoding Finger Flexion by employing a CNN-BiLSTM Recurrent Network BCI system

Short Summary of work done: A brain computer interface(BCI) is a computer based system which collects,analyses and converts brain signals into commands. My work was related to predicting finger flexion from Electrocorticography (ECoG) data by using a deep learning neural network. This required many signal pre-processing methods and dataset generation algorithms as well as knowledge of deep learning and neural networks all of which could be obtained in the course of PS-1.

PS-I experience: The activities conducted by the PS instructors like Group Discussion and Seminar were more useful than the actual PS-1 project. The station instructors were moderately helpful, but had a pretty good experience overall.

Learning Outcome: I was able to expand my knowledge on deep learning and explore whether it was interesting to me or not. I was also able to strengthen my communication and presentation skills through the seminar and report writing.

Name: NIHAR PARAG AHIRE(2020A3PS1234P)

Student Write-up:

PS-I Project Title: LDPC Decoders and their Implementation

Short Summary of work done: Most of the work we did was literature survey to understand how LDPC decoding and encoding actually happens. The later part of it was implementing the same on MATLAB and Verilog

PS-I experience: It was a good experience. The professor I had was friendly and enthusiastic so we learned quite a lot about the topic LDPC

Learning Outcome: I got to know a niche subject of LDPC encoders and decoders

---

Name: SHAH BHAVYA ASHISH .(2020A3PS1759G)

Student Write-up:

PS-I Project Title: Study and Design of LDPC decoder and their Front end (FPGA) implementation

Short Summary of work done: We studied about the LDPC Codes and did a matlab implementation for understanding and then moved on to study the architecture of ldpc decoders and tried to optimise them

PS-I experience: It is a really good experience, even the scientists are learning with us and we can share our insights with them, got a good experience of how the research is done what things to look for

Learning Outcome: There was not a single outcome that we originally produced but recreated some architectures and are now continuing our research.

Name: ARJAV PRAVEEN JAIN .(2020A3PS1788P)

Student Write-up:

PS-I Project Title: ECC for NAND flash devices

Short Summary of work done: I mainly did research on NAND Flash devices and Error correcting codes, learnt Verilog and implemented some circuits on the same.

PS-I experience: It helped me learn about research work and how to go about a research project.

Learning Outcome: I learnt about various applications of NAND Flash devices and applications of ECC.

Name: GARVIT SETHI .(2020A7PS0084G)

Student Write-up:

PS-I Project Title: Process Flow For Pseudo-Coloring Using X-Ray Image

Short Summary of work done: The aim of the project was to implement the method of pseudo coloring of grayscale X-ray images. X-Ray scanners provide images based on different levels of absorption of radiation of different materials. They are used in the medical domain extensively, for instance, for detection of fractures in bones, detection of certain kinds of tumors, lung scans and so on. They are also widely used in the field of security on which we focused. Airports are a sensitive place from the point of view of mass security. So, it becomes very important to analyse the contents of the luggage of the passengers. That is done using X-ray imaging. In the project, the X-ray scanning technique being used is dual-energy x-ray imaging.
But these grayscale x-ray images are hard to analyze. There is a need of providing more details of the images. This can be done using providing a false color to the pixels, depending upon the material of the object. There are several techniques available for false-coloring. This project tries to implement one such technique. I wrote a fully working code for the algorithm described in a research paper given by my industry mentor. The algorithm includes material classification, edge sharpening and coloring steps.

PS-I experience: The industrial exposure was first of its kind and helped in building an experience, team work, and presentation skills. Overall a nice experience.

Learning Outcome: Through this project, I got the opportunity to learn about various Computer Vision algorithms and their applications. I also got a more firm grip on the Python language. I also got to learn about various different Python libraries, which are quite useful in the field of Computer Vision & Image Processing. I got to learn about various color-spaces, which are quite important.

Name: PATEL DHARMIK ROHITKUMAR .(2020A7PS0085G)

Student Write-up:

PS-I Project Title: ML/DL APPROACH TO STUDY THE DIABETIC FOOT COMPLICATIONS USING PLANTAR THERMOGRAM IMAGERY

Short Summary of work done: Our research was based on classifying if a patient is diabetic or not just by having thermal images of plantar region of their feet. The variations in temperature in different parts of foot can act as a strong indication for diabetes and risk of ulceration, and so studying them can be very helpful in medical areas.

PS-I experience: We already had a dataset of 167 patients and we then preprocessed the dataset and applied a variety of different MLlike SVM, Regression, Random Forest, GLCM, ADABoost, XGBoost, etc ; and DL models like deep ANN, CNN, Mini VGGNet,etc. My work was focused on implementing the DL part of the project where I tried a lot of different approaches and reached my final optimal model which I implemented using 5-fold cross validation and with total 11 layers, using CNN. The accuracy my DL model was 91.81 ± 2.05 % which is considered very effective.

Learning Outcome: I learned to use a very important tool called TensorFlow, and I also learned how to solve different problems that arise with small datasets, feature extraction, data augmentation, etc. I understood CNN a little better after actually using it to contribute something valuable to science. I also learned a lot of different technical stuff that might not seem significant but helps a lot when you actually work by yourself.
PS-1 also in a way gives a brief glimpse about how its gonna be in corporate world, I mean no one is gonna teach you at every step , you have to find the solution and implement it and do everything by yourself.

Name: PRANEETH B .(2020A7PS0096G)

Student Write-up:

PS-I Project Title: Investigating and improving existing segmentation models for the detection of threat items in X-ray baggage scans.

Short Summary of work done: Screening threat items from baggage scans in terminals can be a cumbersome task even for specialized personell at airport and railway terminals. Therefore, object detection methods can be employed to automatically detect those items with high accuracy. Semantic segmentation is one such way to achieve this goal. We selected the DeepLabV3 model for our purpose and coupled it with the Focal loss developed by Facebook A. I to counter the class imbalance present in the dataset. The dataset used was the GDXray dataset. It contained 788 grayscale images with appropriate annotations for the 4 different threat items - Gun, Knife, Shuriken, Razor blade. The evaluation metric used was the IoU or Intersection over Union. We achieved promising results after training for just 10 epochs and intend to work on the same model to fit bigger datasets such as the PIDray, which not only have more images but also are coloured.

PS-I experience: The practice school gave me a quick and brief experience of how research work actually takes place in renowned research institutes such as CEERI Pilani. It was very informative and enlightening to work with top Scientists under the government.

Regular meetings were organised along with group discussions and seminars to get an outlook on how my fellow peers were performing. We got access to high end, powerful machines to aid model training and the entire workflow was smooth and entertaining. The mentors were very understanding and guided us throughout the project.

Learning Outcome: I was an absolute beginner when it came to machine learning before starting my PS work, but now I truly understand the basics and intend to explore the field a lot more. I received a lot of experience in the field of workplace conduct and have improved my time management skills. Keeping a regular record of daily work along with discussions have also improved my critical thinking.

Name: KSHITIJ GARG .(2020A7PS0120P)

Student Write-up:

PS-I Project Title: ML/DL APPROACH TO STUDY THE DIABETIC FOOT COMPLICATIONS USING PLANTAR THERMOGRAM IMAGERY

Short Summary of work done: The project statement for my work was "ML/DL APPROACH TO STUDY THE DIABETIC FOOT COMPLICATIONS USING PLANTAR THERMOGRAM IMAGERY". I was responsible for implementing and comparing the results of a variety of machine learning algorithms for the given classification task. The project included proper preprocessing of the image data, developing appropriate models and quantifying the results. Further we implemented different CNN models from scratch to compare the performance of ML and DL based models for the task.

PS-I experience: The Practice School-1 was a new and exciting experience for me. I got to learn many new things about the organisation. Being my first industry exposure, this experience helped me a lot to get practical knowledge. Overall it was a beautiful experience to be a part of the organisation like CEERI Pilani.

Learning Outcome: ML/DL techniques, Python3 and its libraries like pandas, numpy, scikit learn, scikit image, opencv, tensorflow, keras.

Name: AAKASH TIWARI .(2020A7PS0981G)

Student Write-up:

PS-I Project Title: Computer Vision-Based Algorithms For Detecting Heavily Occluded Items

Short Summary of work done: I read two research papers, related to the project and tried to comprehend the explained models in the best possible way. The project I worked in was related to the OPIXray dataset. The aim was to detect heavily occluded threat items from passenger's baggage by using Deep Learning models. DOAM was the model which was explained in the first research paper. I trained and tested the model over the OPIXray dataset and verified the results with the results mentioned in the research paper.

PS-I experience: It was a great learning experience under my PS faculty and industry mentor. I learnt many things about the corporate culture, like - how to maintain discipline to complete the work under given deadline, how to manage our tasks in a systematic manner, how to communicate with our team mates and mentors in an effective way so that the work progress happens quickly and many more. Besides, I learnt a lot about machine learning and deep learning (object detection in particular) while working under the guidance of my industry mentor. I also learnt new skills from my group mates and helped them whenever they needed it, to the best of my capability.

Learning Outcome: I learnt how tasks are done in professional life in an efficient and quick manner using the tools of discipline and effective communication. I also learnt many concepts about machine learning and deep learning. I got experience to work in Google Colab and also got to learn about jupyter notebooks. I used various python libraries in the process and hence developed my coding skills too. I also got to know, how research papers are comprehended in a proper manner and how do we verify them.

Name: SANKALP KULKARNI .(2020A7PS1097H)

Student Write-up:

PS-I Project Title: Prediction of finger flexion for ECoG-based BCI systems using GRU and CNN

Short Summary of work done: I worked on public ECoG dataset. My work was to develop a deep neural network model to correctly predict finger flexion using ECoG

dataset. First part of the work was to read research papers to find various preprocessing techniques that will help improve the accuracy of our model. Next part of the work was to develop a hybrid neural network using Convolutional Neural Network (CNN) and Gates Recurrent Unit (GRU).

PS-I experience: I got to experience the work culture of Research Lab and improve my presentation skills. Overall it was enriching experience working with scientists.

Learning Outcome: I got to learn about various neural signal pre-processing techniques and various deep neural network architectures.

Name: RIJUL RADHU .(2020A7PS1430G)

Student Write-up:

PS-I Project Title: Al-enabled pipeline for disease detection in fruit species using fruits/leaves images

Short Summary of work done: The project was to identify and locate area of disease on strawberry fruits and leaves using different Deep Learning algorithms. Initially I did the literature review to understand the work that has been done already. Then I balanced the existing dataset using different augmentation techniques. Then I trained different Convolutional Neural Networks (CNNs) on both datasets to compare the model performance.

PS-I experience: Even though the PS was online this time, It was a great learning experience. PS faculty and Industry mentor were very supporting. I got exposure on how research is conducted in the industries.

Learning Outcome: I learnt about various deep learning algorithms like Faster RCNN, Mask RCNN, etc. I also learnt about augmenting data using various techniques and libraries to enhance the dataset.

Name: GOWAIKAR SHREEYASH MUKUL .(2020A7PS1719G)

Student Write-up:

PS-I Project Title: Image Inpainting Techniques for Cultural Heritage Preservation and Ancient Art Restoration

Short Summary of work done: I was working on inpainting techniques for the restoration of ancient images. I prepared a Partial Convolutional U-Net to reconstruct damaged regions in cultural images using Inpainting. During this period, I worked using Keras and Tensorflow and was able to explore different machine learning code paradigms. I also worked on h5 files when I had to integrate old pre-trained weights into the new model. I also was introduced to web scraping images of google image search while creating the dataset.

PS-I experience: The experience in CEERI Pilani for an online PS1 was very fulfilling, in my opinion. Our PS faculty was very helpful and supportive and helped us get a project aligned with my skills and interests. We had weekly meetings for updates or information on the course, which helped us immensely. The project mentor assigned to me was very helpful and knowledgeable. I was able to learn many soft skills and technical skills through my interactions with them! In my PS1, I was able to learn a lot and apply the learned knowledge. I learnt skills pertinent to presentations and group discussions as well!

Learning Outcome: I learned different inpainting techniques and GAN architectures. I was also able to learn in-depth how U-Nets could be used in inpainting tasks. Complementarily, I also learned about h5 files(their structures, how to edit them and how to use a custom-made h5 file as the weights of a Keras model). I also learned basic web scraping using selenium when I was given the task of creating the dataset. I also learned soft skills, which were necessary during communications and presentations.

Name: ATHARVA A LIMAYE .(2020A7PS1721G)

Student Write-up:

PS-I Project Title: AI-enabled pipeline for disease detection in fruit species using fruits/leaves images

Short Summary of work done: The objective of the project was to classify the diseased strawberry fruits and leaves into 7 classes of disease and detect the affected areas.The

dataset of strawberry leaves and fruits was found which was later balanced with various augmentation techniques.Training of CycleGAN model was also tried to further enhance the dataset.Various object detection algorithms were then tried on the dataset.

PS-I experience: I had a great experience.Both my Industry mentor and BITS faculty were very enthusiastic about the project and they helped and guided me whenever I faced some difficulty.Even though PS1 was online it was a great learning experience.

Learning Outcome: I learnt about various types of object detection algorithms and CycleGAN.Through the evaluation components, I also believe to have enhanced my soft skills.I also got an idea of how academic research works.

Name: DIXIT DWIJ NITIN .(2020A7PS2129G)

Student Write-up:

PS-I Project Title: Data Augmentation techniques for X-ray Images

Short Summary of work done: The Practice School project focused over training data augmentation for object detection models. The focus of the project was detection of threat objects- guns, knives, blades, etc. The project objective is to improve the performance-average precision of the models training by improving the training datasets.
To this end, we enhances the dataset by including images suspectable to be mis-recognized, and evaluated the precision of object detection models trained thereon.

PS-I experience: PS-1 at CEERI provided a great learning opportunity in the fields of GANs, and time-bound work and delivery.

Learning Outcome: Over and above the technical learning, PS-1 helped improve report writing skills, presentation and discussion skills.

Name: POORNIMA K .(2020AAPS0410G)

Student Write-up:

PS-I Project Title: A hardware implementation of the GIFT-COFB cipher

Short Summary of work done: The aim of the project was to create a Verilog implementation of the GIFT-COFB cipher. In the beginning thorough reading on cryptography and various methods of encryption specifically about AEAD was done. Later a research paper specific to the GIFT-COFB cipher was also read. The implementation was done based on the various properties described in the paper.

PS-I experience: Overall, had a really good experience in PS I. In the course of the work, I was able to have a good interaction with the mentor from the station. Moreover I was also able to get an idea on what a good project report should be and how to give a presentation about a project. I also got a glimpse on how an actual industry would function like.

Learning Outcome: I was able to get a hands on experience with Verilog for implementation of real life systems. Also a brief idea on cryptography and various encryption methods.

Name: ADAPALA SANJANA .(2020B4A72243H)

Student Write-up:

PS-I Project Title: Unsupervised Anomaly Instance Segmentation Using Unsupervised Deep Learning Techniques for Baggage Threat Recognition

Short Summary of work done: My project was related to unsupervised deep learning domain. The model was trained using negative x-ray baggage scans (without threats) and identified threats in testing baggage scan images as anomalies. I did a literature review of a research paper and debugged the code available on the author's GitHub repository. I optimized the RAM usage for training, making it possible to train on large datasets without the need for a powerful workstation. I wrote the code for anomaly mask generation using k-means clustering in python for threat recognition. The framework gave satisfactory results.

PS-I experience: PS-I was pretty engaging. Our mentors were supportive and conducted regular interactive meets. The project itself was in a domain I wasn't experienced with before, so I learnt about it gradually and was able to implement the project.

Learning Outcome: I learnt about unsupervised deep learning approaches and was familiarised with TensorFlow library, Keras API. I improved soft skills like presentation, group discussions and report writing.

Name: GRANDHALA SRI SAI HARSHITH .(2020B5AA2240H)

Student Write-up:

PS-I Project Title: ACOUSTIC INTERACTION WITH MICROFLUIDS

Short Summary of work done: Main objective of my PS1 was to simulate a model for understanding Surface acoustic wave induced acoustic streaming in the fluid in PDMS microfluidic channels in a finite element solver COMSOL MULTIPHYSICS .I was able to simulate the above model using a reduced model and by using some appropriate boundary conditions .Prior to this ,I had to also simulate one port SAW,two port SAW and BAW resonators too .I did a literature survey on design and applications of my respective work initially.

PS-I experience: It was helpful in understanding the industrial experience .It helps your brain expand .

Learning Outcome: I was able to gain huge amount of knowledge of previously unknown domains .

Name: GRANDHALA SRI SAI HARSHITH .(2020B5AA2240H)

Student Write-up:

PS-I Project Title: MEMS based acoustic devices for microfluidic applications: Study ,Design and Simulation

Short Summary of work done: Major focus of my work is to study Microfluidic applications of Surface and Bulk acoustic waves. My initial work included literature review

and calculation of optimal design parameters for design of interdigitated transducers (used produce Surface acoustic saw (SAW)) .I extracted some key parameters like quality factor and S- parameters .Then I researched about the microfluidic applications of SAW and bulk acoustic wave (BAW) devices .Then I was able to simulate the SAW induced acoustic streaming and predict particle trajectories in a channel with PDMS walls ,which is the final aim of my project .

PS-I experience: It was a new experience to read and collect information from many reseach and review papers .I was excited to learn a new software "COMSOL MULTIPHYSICS ." The evaluative components helped me understanding the job environment .

Learning Outcome: Academically ,I was able to gain knowledge about Surface and bulk acoustic wave Microfluidic devices ,which are used very frequently for industrial and biomedical applications . I was able to learn COMSOL MULTIPHYSICS partially . PS provided me with a exposure to industry .

PS-I station: Central Electronics Engineering Research Institute , Chennai

Faculty Name: Amalin Prince A

Faculty Write-up

CSIR-CEERI Chennai Centre was established in 1974, it is a pioneering institute in developing indigenous technologies for automation of Indian process industries. The Chennai Centre had developed many novel automation systems using state-of-art techniques for pulp & paper, food, leather, chemical & plastic industries. Later, the Centre ventured into the development of machine vision systems, process automation systems, visible & near infrared technologies, terahertz technologies and renewable energy-related technologies for societal needs. CEERI Centre is presently involved in major activities in the areas of Signal Analytics, Renewable Energy with Internet of Things (IoT) and Terahertz in Integrated Systems under the broad area of Cyber Physical Systems of CSIR-CEERI and Interface & Skill Development Programmes in IoT, Machine Learning, etc.

Industry looking for in a -I intern

Python programming, Computer vision, Algorithm development & programming, Image processing, Signal processing & Machine/Deep learning

Student

Name: KAUSTAB CHOUDHURY(2020A7PS0013P)

Student Write-up:

PS-I Project Title: An Analysis of ML-Based Methods for the Detection of Arrhythmia with Wearable Devices

Short Summary of work done: Arrhythmia refers to a defect of the heart which can lead to clotting of blood in the heart, as well as considerably increase the chance of heart attack and stroke by 4-5 times). Accurate detection of arrhythmia could enable medical science to prevent several strokes across the population if the condition is then treated properly. However, its detection is only possible by looking for irregularly irregular beat patterns in the heartrate. But since these beats can occur randomly at any instant, it becomes near impossible to catch them through an ECG.
We realise that since nowadays many people wear smart-watches for almost every waking hour. So, if we are somehow able to employ artificial intelligence and enable these wearable devices to be capable of classifying its subjects as having arrhythmia or not by constantly monitoring their heartrate, it could solve the very problem of long-term monitoring that makes the defect go undiagnosed in most cases.
In our project, we explored methods to extract critical features from our datasets and tried out different Machine Learning models taking them as inputs, to perform the above. In doing so, we hope to add to the body of study that aims to decrease the proportion of arrhythmia cases that go undiagnosed, thereby also potentially reducing the number of heart attacks and strokes that affect our population today.

PS-I experience: This PS1 was my first real working experience in the field of computer science. I would certainly call it a valuable part of my degree. My project involved work from many different sectors (pathological analysis [Biology], signal processing [Electronics], and finally machine learning [Computer Science]), and it was beautiful to see how the different fields work together to create a potentially invaluable work. Needless to say, my work was primarily in the post-signal processing part (the machine learning). To take the processed and filtered data, and to extract the pathologically important features from it and then feed and train them on the machine learning models and then analyse them for their accuracy.

Learning Outcome: I learnt many things thanks to this PS1. It was a pleasure to get connected to, work with and, learn from the scientists at CSIR-CEERI, and it felt especially inspiring to work in the biomedical field. I learnt Machine Learning / Artificial Intelligence, of which, I had no knowledge prior to my PS1. I learnt how to collaborate with a team (made some friends, too), how to effectively manage deadlines, and to present formal work to a team of experts. Additionally, I also got an insight into how research in the field

of computer science is professionally undertaken as this was a live project that we worked on.

Name: MANE ATHARV MAHESH .(2020A7PS0153G)

Student Write-up:

PS-I Project Title: Leather Defect Classification using CSP DenseNet

Short Summary of work done: We have implemented CSP DenseNet a state-of-the-art convolutional neural network algorithm and trained it on a leather defect dataset. We learnt how to

PS-I experience: It was a very great opportunity to work with the Researchers working at CEERI. The experience was really enriching and I experienced great personal development in technical aspects of my interests and otherwise.

Learning Outcome: The Practice school helped me deepen my understanding of Machine Learning, Computer Vision and understand their applications in solving real world industrial problems

---

Name: CHITNIS SOHAM ROHIT .(2020A7PS1723G)

Student Write-up:

PS-I Project Title: Hyperspectral Imaging for Polymer Characterization in Plastic Segregation

Short Summary of work done: The primary goal of the project was to segregate different kinds of plastics using NIR-spectroscopy. The spectra obtained using NIR-spectroscopy does not provide us with complex information. Hence, our secondary goal is to build models which would segregate the plastics using Hyperspectral Images.Data was obtained from available Open source datasets. Data was pre-processed using spectral

pre-processing techniques like Smoothing and Standard Normal Variate. Implemented CNN models which were able segregate different kinds of plastics using Hyperspectral Images. As there was limited labeled data available, self-supervised learning was implemented with the 2D-CNN models trained using supervised learning. The models which were implemented will be used to develop models to work with the NIR-spectroscopy data which could segregate plastics.

PS-I experience: Despite the PS station being online, it was amazing experience to be a research intern at one of the government research labs. The insights from my industry mentor and BITS faculty mentor really helped me learn a lot and make this experience a success. However, only limitations of being online is the communication gap in between team members and mentors.

Learning Outcome: I learnt about the best practices followed in research. I also learnt how to analyze and understand the research problem statement. I learnt more about how interdisciplinary research goes and how everyone can contribute to project in their own way. The group discussions and presentations for Practice School 1 helped me improve my soft skills.

Name: RISHAV MUKHERJI .(2020AAPS0330G)

Student Write-up:

PS-I Project Title: 'Eulerian Video Magnification for remote photoplethysmography

Short Summary of work done: The goal is to reveal temporal variations in videos that are difficult or impossible to see with the unaided eye and display them in an indicative manner. The method - Eulerian Video Magnification, takes a standard video sequence as input, and applies spatial decomposition, followed by temporal filtering to the frames, for colour and motion magnification. We experimented and found out the varying frequency bands and amplification factors required for different magnification tasks

PS-I experience: I got formal experience working with a research institute albeit the online mode led to a drop in communication and involvement.

Learning Outcome: I ended learning a lot about image processing and how traditional computer vision is carried out.

Name: VEDANTH PARTHASARATHY .(2020AAPS1071G)

Student Write-up:

PS-I Project Title: Resolution Enhancement of Terahertz Images using learning-based methods

Short Summary of work done: Read multiple papers describing various deep learning methods for super resolution of images, specifically terahertz images. The different models include DRRN, Adjustable CNN, GAN and Zero-shot CNN. Learnt about Terahertz images and point-spread functions. Implemented the models for the images provided from CEERI lab and compared the results.

PS-I experience: Strengthened my knowledge in deep learning and learnt super resolution methods. My mentor, Dr. Mercy Latha, guided me very well in understanding the subject matter. Implemented a deep learning model on real-world data from CEERI lab. Other activities like group discussions were also conducted very well even in online mode. Overall a great learning experience.

Learning Outcome: Terahertz imaging, Super resolution, GANs, Auto-encoders, Zero-shot networks

---

Name: JALTARE ANISH .(2020AAPS1406G)

Student Write-up:

PS-I Project Title: Classification and Detection of Threat Objects in THz images

Short Summary of work done: The project assigned to me was 'Classification and Detection of Threat Objects in THz images.' It was a research-oriented project which involved processing tera-hertz images to enhance resolution and building CNN models to classify images into different classes of threat objects. Also implemented a YOLO-based model for object detection.

PS-I experience: Nice overall. The mentors were encouraging and guided well.

Learning Outcome: Got an insight into how research work gets carried out. Strengthened my fundamentals in deep learning.

Name: SATVIK SARDESAI(2020AAPS1417H)

Student Write-up:

PS-I Project Title: Mask Reordering for resolution enhancement of Terahertz images

Short Summary of work done: The objective in compressive sensing is to obtain a digital image using fewer samples than the actual number of pixels. In this case , we must strive to make our reconstruction as 'likely' to the original image as possible. This can be done by selecting masks which extract more information from the image. Re-ordering of standard matrices helps in doing so.
In our project we explored three different kinds of re-orderings(TV,TG and CC) of matrices(Hadamard, Gaussian, Random, Bernoulli and DCT).For the second part of our work, we added noise to the image and then repeated the experiments/simulations to study noise response of different masks and re-orderings. MATLAB was used as a simulation software as images can be easily handled as matrices.

PS-I experience: It was a delightful experience to learn with the scientists at CEERI-Chennai. I am sincerely grateful to them for taking time from their busy schedule to help us with our doubts and queries each week. The assignments kept us engaged throughout and overall it was a very pleasant experience

Learning Outcome: I learnt a little more about image processing and also gained more experience on working with MATLAB

Name: KUSHANT SUDHIR AGRAWAL .(2020AAPS1740G)

Student Write-up:

PS-I Project Title: X-RAY IMAGING AND IMAGE-PROCESSING FOR LUGGAGE SCANNING AND THREAT DETECTION

Short Summary of work done: I worked on processing x-ray images obtained from luggage scanners for security. The work involved searching about various image processing techniques. Studying about those techniques and implementing those techniques on the x-ray images. The results from application of processes were to be compared or paired with other techniques to get the best results

PS-I experience: It was great experience with supportive faculty and mentors who promoted making best use of the opportunity .

Learning Outcome: I was able to learn about Digital Image Processing and various techniques associated with it. Apart from the technical skills, I was able to improve my communication and presentation skills and other soft skills

---

Name: SOMANI BHAVYA .(2020B1A32008G)

Student Write-up:

PS-I Project Title: Arrhythmia detection with wearable devices using ML-based methods

Short Summary of work done: My work at CEERI primarily focused on optimizing ML models for detecting Arrhythmia using photoplethysmography signals obtained from wearable devices by identifying and extracting new features from these signals. We also tried to provide proper statistical and pathological reasoning behind our feature selection. For this, my team and I did a thorough literature review, identifying 15 new features. We then programmed the extraction code and employed revised arrhythmia detection algorithms to analyze their accuracy. We analyzed the results from the various Machine Learning algorithms with the help of two parameters: Permutation importance and ROC curve. According to the results generated, we obtained near 90% accuracy with six different models, with four of them actually boasting of an AUC greater than 0.90.

PS-I experience: My PS-I experience was good; I learned a lot of technical skills from my CEERI mentor, who was really supportive and helpful. The group discussions and presentations helped me improve my soft skills. However, I felt my experience would have been even better if PS-I had been conducted offline, as it would have given me an opportunity to work at the state-of-the-art laboratories in CEERI and fastened the working process.

Learning Outcome: Through this PS-I internship, I was able to learn and work on ML models and Python programming. I also got an idea of how research is conducted in a real-world organization.

Name: RADHIKA GUPTA .(2020B4A70600P)

Student Write-up:

PS-I Project Title: Implementing Deep Learning Architecture for fine-grained texture recognition

Short Summary of work done: Build 3 end-to-end DL models, B-CNN, DeepTEN and Deep Residual Pooling Networks, to classify textures. Was able to verify the results of existing research by achieving the same classification accuracy.

PS-I experience: PS-1 helped speed up the learning process in the domains of Machine Learning, Computer Vision and Image Processing. Helped me understand how research works, how we're supposed to first review existing papers, compare them and finally implement our own models.

Learning Outcome: Gained some experience in the domains of Computer Vision and Image Processing.

Name: ISHIKA SANTOSH KADAM .(2020B4A70964P)

Student Write-up:

PS-I Project Title: Using Computer Vision for Plastic Segregation

Short Summary of work done: Implemented deep learning models and classification and exploration algorithms on hyperspectral pictures of plastics. These were sorted on the basis of their spectral plots using K-means clustering and other image classification algorithms on HYPERtools GUI on MATLAB. Applications of hyperspectral image

analysis was also performed on AVIRIS images as remote sensing exercise on Python using Spectral and NumPy libraries mainly.

PS-I experience: It was an enriching learning experience where we delved deeper into deep learning projects. I enjoyed working with our mentor who encouraged us to take initiatives of our own. The liberty to understand topics on my own proved to be quite advantageous and the learning peak was high as we self explored through topics like Linear Regression, Support Vector Machines, K-Nearest Neighbors, K-Means Clustering, Principle Component Analysis (PCA).

Learning Outcome: Learnt a lot about Digital Image processing, TensorFlow, Keras API, Python libraries like Skikit, Spectral and HYPERtools

---

PS-I station: Central Electronics Engineering Research Institute , Pilani

Student

Name: JOSHI SIDDHANT TUSHAR .(2020A3PS0543G)

Student Write-up:

PS-I Project Title: BLDC Motor Control

Short Summary of work done: We worked on designing and developing an Embedded System which controls the speed of rotation of a Brushless DC Motor. This system was simulated on the "MATLAB - Simulink" software. The Microcontroller we used was the Texas Instruments C2000 Piccolo F28027F. My specific role within the project was to configure the input end, which mainly consisted of the Analog to Digital Converter, Speed Measurement, and the Field Oriented Control Subsystem. We eventually generated the C code governing the MCU.
*Since this was an online internship, we were limited to simulations, without actually being able to deploy the system on hardware and test it.

PS-I experience: Over the course of eight weeks, I had an amazing experience, getting to learn a lot about my assigned topic and developing critical soft skills.
We worked under Dr. Bhausaheb Botre, principal scientist at CEERI Pilani. He guided us extensively in the fields of Embedded System and was very helpful, supervising us throughout the duration of the internship.

Dr. Puneet Mishra was my allotted PS-1 Faculty. He gave his invaluable inputs during Group Discussions or Project Update Meetings which aided a lot in the successful completion of the project.
Overall, this was a very fulfilling internship which I enjoyed thoroughly.

Learning Outcome: Understanding of BLDC Motors, Embedded Systems, TI Microcontroller
Using "MATLAB - Simulink" Software
Developed organizational attitudes and values, acquiring soft skills such as team management, teamwork and social skills (especially in communicating with the industry professionals)

Name: ANIKETH PURACKATTU SABU .(2020A3PS0570H)

Student Write-up:

PS-I Project Title: DATA MONITORING AND ANALYSIS OF BATTERY IN E-TRICYCLE USING IOT AND ML

Short Summary of work done: This project is focused on the analysis of different machine learning techniques for estimation of State of Charge of a battery. To tackle the challenge of lack of real time data available for training of machine learning models we make use of a MATLAB simulation of a battery model with a BLDC motor as load for generating the required data. The cubic SVM, quadratic SVM, Fine tree, Linear Regression and XGBoost are used for SOC estimation and these algorithms are then compared based on their RMSE values.

PS-I experience: It exposed us to the latest research in the electric vehicle industry, gained insight into the challenges, and explored possible solutions using machine learning techniques.

Learning Outcome: I learned to model simulations to generate MATLAB data and the basics of machine learning techniques.

Name: ARIJEET SINHA .(2020A3PS0574G)

Student Write-up:

PS-I Project Title: Brushless DC Motor Control

Short Summary of work done: We worked on designing and simulating an embedded system which is used to control the speed of a Brushless DC motor using the Texas Instruments C2000 Piccolo F28027F microcontroller. The simulations were done using the MATLAB/Simulink software. The work I specifically did was to configure the output end of the embedded system which included generation of pulse width modulation signals for speed control. Our eventual objective was to generate the C code governing the microcontroller as being an online internship, hardware deployment was not possible.

PS-I experience: It was a great learning experience where I got to learn a new software and a lot about my project domain. I received valuable inputs from both our project mentor and our faculty mentor which helped me in learning new things and aided me in the completion of the project. I also developed various soft skills which surely help me in my pursuits.

Learning Outcome: I got to learn about embedded systems, microcontrollers, BLDC motor and various motor speed control algorithms. I also learnt a new software i.e., MATLAB/Simulink and developed various critical soft skills.

Name: YASH TRIPATHY .(2020A3PS0998P)

Student Write-up:

PS-I Project Title: IOT based battery monitoring system for an E-tricycle

Short Summary of work done: In this project I had the role of developing an android app as the user interface for the battery monitoring system. I made the app using android studios and java. I was also given a task to make a model to simulate important data of an electric vehicle which will later be used with ML algorithms to comment on the performance of the vehicle. I made this model on Simulink using the basic electric vehicle body available on Simulink and was able to find the speed, voltage, current and SOC (state of charge) of the E-vehicle.

PS-I experience: As this was my first core internship experience so I wanted to explore different fields in order to find out where my interest was. Therefore I went into this project even I was not very familiar with app development. The first 2 weeks was just reading research papers and articles to understand our project and how we go about it but after that it was fun. Our mentor was very helpful and always available if we had any doubts. Overall the experience was good as I was able to do some valuable work with CEERI.

Learning Outcome: My main role in this project was to make an android app and I was not all familiar with android development so that was the biggest learning (working with android studios and designing xml files). I also had to learn a bit of Java for the app development. Secondly, I was able to learn how to work with Simulink and different components of the simulation. Lastly, one of the most important thing I learned in this PS was how to properly do literature review (reading an article and extracting important information out of it) as it is one of the most essential parts of any core project.

Name: ANIRUDH PUPNEJA .(2020A7PS1376G)

Student Write-up:

PS-I Project Title: Development of a Colposcope for Cervical Cancer

Short Summary of work done: -Worked on a classification algorithm to classify the cervical cancer in the three sub-types
-Working on some of the features for the Android app which include, inclusion of the classification algorithm, generating the pdf after the inference and green filter for the cervix image.

PS-I experience: It was a great learning experience, working at the intersection of biology and computer science. It really helped me build a perspective about the use cases for techniques in computer science.

Learning Outcome: - Learned Tensorflow
-Learned App development

Name: PRANAV SRINIVAS .(2020A7PS1694G)

Student Write-up:

PS-I Project Title: CONVERTING AN EXISTING WEB-BASED WATER QUALITY MONITORING DASHBOARD INTO AN ANDROID APP

Short Summary of work done: I was told to convert a web dashboard into an android app. I decided to make a Progressive Web App to achieve the said objective. Over the course of 8 weeks, I went on to learn the various technologies involved in making a Progressive Web app. I learnt JavaScript for the purpose of coding the necessary files. Once the website files were handed over to me, I finished linking my files with those of the website. I was then required to host all of the files on a website so that the PWA could be tested. I encountered numerous errors along the way but after the iterative process of debugging and learning, I was finally able to develop the app. The app worked as intended and provided a smooth and seamless user experience.

PS-I experience: PS-1 was a very fruitful experience and a challenging one at the same time. It taught me how to face challenges and come up with unique solutions. There were also many instances where I had to think on my feet and this made me trust my instincts more. Both my PS-1 faculty mentor and project mentor were extremely supportive throughout this journey. I would like to conclude by saying that PS-1 is a program that every engineering student must be able to take part in for it gives the student experience and confidence, things which cannot be gained from classrooms alone.

Learning Outcome: I learnt how to develop a Progressive Web App for any website. I also learnt how to host my own website. Some of the non-technical qualities I learnt were to be more confident in my work, to be punctual and to solve tough problems in a creative and unique way.

Name: ANUBHAB KHANRA(2020A7PS2144H)

Student Write-up:

PS-I Project Title: Satellite based leak detection in pipelines

Short Summary of work done: Water leakages in underground pipelines cause vast amounts of water losses every year. Manual surveying can only reveal 10-12% of invisible leaks and is not cost-efficient. Hence, a solution that can detect leaks without needing

onsite inspections would benefit various water utilities worldwide. This project uses machine learning to predict leaks based on open-source satellite data.
Images were obtained from the LANDSAT-7 satellite from various places in Austin, Texas. These were labelled "True" or "False" based on whether the images were taken before or after the leaks. Resnet-50, a pre-trained 50-layered convolutional neural network, was trained on this data for several epochs till the training and validation losses plateaued.
We obtained a maximum accuracy of 72% after using discriminative learning rates. We assume the accuracy could be improved with more images to train from, as resource constraints enabled us to train only 500 images per label. A backend was also created and deployed for easy client-side usage. Further improvements must be made by creating a frontend and increasing the model's accuracy with better training data.

PS-I experience: We had to work on our specific goals within set deadlines, and the evals helped us understand in depth the industry and how to give seminars and presentations.

Learning Outcome: I learnt how to apply machine learning in real world applications as well as deployment. Also taught us how to work in a corporate industry and was very helpful.

Name: SAKUNDE ATHARVA UMESH .(2020A8PS0357G)

Student Write-up:

PS-I Project Title: Drone Video Processing to Map Farmlands with their Issues, Yield, Time of Harvest, etc.

Short Summary of work done: My work at PS-1 included writing algorithms in Python using Deep Learning, Computer Vision, and Image Processing to 1. Detect Fruits on Trees in Farmlands, 2. Classification of Fruits as Ripe/Unripe, 3. Classification of Plant Leaves as Perfectly Watered or Underwatered based on the color and texture of the leaf. Since I had minimal experience in Computer Vision and Deep Learning fields, I had to learn about these technologies along the go while implementing them simultaneously in my project.
In OpenCV, I explored, learnt, and implemented the method of using masks to detect and find colors in the image, the blob detection algorithm, Morphological Operations, Contour Detection, putting text and various shapes such as rectangles (Bounding Boxes) on different detected objects, and pixel-level image analysis techniques. Secondly, I learnt about Convolutional Neural Networks, The mathematical motivation behind the method, Various techniques such as Backtracking, Gradient Descent, etc., and the implementation

of the method in Classification-Based Problems. Thirdly, I learnt about the Mask-RCNN and the YOLO object detection methods, their working and implementation. Also, I learnt about the various libraries that come in handy when writing these Computer Vision and Deep Learning algorithms like OS, NumPy, Pandas, re (Regular Expressions), and sys. Finally, I combined these various implemented models to solve the original problem.

PS-I experience: PS-1 at CEERI Pilani was a very healthy learning experience, especially being guided by an expert scientist, Dr. Satyam Srivastava, at the institute on a practical hands-on project was really an amazing experience, although it did seem a little overwhelming at times since it was the first time, I was using these new technologies and methodologies. The various seminars, group discussions and report writing evaluates conducted by my Faculty Mentor, Dr. Puneet Mishra Sir, also provided immense practical experience. This exposure to the various fronts of the industry has been and will continue to be a valuable learning experience I have ever had.

Learning Outcome: I learnt and implemented the state-of-the-art Image Processing Techniques like Computer Vision – OpenCV and Deep Learning algorithms like Convolutional Neural Networks, YOLO, and, Mask-RCNN while doing the project. Apart from these, I also learnt about the research industry – its opportunities, challenges and mindset that needs to be adopted while attempting to find a solution of any real-world problem. I also learnt some soft-skills and industry relevant skills like how to prepare and deliver a seminar, how to present your work through reports and Group Discussion skills.

Name: ANUSHKA JAIN .(2020A8PS0708H)

Student Write-up:

PS-I Project Title: Study of Wave Liquefaction Technology to Reduce Green House Gases

Short Summary of work done: Wave Liquefaction Technology is a process which converts coal and natural gas to synthetic crude with the help of a simple and continuous process. The process was established originally with the intention of coal resources being an alternative and cost-effective source of military jet fuel. An added advantage is the lower emission of greenhouse gases as compared to the usual crude oil refining process. As it is a recent technology, the project aims at seeing its scope in the coming years (especially with regard to our country - India). This is because sustainable production of carbon materials can help in the reduction of emissions of green-house gases which in turn will benefit the country and the environment.

There was more of literature survey in my project. The software part of the project however could not be completed.

PS-I experience: My PS-1 experience was pretty good. The project needed a lot of research and literature survey.

Learning Outcome: I have learnt majorly about the wave liquefaction technology and that in the coming years that technology will be widely seen and utilised in our country as well

---

Name: ANSH GUPTA .(2020A8PS1506G)

Student Write-up:

PS-I Project Title: DESIGN AND SIMULATION OF MEMS BASED IR EMITTER

Short Summary of work done: I read a lot many papers on MEMS based IR emitter. After reading them and getting basic knowledge I choose two particular microheater geometries. I did simulations for these two geometries on a software called COMSOL. On the basis of the results I concluded which geometry is better.

PS-I experience: It was a great experience where I learnt a lot many new things and alongside I learnt to use a whole new software.

Learning Outcome: I learnt a lot about MEMS technology and about the software COMSOL.

Name: DHANANI NAITIK NILESH .(2020A8PS1774G)

Student Write-up:

PS-I Project Title: Project Vardaan

Short Summary of work done: I have created a full stack app using flutter framework and dart programming language.The back end of the app was done using firebase auth for authentication and cloud firestore for database.
The user can log in to the app or register if they are a new user. The user credentials are stored on firebase.on signing in user can take new reading or see previous reading or get a pdf of previous readings.

PS-I experience: PS 1 introduced me to app developement using flutter which was a completely new topic for me. I am now able to create an app from scratch which will be a useful skill in todays world.
The ps faculty DR. Puneet Mishra guided me whenever i needed any help regarding the evaluations or my project.
My mentor Dr Satyam Srivastava inspired me to work harder and pushed me to create a useful product for which i am thankful.

Learning Outcome: PS 1 introduced me to app developement using flutter which was a completely new topic for me. I am now able to create an app from scratch which will be a useful skill in todays world.

Name: AYAPILLA SRI BHASWANTH .(2020AAPS0304H)

Student Write-up:

PS-I Project Title: Analysis of Battery in Low Power Electric Vehicles using Machine Learning Techniques

Short Summary of work done: The project involves the use of Machine Learning techniques for the analysis of batteries in low-power Electric Vehicles. Several ML techniques were used for State of Charge (SOC) estimation and load forecasting. MATLAB simulations for speed control of a BLDC motor using a PID controller and a Lithium-ion temperature-dependent battery model were used to predict the SOC and the power of the battery. The data generated from these simulations were used to train the ML models.

PS-I experience: I had a wonderful experience working on the project assigned to me. The scientist I worked under was very cooperative and guided me at every step, making it a smooth ride. The work wasn't too hectic but required dedicated time and effort to an extent. The knowledge I gained will definitely help me out in the long run, and overall, I had a very productive experience.

Learning Outcome: As I worked to resolve a real-world issue, I had the chance to put my machine learning knowledge to use and also learned about various new ML algorithms by reading several research papers. I gained a new sense of professionalism and a clearer view of what it meant to be in the professional world.

Name: HRITHIK JAYASANKAR .(2020AAPS1018G)

Student Write-up:

PS-I Project Title: Speed control of BLDC motor

Short Summary of work done: Design a control system for the speed control of a BLDC motor

PS-I experience: It was a very nice experience where I learned a lot. I learnt a lot of research methodology and procedures from my mentors and on the whole it was a very educational experience.

Learning Outcome: I learnt to operate a new platform called SIMULINK. My knowledge in the field of control systems design deepened.

Name: NIHARIKA PAPPU .(2020AAPS1322H)

Student Write-up:

PS-I Project Title: Study of different Data Analysis and Machine Learning Techniques for low power Electric Vehicles

Short Summary of work done: Generated data for predictive analysis of charging behaviour of an Electric Vehicle using MATLAB. Simulated several models for the same. Analysed and predicted the required parameters using machine learning techniques.

PS-I experience: It was a wonderful experience working under a principal scientist at CEERI Pilani. We had weekly meetings where we had to update the scientist about our progress. The workload was manageable.

Learning Outcome: Through this project I got acquainted with simulating models on MATLAB and data generation processes. I was also able to explore various machine learning techniques, their workings and evaluation metrics.

Name: DAGWALE RASHMI .(2020AAPS1407H)

Student Write-up:

PS-I Project Title: Study, Modelling & Simulation of BLDC Motors for its Electric Vehicle Applications.

Short Summary of work done: I was working under Dr. Bhausaheb Ashok Botre on the project of BLDC Motor for its EV application. First I started with learning the working principles of BLDC Motors, the electromagnetic phenomenon behind it. I had made few models related to the same on MATLAB/Simulink. I read articles on parameters of BLDC Motors, types of losses in BLDC Motors.
I learnt about PID Controllers. There are different methods to tune the controller. I read few like ZN Rules, Manual Tuning and Auto-Tuning. I have used Auto-tuning in my model. I have designed open-loop BLDC Motor and Speed control of BLDC motor using PID Controller using Simulink. I compared the outputs by varying the load and input voltages.

PS-I experience: It was a great experience working at CEERI Pilani. I was working under Dr. Bhausaheb Ashok Botre sir, principal scientist at ceeri. He was very interactive and supportive throughout my PS. Sir would conduct meets every week and help us progress in our projects.

Learning Outcome: To learn from the industrial point of view. Learnt about BLDC motors, its working, speed control and its applications.

Name: SUKHANROOP KAUR BRAR .(2020B2A31922P)

Student Write-up:

PS-I Project Title: Study Of Metamaterial Based Absorber Layer For Pyroelectric Infrared Detector

Short Summary of work done: The PS-1 at CSIR-CEERI Pilani was really a very educative experience. The first week mostly had the sessions with the scientists from the Ceeri Campus. By the end of the first week, a scientist from Ceeri Pilani, Dr Pankaj Agarwal was appointed as my project mentor. We decided the exact project for the PS-1. It was decided to be "Study Of Metamaterial Based Absorber Layer For Pyroelectric Infrared Detector." Week-2 to Week-6 mainly involved the literature survey from different research papers and thesis the main topics being studied being 'Carbon based coatings' and 'Metamaterials.' In these weeks I mainly studied mainly about these being used as absorber layers in the Pyroelectric Infrared Detector and had weekly meeting with Dr Pankaj Agarwal. The main focus till the Mid-term evaluation was the literature survey only. From the Week-7 onwards, I started to simulate the literature survey models on the COMSOL Multiphysics Software. I simulated two already designed models to get trained to use the software. Then I simulated a new structure for the metamaterial based perfect absorber for the detector. The main focus for the final report and the Seminar for the end term evaluation were these simulations and the new structure.

PS-I experience: The PS-1 was a very enlightening experience. I learned about many new things about which I have not even heard before. Both the faculty mentor, Dr Puneet Mishra and the Ceeri Pilani Mentor, Dr Pankaj Agarwal were very supportive, encouraging and helpful. I learned to work in a research environment and had a research experience.

Learning Outcome: I learned to work in a research environment and had a very nice and informing experience. I mainly learned the different materials used for the absorber layer for the construction of the Pyroelectric Infrared Detector with the main focus being towards the Metamaterials.. I also learned to use the COMSOL Multiphysics Software. I also simulated a new structure for the Perfect Metamaterial Absorber which had near unity absorption. In short, PS-1 was a highly educative experience.

Name: UTKARSH GARG .(2020B4A71185H)

Student Write-up:

PS-I Project Title: Predicting driving range accurately with the help of different data analysis and ML techniques

Short Summary of work done: Our PS-1 project was to accurately predict the driving range of the EVs. We tried to implement this with the help of different ML algorithms. After going through the different research paper and we found that GBRT and XGBM was the best ML algorithm to be implemented for the prediction of the driving range. For training our algorithm we needed a dataset and we were instructed to generate it with the help of Simulation of EV in the MATLAB. Through simulation, we also got to know how the EV mechanism works. After the simulation, we had the dataset containing speed, SOC, Current, etc. We also took a real-world dataset from the public domain to train our algorithm better. After performing data cleansing and dividing the data into training and test set, we got the final result that the accuracy of the GBRT is 86% while of the XGBM model is 93%. This further can be improved by taking into consideration various attributes like road conditions, driving patterns, etc.

PS-I experience: As I was looking to have a project under ML topics, I was happy with my project allocation and I got to learn many new things like simulation and working of the EV, MATLAB, and Simulink software, different ML models like GBRT, XGBM, Light-GBM, etc. It was great to work in CEERI Pilani which is a world-class lab where we got a very helpful PS Mentor. I feel that the online experience was good but an offline PS would have been much better

Learning Outcome: learned new software like MATLAB, Simulink and new ML algorithms like GBRT, XGBM and parameters and designing of the EV in MATLAB

Name: KARTHIK R VARMA(2020B5A32292H)

Student Write-up:

PS-I Project Title: FIELD-ORIENTED CONTROL IMPLEMENTATION AND MODELLING OF IPMSM MOTOR FOR LOW-POWER ELECTRIC VEHICLE APPLICATIONS

Short Summary of work done: The aim of this project was to implement field oriented control algorithm on an Interior Permanent Magnet Synchronous Motor block on MathWorks Simulink software. A thorough discussion of the theory of PMSM motor was done along with exploring the various current and axis transformations done for proper PID closed-loop control of the entire system. Various results such as the -
1) Speed of motor (RPM)

2) Torque
3) Power output
4) Direct and Quadrature axis voltages and current signals,
were studied which verifies the existing equations governing an interior PMSM motor. These independent FOC block control results are analyzed along with exploring SPWM and inverter integration into the existing simulation. A thorough discussion on the theory of SPWM technique and Inverter architecture was done along with independent test results of 3-phase voltage outputs with a test PMSM motor. Lastly, possibilities of integrating the SPWM-Inverter block and the FOC block to the IPMSM blockset was explored and recommended as a future work possibility.

PS-I experience: It was an amazing experience in terms gaining knowledge, to be able to network with like-minded peers and learn from various experienced scientists and understand the research and work standard at the industrial level. Dr. Bhausaheb Ashok Botre, our mentor and Principal Scientist at CEERI Pilani, was very knowledgeable and understanding, and I would like to thank him for his time and guidance.

Learning Outcome: I became proficient in using MATLAB and Simulink software, along with deep understanding of Control Systems, Power electronics involved in the project. I was also able to develop necessary work ethics and communications skill, and the weekly presentations and evaluatives like group discussions, seminars, etc. were very productive.

PS-I station: CSIR-National Aerospace Laboratories (onsite) , Bengaluru

Student

Name: HRISHIT MOHAN DAS .(2020A3PS0346P)

Student Write-up:

PS-I Project Title: Radar Cross Section (RCS) reduction using Metasurface-based Radar Absorbing Structure (RAS) for Stealth Applications.

Short Summary of work done: Validation of an Identified RAS model from a resrarch paper, afterwards design and optimization of novel RAS unit cell designs for ultra-wideband operation using CST Microwave Studio, Equivalent Circuit Modelling using

ADS and further validation of designs using COMSOL Multiphysics. Finally publication of Classified NAL Proprietary Documents and submission in a conference.

PS-I experience: Gained a lot of insight on the Aerospace industry as a whole and got to visit the Anechoic chamber, LCA Tejas and Saras Mk II flight simulator amongst other facilities at NAL. Truly remarkable and interesting work was done in a short period of time and everyone at the lab was extremely helpful.

Learning Outcome: It was absolutely amazing working with such distinguished scientists at the Adaptive Antenna Facility, Centre for Electromagnetics (CEM). Learnt a lot about how research is done, how papers are to be written and presented at conferences, correct data representation and plotting as well as the softwares.

Name: HRISHIT MOHAN DAS .(2020A3PS0346P)

Student Write-up:

PS-I Project Title: Radar Cross Section (RCS) reduction using Metasurface-based Radar Absorbing Structure (RAS) for Stealth Applications.

Short Summary of work done: 1. Understand the working principle and EM design of RAS via literature review.
2. Optimize RAS models to achieve broadband RCS reduction
3. Perform Surface Current estimation, RCS analysis, Equivalent Circuit Modelling (ECM) of designed RAS.
4. Frequency reconfigurable RAS design using PIN diodes.
5. Electromagnetic (EM) design and RCS analysis will be carried out using full wave simulation software like CST, FEKO etc.
6. Two confidential Project Documents published by NAL.
7. One conference paper submitted at VCAS 2022 by Springer and currently under review.

PS-I experience: This was the best station one can hope for if they want to pursue a career in research in the future and is an excellent stating point. I was stationed at the Center for Electromagnetics (CEM) and my Industry mentor was Sr. Principal Scientist, Dr. Hema Singh at the Adaptive Antenna Facility. We worked in a lab full of workstations and high powered computers for simulations. Dr. Hema is extremely kind and helpful and guided me throughout my project. You will get to see your project having tangible output within just a few days. In the lab various contractual staff having just completed B.Tech

and M.Tech are also present and they also helped me in familiarization with the software and how to correctly document all my work.
I have to pushed myself, motivated by the fact that maybe some day my designs might help India make it's own stealth technologies and within two months, the amount of work done was incredible, especially in such a niche area on which I had 0 knowledge on Day1 thanks to the excellent lab team. I would recommend this station to anyone who wants a taste in R&D and wants to tread the uncertain water of research, where your questions won't have answers and it will be your job to find them!

Learning Outcome: How to approach a problem via the Scientific Method, starting with identification, validation, ,design, simulation and optimization. All these were the steps required to complete my project. I learnt to use simulation software like CST Microwave Studio, ADS, CADFEKO and SigmaPlot for plotting graphs and results. Moreover how to correctly document work for future use was another great learning experience and of course writing a conference paper with thorough literature review and presenting my findings in a technical way. I also got to learn a lot about Microwave Engineering and saw the applications of EMT (Electromagnetic Theory) in real life. Finally I also improved my soft skills and got an experience of how to work in an organization especially in research lab which has a very open environment and you can always consult and clarify doubts or problems with your Scientist. No doubt is small in research, and it is encouraged to talk to the Scientist to gain a deep understanding of the subject.

Name: ROHAN KANNA .(2020A4PS1880G)

Student Write-up:

PS-I Project Title: Fundamental studies on thermoacoustics of the Rijke tube

Short Summary of work done: During my PS-1 experience we performed fundamental studies on thermoacoustic phenomena and conducted relevant experiments for further analysis. We gained hands on experience by working in the Fluidic Thrust Vector lab as well. We performed several variations of the Rijke tube experiment after our initial literature survey. Furthermore we used MATLAB to analyze the recorded data.
We performed flow visualization experiments to better understand and observe these phenomena. Image processing techniques were used to post process the flow visualization images.

PS-I experience: PS-1 was insightful and eye opening in several ways. NAL has excellent facilities and some of the smartest minds in India. It houses some of the most unique and essential laboratories for Aerospace Research and Development. I gained

hands on experience in working in these labs and also utilized their numerous resources available in the NAL library to learn topics related to Aerodynamics, Fluid Mechanics and Combustion processes. Working with reputed scientists in this sector was an enriching experience and taught me a lot about how industries tend to work.

Learning Outcome: I explored different fields related to my core branch and gained hands on lab experience and improved the quality of my research and report writing. I understood how different equipment and software are used to gather and analyze data. I've also come to appreciate the infrastructure and facilities required to run a large scale government R&D operation

---

Name: SHREEDHAR RAJESH .(2020B5A80798H)

Student Write-up:

PS-I Project Title: A study of Electromagnetics of a Ground Based Radome

Short Summary of work done: Did a little bit of literature review on Electromagnetics of a Ground Based Radome. Tried to model radome panels. Wrote a code for Ray tracing and transmission analysis for an A sandwich Radome. Did simulation for parabolic reflector antenna with and without radome.

PS-I experience: It was very informative and a good research exercise

Learning Outcome: Learnt to code a little bit on MATLAB. Learnt simulation on COMSOL multiphysics. Learnt the Electromagnetics of ground based radome

---

PS-I station: EFY Group , New Delhi

Student

Name: ANURAG GADE .(2020A3PS1337H)

Student Write-up:

PS-I Project Title: ESP32 LoRa Gateway

Short Summary of work done: Our task was to validate a router which was made using the ESP32 microcontroller and LoRa modules. One of the practical application of the project can be described as reading sensor data, and relaying it to a control center far away, as the LoRa module has capabilities to transfer data upto distances of 15 kilometers. In our objective, we were supposed to store the incoming data onto ThingSpeak, as ThingSpeak has descriptive data visualizers. We have simulated and tested the design given, and verified the datat transfer onto the ThingSpeak channel. The preliminary testing was to verify if the data is being transferred one-to-one from one node to the other node, after which the received data was transferred to the cloud server.

PS-I experience: The overall experience was really informative, and helped me to hone my skills in working and interfacing the ESP32 and to get a strong idea about the different communication protocols involved.

Learning Outcome: I have learnt and benefitted greatly from doing the project as it helped me to learn effective debugging problems encountered during the programming and interfacing. I have also sharpened my skills on interfacing microcontrollers and using different modules.

Name: KUMAR AAYUSH(2020AAPS0306G)

Student Write-up:

PS-I Project Title: Wireless LED dot matrix scrolling display using STM-32 microcontroller

Short Summary of work done: Tested the project given by the author by building the circuit from scratch and verified the functioning so that it can be published in the EFY magazine. Used components like STM-32 microcontroller which can be a more cost effective alternative to the Arduino board. Also used LED dot matrix which is used in many modern day display devices.

PS-I experience: It was an informative experience and helped me to learn about microcontroller interfacing.

Learning Outcome: Interfacing various components with the microcontroller, use of FTDI module to transfer code written in Arduino IDE to STM-32 microcontroller and use of LED dot matrix display device.

PS-I station: Electrono Solutions , Bengaluru

Faculty Name: Ashwin K P

Faculty Write-up.
Electrono solutions: The mentor assigned for PS was Mr. Arun Kumar, who is the research director of the company. He assigned 25 disparate projects to 25 students, where each project comes under the header of condition monitoring of induction motors. He conducted the whole internship process with absolute professionalism with regular meetings, discussions, labview access, labview mentorship and report writing in IEEE format.

Industry looking for in a -I intern

1) Professionalism
2) Diligence
3) Ability to take up responsibility
4) Ability to co-relate theory with practice

Student

Name: PRAMATH BALISAVIRA GURUPRASANNA(2020A3PS1444G)

Student Write-up:

PS-I Project Title: Assessment of Fan-Blade Vibration in a Three-Phase AC Induction Motor

Short Summary of work done: The objective of the project was to give an insight into Artificial Intelligence, Machine Learning, and Cloud Computing via the implementation of Condition Monitoring and Vibrational Analysis on a Three-Phase AC Induction Motor to assess and possibly predict Fan Blade Vibrations in an Axial Fan of certain specifications.

The project was implemented on LabVIEW and developed NI Instruments in the best possible manner.

PS-I experience: I was able to get good hands-on working experience and industry exposure. I was able to get an idea about the opportunities for building stable careers in the corresponding industry domain

Learning Outcome: This project gave a good insight into the concepts of Industry 4.0 - Digital Transformation Solutions, Condition Monitoring, and Vibrational Analysis. It also enhanced our ability to translate algorithms into graphical code. It improved our ability to think logically and apply in the domain of programming. The project gave an idea about future career opportunities in the industry. It also made us understand the motive behind the fourth revolution of the industry and the importance of the above mentioned concepts.

Name: PRAMATH BALISAVIRA GURUPRASANNA(2020A3PS1444G)

Student Write-up:

PS-I Project Title: Assessment of Fan-Blade Vibrations in a Three-Phase AC Induction Motor

Short Summary of work done: The objective of the project was to give an insight into Artificial Intelligence, Machine Learning, and Cloud Computing via the implementation of Condition Monitoring and Vibrational Analysis on a Three-Phase AC Induction Motor to assess and possibly predict Fan Blade Vibrations in an Axial Fan of certain specifications. During the initial stages of the project, it was necessary to conduct background research on topics like Condition Monitoring and Vibrational Analysis, Digital Transformation Solutions, and Industry 4 pre-project allotment. After project allotment, we were also required to go through research papers to find implementable algorithms and mathematical models of Vibrational Analysis to execute our deliverable topic. The main learning was on Condition Monitoring and Vibrational Analysis. The algorithms were implemented in LabVIEW, developed by NI which is a graphical programming interface. The next step in the project was to search for adequate and accurate datasets suiting the project requirement in order to simulate and test the implemented model in LabVIEW and generate results in the right format. This project gave a good insight into the concepts of Industry 4.0 - Digital Transformation Solutions, Condition Monitoring, and Vibrational Analysis. It also enhanced our ability to translate algorithms into graphical code. It improved our ability to think logically and apply in the domain of programming. The project gave an idea about future career opportunities in the industry. It also made us understand the motive behind the fourth revolution of the industry and the importance of the above-

mentioned concepts. The project was mainly implemented on LabVIEW and was simulated with certain datasets and according the results were obtained.

PS-I experience: The PS1 program gave good hands-on experience and industry exposure which will be useful in building our future careers.

Learning Outcome: This project gave a good insight into the concepts of Industry 4.0 - Digital Transformation Solutions, Condition Monitoring, and Vibrational Analysis. It also enhanced our ability to translate algorithms into graphical code. It improved our ability to think logically and apply in the domain of programming. The project gave an idea about future career opportunities in the industry. It also made us understand the motive behind the fourth revolution of the industry and the importance of the above-mentioned concepts. The project was mainly implemented on LabVIEW and was simulated with certain datasets and according the results were obtained.

Name: SHASHANK PANDEY .(2020A7PS0238H)

Student Write-up:

PS-I Project Title: Early-stage bearing fault detection using machine learning and deep learning techniques

Short Summary of work done: I built two multi-class classification models, one on Python and the other on MATLAB, to classify whether ball bearings, based of several observed metrics present in a dataset, were faulty or not, and, if so, where was the fault located. The two models built were a transfer learning-based neural network for image classification, and for comparison, a vanilla naive Bayes classifier.

PS-I experience: The work done was of a largely individualistic nature. A few days into the start of PS1, the company took our preferences for project domains, where I gave ML. After that, I was allotted my specific topic. From then on, apart from an update meet to check the status of your project around once a week, and the scheduled PS evaluations, you were largely on your own. While we were given a wide latitude with regards to tools and technologies used, they offered support, assistance and technical sessions which were held, only for specific softwares, and working using other tools would mean that you have to find your own path. It was quite an individualistic environment, and it was up to each person how much time they wanted to give for their project. Towards the end, the frequency of the meets ramped up as we prepared for our final seminars. Standards were high, and quite a few students had to redo work on their project.

Learning Outcome: The project helped me in acquiring various new technical skills, including MATLAB. I also had a first-hand experience of the type of work, and the independence one gets at such companies. The outside-work hours sudden meetings created and nurtured a sense of unintentional flexibility in me, which I am confident will prove to be invaluable in the future.

Name: DHRUVIT PARAG JHAVERI(2020A7PS0954G)

Student Write-up:

PS-I Project Title: CONDITION MONITORING FOR 3-PHASE INDUCTION MOTOR WITH SPECIFIC FOCUS ON FAN-END BEARING FAULTS

Short Summary of work done: My work at Electrono mainly dealt with bearing faults in 3-phase induction motors. Bearings are the heart of induction motors and are the critical parts generally exposed to maximum wear and tear. So, I was assigned to develop an algorithm that can predict any breakdown in the fan-end bearings beforehand. My project's main focus was on one particular kind of fan-end bearing faults which occurs when there is some damage like a crack in the wings of the cooling fan of the motor. The major computational techniques that I used in this project are the autoregressive model, spectral kurtosis and envelope analysis. The first two were to refine and clean the vibrational data obtained by the MATLAB simulated motor and the envelope analysis was done to reach to the final conclusion of whether the bearing was faulty or not.

PS-I experience: Overall, it was a great experience. I learnt more on how inter-disciplinary research works because my project involved a good amount of understanding of the fields of Computer Science, Electronics and Mechanical Engineering. I also got to learn a lot from Arun sir, who mentored me throughout the project. Sometimes I struggled through few things, but it was all worth it at last.

Learning Outcome: I learnt quite a lot of skills while interning at Electrono Solutions, both technical and non-technical. I learnt how communicate effectively with others and how to work as a team. I also learnt how to successfully model a 3-phase induction motor taking into account all possible kinds of faults and noises. Then I also learnt to use various machine learning algorithms to refine and clean the obtained vibrational data before applying envelope analysis to it. After the application of this technique, it successfully predicts the presence of faults in fan-end bearings. I also learnt how to work with tools like MATLAB, LabVIEW, MongoDB, etc., to make our process more professional and efficient.

Name: BANKAR TANMAY TUSHAR .(2020A7PS0976G)

Student Write-up:

PS-I Project Title: Possible Mounting Structure of a 3 phase induction motor

Short Summary of work done: Vibrational analysis of a 3-phase induction motor to determine possible mounting structure

PS-I experience: It was good

Learning Outcome: I learnt how to work in a team, group discussions and do research on a given material

---

Name: KANTIA ISHAN VIKAS .(2020A8PS1131G)

Student Write-up:

PS-I Project Title: Developer

Short Summary of work done: My project was to develop a program/algorithm to detect and predict faults in an induction motor specifically broken rotor bars as part of condition monitoring. The project was implemented in a graphical programming software known as LabVIEW. I had to go through research papers to find a suitable algorithm and implement and test out the same . I implemented the motor current signature analysis method to detect the broken rotor bars which analyses single phase current data and found a dataset to validate my program. We had frequent discussion sessions with the research director of the station to clear any doubts. After demonstrating the final project to the concerned authority, we made a detailed research paper in IEEE format of the project and submitted it to the authorities.

PS-I experience: I got to learn a lot from this internship. What type of real life problems exist and how they have to be tackled and solved, what to do and who to approach when

you are stuck on a problem and the introduction to work culture . This experience helped develop my soft skills and brought out the importance of professionalism and being punctual.

Learning Outcome: The learning include but not restricted to soft skills such as group discussions , presentations , seminars etc., The work culture in companies, the work life balance and technical skills. The opportunity and the freedom to work on a real world project how you want to and how to overcome hurdles in the process wouldn't have been possible to learn if it were not for this experience. I am grateful that BITS PSD and Electrono Solutions gave this opportunity to me .

Name: JULOORI AMOGH(2020AAPS0422H)

Student Write-up:

PS-I Project Title: DETECTION OF ANGULAR MISALIGNMENT, BENT SHAFT CONDITION IN A 3-PHASE INDUCTION MOTOR USING CONDITION MONITORING THROUGH VIBRATIONAL ANALYSIS

Short Summary of work done: A graphic algorithm was designed using LabVIEW software to perform vibrational analysis on the axial vibrations of the motor under study to detect the presence of angular misalignment, bent shaft condition occurring in the motor. It can be concluded that a decent efficiency was obtained in the detection of the faults as per the generated results.

PS-I experience: The experience throughout my PS-I can be described as a successful introduction into the real world which could clearly show the difference between the academic and working environments. Many new concepts were learnt, technical skills were enhanced, such as an introduction to LabVIEW software and an overall increase in academic knowledge was the most important result.

Learning Outcome: The basics of a new software called LabVIEW were learnt. The area of Condition Monitoring was briefly explored. Concepts like vibrational analysis and FFT analysis were also a part of the important learnings throughout my PS-I. The impact of minute faults in industrial components like induction motors on an entire industry could also be understood through my research.

Name: SOMAN YASH NILESH .(2020AAPS1429G)

Student Write-up:

PS-I Project Title: Condition Monitoring: Vibration Analysis of 3 - phase Induction Motor - connected gear - drive misalignment condition

Short Summary of work done: I developed an application analysing the motor fault condition parameters automatically for the failure conditions, i.e., 3 - phase Induction Motor - connected gear - drive parallel and / or angular misalignment

PS-I experience: Overall, PS - I was a good experience for me over this summer. I got to work on an interesting project with a direct industrial application, and learnt new skills on my way towards completing the same. I thank the Practice School Division (PSD) for giving me this opportunity

Learning Outcome: misalignment, Fast Fourier Transform (FFT), rotor vibration, Load Torque Signature Analysis (LTSA), Motor Current Signature Analysis (MCSA), fault diagnosis

---

Name: MAITREYI SUNTHA .(2020B2AA2475H)

Student Write-up:

PS-I Project Title: Condition Monitoring For A Motor For Soft Foot Condition

Short Summary of work done: My project was to prepare a method for vibration analysis collected from a motor and predict soft foot. I followed two different methods, the first one where the generation of a signal was done with help of a slider-based graph in the real-time axis, and the second one where I generated vibrations using MATLAB. In total, I have prepared 4 different algorithms, and the 4th algorithm is giving the closest to the output expected as per the reference articles. I have learned more about how industries work, and how IT and automation are used on the Industry Floor. I learned to work on different software specifically LabVIEW. Throughout the PS I learned the workings of not only this software but also the corporate world and how to manage work and life. It was a very insightful experience.

PS-I experience: It was very knowledgeable and enriching experience.

Learning Outcome: I have learned how to use LabVIEW, MATLAB and MongoDB. I have gained knowledge about

---

Name: ASHRAY KASHYAP .(2020B3A70494G)

Student Write-up:

PS-I Project Title: Condition Monitoring: Lack of lubrication condition in bearings of 3-phase AC induction motor using vibration analysis

Short Summary of work done: The problem statement: Lubrication is essential for the proper functioning of the mechanical parts. Lack of lubrication might lead to mechanical damage and hence would result in increased downtime of machines in the industries. It is important to continuously monitor the machine parts for signs of faults so that action can be taken at an early stage. My task was to capture the vibration data from bearings of a 3-phase AC induction motor and identify the lack of lubrication in them based on characteristic features and thereby classify them such that appropriate action could be taken with the least amount of mechanical damage.
The software on which the work was performed: NI LabVIEW
My Solution program: The vibration signals from the bearings would be collected through an accelerometer but due to the unavailability of real bearings and motors, the signal had to be simulated through the software. Thereafter, through certain signal processing techniques, certain metrics were derived using which, conclusions could be drawn on the condition of the lubrication in the bearing. Techniques used included envelope spectral analysis, spectral coherence and spectral kurtosis. These parameters were then run through some conditional statements which classified them. The output generated a quality index of the condition of lubricant in the bearing.

PS-I experience: The overall experience was very insightful. The professor and the industry experts were helpful and gave insights to better execute the solution. When I was stuck at some stage, they were there to help. The evaluatives were also held in a structured manner.

Learning Outcome: I got to learn a lot about signal processing, condition monitoring, motors, and bearings and also got an industry experience in the same. I got the opportunity to learn a new programming language and explore the field of electronics as well.

Name: HARSHIT GUPTA .(2020B3AA1162G)

Student Write-up:

PS-I Project Title: Determination of Belt-Pulley Misalignment Condition in Three-Phase Induction Motor

Short Summary of work done: The project's main objective was to give an insight into various topics such as Machine Learning, Industry 4.0, and the Internet of Things. The main work in the project involved condition monitoring of a three-phase induction motor to detect belt-pulley misalignment condition. The project was implemented using the Motor Current Signature Analysis and Laser Alignment tool on LabVIEW software in the best possible way.

PS-I experience: PS-I was a wonderful experience. I got a real-time understanding of working in the industry. I also learned about the challenges while working on the project and understood how these challenges could be worked out to implement the solution for the problem statement in the best possible manner.

Learning Outcome: PS-I helped me to improve my communication and management skills. I also gained various skills and learned new software like LabVIEW and Simulink. I understood the industry's working through interaction with multiple people from the industry. I learned about several new topics through my project.

Name: JAIVAL TALATI(2020B4A31650P)

Student Write-up:

PS-I Project Title: Model (In LabVIEW) on EMI/EMC in 3 phase AC induction motor w.r.t ISO-10816 Standards

Short Summary of work done: My project was to make model on EMI in 3 phase AC induction motor in compliance with respect to ISO-10816 standard. A very specific

Industrial problem was given and I had to model it out in LabVIEW. For more clarity regarding my project I was made to go through the emerging concept of Condition Monitoring, which is becoming an integral part of predictive maintenance in modern Industries. Also I researched on Vibrational Analysis techniques to help me find an algorithm to solve this. Then using LabVIEW a model regarding the same was made in software. Fuzzy Logic was then used to predict accuracy of the result.

PS-I experience: Everything went smoothly and in professional manner. There was constant interaction with Company mentor as well as allotted faculty. We at least used to have one meeting with the company mentor and allotted faculty to guide us. Regular Group discussion and seminars also helped in clearing doubts and developing soft skills.

Learning Outcome: I learned about how Industrial Revolution 4.0 is entering the industrial eco system. Also how IoT and ML is used in the process of doing so. Also got a great deal of knowledge regarding Condition Monitoring and its importance. Got familiarised with LabVIEW software which can be used to test and make a wide range of electronic machines. Also as I talked with people in industries to help in my work, I got to learn a lot regarding how industries work and realised how so much research is being done on every minor topic so as to improve safety and efficiency.

Name: AARON MATHEW .(2020B4A32313H)

Student Write-up:

PS-I Project Title: Condition Monitoring of Three Phase Induction Motor using ISO 10816-3 standards

Short Summary of work done: I was made to design a monitoring system on LabVIEW which would indicate the working condition of a three phase induction motor by referring to the ISO 10816-3 charts.

PS-I experience: Initially, we had an orientation to know a little about the company. After that we were assigned project topics individually and we had a few meets to discuss doubts related to the project. We had to give 2 presentations and submit a paper in IEEE format to the company.

Learning Outcome: Learning outcomes include: Basics of LabVIEW , Condition Monitoring , Writing IEEE paper

---

Name: BHAVYA L NARAYANAN .(2020B5A81570G)

Student Write-up:

PS-I Project Title: CONDITION MONITORING OF AN INDUCTION MOTOR USING VIBRATIONAL ANALYSIS: VELOCITY AND ACCELERATION TRENDS

Short Summary of work done: This project deals with the fault prediction of 3-phase induction motors. A three-phase induction motor has wide-ranging applications from everyday household appliances like pumps to large furnaces and crucibles in the steel industry. Fault prediction becomes crucial in such an industry where the shutting down of even one motor can cause huge losses to the manufacturers or might lead to heavy casualties or loss of life. Amongst the multiple vibrational analysis methods for predicting faults, this method of uses acceleration and velocity trends to predict motor health.
In this Project assigned by the PS Station I implemented a conditional algorithm based on the ISO 10816 Vibration severity char, to predict the health of an induction motor dynamically.

PS-I experience: The experience was as per expectations. It helped me interact with my peers more effectively and understand the dynamics in the organisation. The mentor was helpful in the meetings and gave us resources to reach our end goal.

Learning Outcome: I learned a lot about fault analysis in an induction motor. Through the course of this project, I was also exposed to a unique programming platform, LabVIEW which I learned thoroughly through the course of program. Vibrational analysis was another thing I read and learned about during this period.

Name: SHREYA PRABHAKAR .(2020B5A81976H)

Student Write-up:

PS-I Project Title: FAULT DIAGNOSIS IN ADVERSE MOTOR CONDITIONS WITH A FOCUS ON VOLTAGE BASED FAULTS

Short Summary of work done: During the course of this PS-1. we were given individual projects, all under the broad topic of condition monitoring and predictive maintenance. For my topic, I had to develop an algorithm for the detection of voltage faults. I developed the algorithm on MATLAB, using fuzzy logic. I also had to look into gathering a dataset to test my model. For the same, I had to simulate a motor on SIMULINK.

PS-I experience: PS-1 was overall a good experience with a lot of technical and professional skills learnt in this period. The work was all individual, but, PS allowed students from all campuses to interact together. However, the uncertainty about meet timings, and having meets on days that were marked as holidays, caused some personal scheduling issues .

Learning Outcome: My PS-1 experience at Electrono helped me to learn and familiarise myself with a lot of new technologies. The project work helped me hone my technical skills, while, the Group discussions, seminars and peer review meets helped me hone my professional skills.

Name: SAJAL SHARMA .(2020B5AA0740P)

Student Write-up:

PS-I Project Title: Early Stage Fault Predictions for Motor Bearings of a Three Phase Induction Motor.

Short Summary of work done: I basically made a program that would take the signal from an Induction Motor and process it using some techniques to detect bearing faults, if any, at an early stage. So for this, I first simulated a signal in MATLAB and then filtered it using Autoregressive Modelling to obtain the residual signal. This signal was then used for Spectral Kurtosis and Short Time Fourier Transform to obtain a band for Envelope Analysis. Finally Envelope analysis was used to determine the bearing fault along with the fault frequency. The I/O interface was also designed using MATLAB.

PS-I experience: My PS-1 experience would be very learning oriented, where I learnt about languages like MATLAB, and LabVIEW and how to do signal processing in these. I also understood about condition monitoring of motors and why it is so important for the industry. Lastly, I also learnt how to write IEEE Reports that can be published in a journal.

Learning Outcome: I learnt programming in MATLAB, LabVIEW, Induction Motor Condition Monitoring, and about Signal Processing techniques.

PS-I station: Gujarat Energy Research and Management Institute , Gandhinagar

Student

Name: Abhirath Anand(2020A7PS0141P)

Student Write-up:

PS-I Project Title: Extreme Learning Machines Autoencoder

Short Summary of work done: I read various papers and blog posts about extreme learning machines and online-sequential extreme learning machines, including the mathematical background behind them and the places where they are used. I implemented an extreme learning machine model in Julia for the purpose of image classification on the MNIST dataset. I also learnt about using autoencoders as powerful feature extractors and how they can be combined with online-sequential ELMs for the purpose of online learning for the task of condition monitoring.
The Gujarat Energy Research and Management Institute (GERMI) deals with research in the area of renewable energy and energy efficiency. Condition monitoring ensures that machine parts which are not in perfect health are identified and replaced as soon as possible. Worn out parts in machines are a major cause of energy wastage. Such parts may not immediately cause the machine to stop working but will nonetheless slowly degrade over time, continually impacting both performance and energy usage detrimentally. What regular condition monitoring allows industries to do is to save out on a large amount of energy wastage caused by parts that are worn out. Thus the project has a focus on energy saving, which is one of the chief research areas of the organisation.

PS-I experience: My PS-I experience was very good. I learnt about a lot of new concepts and it was fun to work on research that has applications in the real world. I enjoyed working with GERMI and was very happy with my work.

Learning Outcome: I learnt about extreme learning machines and online-sequential extreme learning machines, including the mathematical background behind them and the places where they are used. This includes concepts like the Moore-Penrose pseudoinverse, which I did not previously know about. I implemented an extreme learning machine model in Julia for the purpose of image classification on the MNIST dataset. I also learnt about using autoencoders as powerful feature extractors and how they can be

combined with online-sequential ELMs for the purpose of online learning for the task of condition monitoring. I also learnt how to summarise my learnings in a concise report.

Name: YASHOVARDHAN YAMAN GUNJAL .(2020A7PS2092H)

Student Write-up:

PS-I Project Title: Understanding Extreme Learning Machines and the mathematics behind it and studying its implementation in fault monitoring systems.

Short Summary of work done: I went through more resources given on http://www.extreme-learning-machines.org/, including the papers attached on the page and the tutorial slides given. I also looked in detail into the math behind ELMs and how it works. I also looked at how its implemented in python to understand real world implementation. I went through resources given on sciencedirect.com/science/article/abs/pii/S0925231206000385, the paper titled 'Extreme learning machine: Theory and applications' written by Guang-Bin Huang et al, who came up with the concept of ELMs. I also looked into the math to understand 'Parameter update mechanism in ELM' as instructed.I went through various implementations of ELMs given on http://www.extreme-learning- machines.org/elm_codes.html, focusing on the python implementation as it is my language of convenience. I also studied and reimplemented the ELM model as the one given on the website, developed by David Lambert and his blog regarding the same. I went through the paper given on https://ieeexplore.ieee.org/abstract/document/8628810 to understand the applications for ELMs in anomaly detection and learnt about its implementation in fault monitoring system.

PS-I experience: I had a very nice experience with my allotted institute. My faculty incharge Prof Manoj Kakade was very approachable and understanding and made sure the whole PS process went smoothly regardless of when we approach him. The allotted institute was also very supportive and their faculties were always open to deal with any queries we had.

Learning Outcome: I learnt about Extreme Learning Machines and how they're significantly resource efficient and learn in real time. I also learnt about its auto encoder implementation in python and studied its implementation in fault monitoring systems.

Name: DARSHAN KIRANKUMAR BAGRECHA .(2020A8B52153H)

Student Write-up:

PS-I Project Title: Speech to Text conversion

Short Summary of work done: Human speech in audio files were to be converted to text. The main aim was to develop the algorithm to classify the audio signal into text. Signal processing, Audio analysis and Deep Learning model was used in this project. CNN, STFT and MFCC were applied. Python was the primary programming language used.

PS-I experience: PS was a nice learning experience, though a little hectic, but I got to learn a lot from this project. Also working under a mentor it improves our communication skills.

Learning Outcome: I learned about signal processing, image processing, data-visualisation and Deep learning.

Name: BARATH M .(2020A8PS0715G)

Student Write-up:

PS-I Project Title: Adaptive Data Denoising Scheme Using Deep Autoencoder

Short Summary of work done: First we learned about deep learning and neural networks and how to implement them using TensorFlow, keras API along with the use of other python libraries such as numpy, sklearn, matplotlib. Then we looked at a specific type of neural network architecture called autoencoders. We implemented autoencoders and denoising autoencoders as an unsupervised learning algorithm to compress data to a lower dimensional form and reconstruct a denoised version of it. The two main aims were to learn a lower dimensional representation of complex data for faster computations and reconstruct desired outputs without any noise in the data.
For further work we also implemented a resolution enhancement autoencoder similar to denoising applications and touched upon the concepts behind use of autoencoders for anomaly detection in various real life applications.

PS-I experience: It was a good experience for me as I got exposure to a field of artificial intelligence, it has helped me understand a lot of concepts related to machine learning that I can now further research upon more comfortably.

Learning Outcome: My research skills improved a lot as I had to go through a lot of sources to understand certain concepts related to neural networks and I also have a better grasp of programming in TensorFlow to implement learning models. Through this project I have gained a good understanding of machine learning and can continue pursuing it through various other projects.

Name: UTSMAY KUMAR .(2020A8PS0881G)

Student Write-up:

PS-I Project Title: Design of a real time display system for air monitoring

Short Summary of work done: The work done in the project model involved understanding of different electronic components which could be used in generating such models, besides that it can be used for various other aspects. The project also involved performing soldering for integrating sensors, and other components into the PCB layout for their final configuration in which the PCB layout has been utilized as a base. The main aspect of the project was initialization of Raspberry Pi which took about two weeks for understanding the OS and accessing it, this was further used as a platform of integrating sensors by making python code for Nova SDS011 sensor, MQ135 etc. Raspberry Pi OS also involved integrating OLED to it and designing the font size as per the needs of the user. The entire project journey was about 6-7 weeks.

PS-I experience: I am grateful to have been given this opportunity of working in such a designated project. I learned various aspects of core electronics which I had never thought of. The detailed and meticulous manner in which the theoretical and practical aspect of the project was taught to me was really admirable. Understanding the functioning of Raspberry Pi was probably the most heartful experience for me, after I got to know its actual in-depth application and utilities.

Learning Outcome:
The main learning of the project model was understanding of the core electronics aspect of the model. The opportunity to have a brief understanding of Raspberry Pi which acts as the main component of the project. Besides this, it gave me an opportunity to have a brief overview about python as a language. Since it was required for integrating the working of sensors and the OLED display. The project further gave me an experience of

performing soldering, the hands-on experience of soldering the components into the PCB layout brought to me a sense of additional responsibility and dedication towards the project model. Since the nature of the project is a hardware one, it gave me the opportunity to learn about more hardware components like CRO, wave function generator etc. which were not necessarily used but could be used to extract the output in a different manner.

PS-I station: Indira Gandhi Centre for Atomic Research (IGCAR), Kalpakkam

Student

Name: SANJANA SUNIT JAMUAR .(2020A1PS0198P)

Student Write-up:

PS-I Project Title: Thermodynamic modeling of distribution coefficient of lanthanides in diglycolamides

Short Summary of work done: For the project I have extracted data from literature of Europium ions in nitric acid aqueous phase in DGA extractant. Used the data for osmotic coefficient of Europium Nitrate to calculate the activity coefficient and the denaitu correlation, stimulated the data on Matlab to get the best fit curve and hence calculate the molar activity coefficient.

PS-I experience: IGCAR is a well reputed organisation and they gave me a great project. Through the project I was able to learn things about nuclear fuel reprocessing and to explain experimental data we need to validate it through calculations.
I was a great experience to talk to scientists and apply things we've learnt in the past to real life processes.

Learning Outcome: Through the PS I have learnt to be regular with my work, diligent and considerate of my mentors time. I should be able to understand the work I have been given and ask crisp doubts to my mentor.
Graphical data extraction, modeling on MATLAB and thermodynamic modeling were some of my learnings.

Name: PRAGYAN UPADHYAYA .(2020A2PS1361P)

Student Write-up:

PS-I Project Title: Development of a Computational Program for Slab on Grade Analysis

Short Summary of work done: My topic was the development of a computational program for slab-on-grade analysis.
Initially, I went through the codes given by mam various other online resources were also utilized to expedite information on various parameters mentioned in the codes. Mainly ACI 360 R90 was utilized along with Technical Manual (Airforce) Chap.15, and GRDSLAB.xls was used as a validation reference.
The algorithm of the program was to first take the input of various parameters from the user like trial thickness and load dimensions, wall loads dowel diameter, subgrade modulus, wheel load, post loads, etc.
Then it did the stress and deflection analysis on the trial thickness. Where wall loads exceed the permissible values there have been provided provisions for thickening at the middle and at the edge. Critical aisle width and load, along with dowel parameters are also determined. Then it found out the design thicknesses by various methods like PCA axel load design, PCA post load design, WRI design, TM (air force) Chap 15, and the COE design methods. All of these design methods included various charts which had been utilized in the program using non-linear regression equations. For this manual plotting of x and y values was done then these were put into an online regression equation software to obtain the regression equations. I received continual feedback from mam. I regularly updated the diary and shared the progress with mam via email or through the weekly report.
These design thicknesses were then reported and then stress and deflection analysis as mentioned before is done on each one of them. The program displays ‘slab thickness OK’ against the thicknesses where the stress and deflection are within safe limits. It also provides the details regarding the sealant specification and the joint width as per the TM document. If no thicknesses are within safe limits the procedure is repeated with increased trial thickness. Finally, it also enables the user to get a complete analysis of the slab thickness chosen from these.
Then I prepared the project report consisting of the information on various parameters. I also did the spreadsheet validation of the program output against the GRDSLAB.xls document output or a code example.
Thank you.

PS-I experience: My PS1 experience was very nice. I received continual monitoring and feedback from mam (IGCAR MENTOR- Ms. R Preetha). The components of PS1 especially the Quizzes and the Group Discussion were very nice. My BITS mentor Prof. KG Krishna illuminated greatly the Japanese work culture. It was a very nice learning experience. I am grateful to IGCAR and BITS for providing this opportunity, I would also like to express my thanks to all the BITS and IGCAR organization members who successfully organized this PS1 program.
Thank you.

Learning Outcome: Organization Strucutre and its functions along with a better appreciation for utilization of programs to facilitate the design process. Application of highway engineering courses.
Importance of program in design purposes.
Thank you.

Name: KSHITIJ RAVI SANGHI .(2020A3PS0401P)

Student Write-up:

PS-I Project Title: Development of GUI for fault calculation and relay coordination for the IGCAR electrical power system.

Short Summary of work done: This involved learning about power system protection , fault calculations and relays along with VBA macro to complete the project. Worked directly with the main IGCAR electrical plans and implemented modules to calculate the faults.

PS-I experience: IGCAR is very professional in its working, my mentor was very active and helped me at every stage , he was very understanding and made me feel comfortable with the work. Help was very easily available and communication was frequent. It was a very good experience working in such a prestigious institution .

Learning Outcome: Learnt about power systems and how the industry operates, what are the practices in power system protection.
Inculcated the habit of making notes every time I had a meet with my mentor.
Time management as I had to prepare for interview tests along with the PS work.

Name: KEDAR NANDKHEDKAR .(2020A3PS0481H)

Student Write-up:

PS-I Project Title: Simulation of electronics Drive Circuit of Temperature-sensitive Magnetic switch (TSMS) along with electromagnet

Short Summary of work done: My work was to simulate a circuit/assembly on FEMM software and do a parametric study on it. Initially I had spent time on understanding the assembly. I simulated various models with different structures and parameters for a range of inputs and noted down the required outputs. Later, I plotted graphs for finding out relations between parameters and identify the most suitable ones. There were many hurdles in my way which gave me insights into the project.

PS-I experience: Our PS had a late start with little communication with the center for the first few weeks. But, once I approached the mentor, he did provide me with work and required materials to understand the task. The mentor was always available to solve my doubts, we had meeting at 8 pm and even at 7 am. I understood that the mentor's are more that happy to guide us if we show the expected interest in the topic.

Learning Outcome: Your enthusiasm and curiosity will help you gain the experience and we can't expect that to happen on its own.
We should be patient and can't expect immediate response to our demands.

Name: SUCHETAN R S .(2020A3PS1760G)

Student Write-up:

PS-I Project Title: Microcontroller design for discrimination of alpha and beta radiation in nuclear systems.

Short Summary of work done: Developed a system using an STM32 microcontroller to differentiate between alpha and beta radiation based on the pulse width as well as the pulse amplitude. Also developed an analog circuitry to eliminate power system noise in

the signals using a voltage comparator made from an operational amplifier. Used proteus 8 for simulations and STM32 cube IDE as the development environment.

PS-I experience: It was a great experience and I learnt a lot from it. My mentors at IGCAR were always supportive and clarified all my doubts and I bonded with them well. The good level of interaction and doubt clearance helped me complete the project well in time.

Learning Outcome: Microcontroller design, STM32 board, Analog electronics: Operational amplifiers. Embedded system design and Embedded C.

Name: VEDANT MUNJAL(2020A4PS0509P)

Student Write-up:

PS-I Project Title: Evaluation of Mechanical Performance of Extended Reach Manipulator Tong/End Effector

Short Summary of work done: I dealt with the forces, stresses and deformations developed in the end effector of an Extended Reach Manipulator, which is an RRPRRR master slave manipulator (MSM). Master slave manipulators (MSM) are the most vital and widely used remote handling tool in nuclear industry. MSM substitutes the human arm for handling radioactive materials behind
lead shielded hot cell. Extended reach manipulator is a six degree freedom MSM installed for large cell volume coverage of 23 cubic meters. The end effector's load carrying capacity was determined in a variety of different conditions, like varying link lengths, altered points of application of force, varying gripper pad frictional coefficient and varying tong separations. The stresses and deformations were then modelled in ANSYS Static Structural.

PS-I experience: My PS-1 experience at IGCAR was truly exceptional- my industry mentors helped and guided me throughout the project and our assigned faculty member also inculcated corporate ethics and professional values in his meetings. I completed all my project objectives within the stipulated time and gained priceless experience while working at IGCAR.

Learning Outcome: I had to learn a lot of technical skills like running simulations on ANSYS, understanding the fundamentals of finite element method, understanding the configuration of the master slave manipulator and its industrial deployment, etc.

I also learned a lot on the soft skills end by ensuring proper communication and developing good interpersonal relationships at the workplace. Insights from our faculty member who borrowed from his experiences also helped immensely.

Name: BIJOY BHASKAR LALL .(2020A4PS1086P)

Student Write-up:

PS-I Project Title: Kinematic Analysis of Revised Articulated Manipulator

Short Summary of work done: The goal of the project is to carry out a kinematic analysis of a Revised Articulated Manipulator (RAM). A RAM is a master-slave manipulator used in lead hot cells of nuclear reprocessing industries. It is a substitute for the human arm for handling radioactive materials. The master arm is operated from outside producing a 1:1 (exactly same) output by the slave arm in the hot cell side. A manipulator is required to handle highly hazardous and radioactive materials remotely and safely by the reactor plant personnel. A manipulator is used to carry out complex tasks and remote maintenance work in high radiation environments, and with the presence of chemical vapors.
In this project, starting with a planar 2-link mechanism, various mechanisms were simulated on MSC ADAMS, a multi-body dynamics software. Their reach diagrams and work areas were obtained under various constraints and verified analytically. AutoCAD was used to calculate the area of the reach diagrams.

PS-I experience: As my first venture into a professional environment, Practice School-1was a pretty brilliant experience. Even with the constraints of it being an online internship, there was a lot of learning involved. It was amazing to have such brilliant scientists as our mentors and to be able to pick their brains which would not have been possible without PS-1.

Learning Outcome: There is no such thing as ‘branch specific’ work: In the real world, everything is inter-disciplinary, moving beyond the confines of say just mechanical or computer engineering. The biggest eye opener for this revelation was the wide array of projects being carried out by my colleagues during PS-1 at IGCAR. One would think that it being a nuclear research facility, the research will be fission/fusion oriented and have to do with particle research or nuclear reactor related research. But, while research related to the topics I just mentioned is also being carried out, it just forms a part of the wide-range of research activities going on at IGCAR. Its all about looking at the bigger picture and combining the necessary knowledge and skills from whatever field of science and engineering in order to efficiently attain the desired outcome.

As far as the specific learnings from my project are concerned, I learned a lot about the basics of robotics as well as how to calculate the kinematics of a robot which is essential from the design point of view. I learned how to use a new software, MSC ADAMS, which is a multi-body dynamics software. My skills on AutoCAD were tested as well.

Name: MOHIT VIKAS JAVALE .(2020A4PS1886P)

Student Write-up:

PS-I Project Title: Numerical Simulation of Heat Transfer via Natural Convection in a Thermo-siphon dissolver

Short Summary of work done: Performed CFD+HeatTransfer simulations using openFoam package for the dissolver geometry provided. Initially completed a 2D simulation, followed by the 3D case. Further, experimented with different types of meshing, and checking is similar results obtained over different meshing sizes and types to ensure mesh-independence of results obtained.

PS-I experience: The PS-1 was a good experience to have, and introduced us to many of the problems faced in the industry, how to approach them and moving towards solving them. The industrial mentors provided satisfactory support and help while trying to complete out projects, while the faculty mentors ensured smooth evaluative components throughout the PS1 project.

Learning Outcome: This was a great exposure to the industrial issues faced by an organization. It was a great eye-opener to understand that in the process of running a nuclear power plant, there are lot's and lot's of small small issue that need to be dealt with and improved in every process along the way, which can have a huge impact in the long run. It was also a good opportunity to brush up my communication skills and adapt them to the formal and profession environment.

Name: HRISHIKESH HARSH(2020A7PS0313P)

Student Write-up:

PS-I Project Title: Cross Lingual Document Similarity Analysis through Multilingual Thesaurus

Short Summary of work done: The work I did at IGCAR involved creating an algorithmic approach/implementation to create a tool which could perform Cross Language Document Similarity Analysis or in other words, detect Plagiarism across two documents of different languages giving importance to context of the words (Suspicious Document being in English mostly). Me and my teammates read research papers and various web resources to gather ideas for its implementation and eventually did create an algorithm/tool right from the scratch which could take up an Input Corpus of Source Documents and a Suspicious Document and return the results of the Plagiarism Check. We also implemented several ways to help the user visualise those results through Heatmap (with hover-over feature revealing source), Textbox with highlighted plagiarised portions, and Pie Charts and Tables to display the exact numbers attributed to each of the source documents.

PS-I experience: The PS-1 experience for me has been a pleasant one which has taught me collaborating and working as a team along with other valuable things like innovating and improvising on ideas and work under pressure. I did my best to try and contribute to such an esteemed organisation through my Project and was guided throughout this journey by my Faculty mentor and my Industry Mentor. The challenges and questions tackled during the PS have surely helped me improve myself in many areas and overall it has been great to be associated with IGCAR and learn in these 8 weeks.

Learning Outcome: The primary learning outcomes include knowledge of Natural Language Processing (NLP) and associated concepts and models like N-Grams, Word2Vec, BERT etc. Also learnt about the associated libraries implementing these concepts like nltk, spacy, scipy. Worked with numpy, pandas, googletrans API, DeepTranslator API, plotly, tkinter etc. and improved my understanding of these. Among the secondary learning outcomes, I can say I learnt a great deal about Industry Work Culture (primarily through GDs), working in a team, punctuality and definitely improved my public-speaking skills through the Presentations and Seminars.

Name: PRATHAM GOYAL(2020B3A30822P)

Student Write-up:

PS-I Project Title: Design of automatic device for cutting solid sodium bricks into small chunks and release system

Short Summary of work done: Aim was to create a dedicated to device to cut sodium in small chunks weighing 1-2gm and due to properties of sodium various factors have to be taken care of. Work done included the machine design along with its GUI and automation.

PS-I experience: PS-1 gave a great insight about how the industry works and how we are supposed to be prepared for various tasks. It added great value in terms of domain knowledge, professionalism and many other soft and hard skills.

Learning Outcome: I was able to learn a lot of things including various technical skills involving mechanics, automations and GUI. Along with also learned various soft skills which were needed in the field job.

Name: CHINMAY ANAND .(2020B3A70776H)

Student Write-up:

PS-I Project Title: Development of capital project/budget monitoring system

Short Summary of work done: The project aimed to create a web-browser-based application for Project and Annual Budget Monitoring for all Projects in progress at IGCAR under the Department of Atomic Energy. The web application was made using Flutter and Dart, while the database was managed using Firebase to provide Backend as a Service. The application provides a user authentication mechanism; it is connected with the Cloud firestore database and allows viewing the project and budget details of various projects that are underway at IGCAR. Relevant excel files can be uploaded to the backend through cloud storage on firebase.

PS-I experience: PS 1 was a great learning experience for me. Initially I was completely unaware of the project that I was allotted . Slowly I worked with my teammates and we together tried to figure out as to how should we collaborate to tackle the challenges we face and learn the techstack that we had to use (objectively flutter and firebase) . The importance of deadlines became very clear to me in these 2 months . I learnt to communicate through mails with my industry mentor and be patient enough to wait for his replies. It was an enriching experience in which I enjoyed working .

Learning Outcome: I learnt skills like flutter and firestore. I learnt to convert excel files into csv and json. The sheer courage to handle situations which seem impossible to be faced and the resilience to never give up were some of my biggest learning outcomes. Although we may not have been able to completely produce what was required from us but me and my team members gave our best efforts and "learnt to learn" things in a fast manner.

Name: STAVYA PURI .(2020B5A70912P)

Student Write-up:

PS-I Project Title: Modelling and Simulation of Electrode Systems for optimising Conductivity Sensor Measurement Range

Short Summary of work done: The researchers at Indira Gandhi Centre for Atomic Research developed a high-performance pulsating conductivity monitoring equipment built with a new type of sensor created in-house, namely a pulsating sensor. Our main goal was to develop a COMSOL model of the pulsating sensor that was developed in house and simulate various physical conditions to optimize conductivity range. I modeled a Wire Electrode experiment wherein I calculated the various Current Distributions, Velocity fields which provided me the knowledge to learn the optimisation of geometry and material mass distribution by observing the intensity of current density on surfaces.

PS-I experience: It was a fun and enlightening experience which gave me the idea of the working of an organization and how research work is conducted in such prestigious organizations

Learning Outcome: I learnt about COMSOL a multiphysics tool, Electrochemistry, Finite Element Method, How to conduct research and How to read research papers.

Name: ARYAMAN KOHLI .(2020A2PS1055H)

Student Write-up:

PS-I Project Title: QUALITY ASSESSMENT OF CONCRETE PRODUCTION USING STATISTICAL QUALITY CONTROL TOOLS

Short Summary of work done: This project aims to make a review of the concepts and use of the basic Stastical quality control tools such as histograms, control charts, pareto charts, cause and effect diagram that are currently used in the concrete industry and by the use of examples, shows the applicability and benefits of applying the concepts of these tools for improving the quality of concrete production. Here, I've taken a case study and the techniques of control analysis has been applied to the compressive strength values of 150mm concrete cube samples tested at an age of 28 days, with grade of concrete being M30.A complete data for one year period was collected from QCS & Concrete laboratory, CEG, IGCAR and were analyzed using different SPC tools and were detected for various variability factors The tools implementation and data analysis shows clearly that these tools can be applied in such a sector effectively and can be used to improve the concrete production processes to a very good extent .

PS-I experience: It was a good experience

Learning Outcome: I got to know about the reaserch sector of our country and based on the project i learnt the quality analysis of materials

---

Name: AMAN VERMA .(2020A4PS2326H)

Student Write-up:

PS-I Project Title: Thermal Design and Analysis of Cooling and Dehumidifying Coils for AC and V systems

Short Summary of work done: Thermal Design and analysis of a cooling coil whose observations (like inlet and outlet temperatures, DBT,WBT,etc.) were provided along with some good references.
I was supposed to do the calculations and find the Design (area and number of rows of coils) using some equations given in reference materials.

PS-I experience: It was good .

My PS mentor was in contact with me throughout the PS and helped me whenever I asked.

Learning Outcome: Learnt about cooling coils . Heat and mass transfer aspects in cooling coils and how they work in Air conditioners and maintain the humidity, temperature and uniformity.

Name: UTKARSH .(2020A7PS0981P)

Student Write-up:

PS-I Project Title: Design and Development of Desktop Process Analysis and Alert System

Short Summary of work done: The first phase of the project included data collection. I used systeminformation library of node.js for the purpose of data extraction. We wanted process attributes through which we could extract enough information about the processes such that we are able to classify them accordingly. So, I chose particular attributes which could give us some potentially important information. I wrote a node.js code that produced a log file containing information about all the processes running in a particular system. It collected data at regular intervals of 5 minutes from every system. We needed to use the data for training our machine learning model, so we wanted the data to be in CSV format. For that, I wrote a C++ code that took a log file as input and produced corresponding CSV file as output. After that I along with my project partner built a multi-class classification model for finding out the non-genuine processes and we tweaked it according to our dataset for producing better results.

PS-I experience: It was an extremely great experience for me. I worked under the guidance of mentors from one of the most prestigious research organizations in India. Even though there was some work load but knowing that I was contributing to something that would actually be of importance to the organization felt really good. During the project I learnt node.js and machine learning and put my knowledge to practical use which proved to be really beneficial. I learnt how to work in a team and communicate in a professional environment. But all this progress wouldn't have been possible without the support of my industry mentor. Despite his busy schedule he always made up time to clear my doubts and I am extremely thankful to him for that.

Learning Outcome: I learnt about a plethora of different things during my time as a research intern at IGCAR -
Learnt node.js from scratch and about different node.js libraries.

Learnt how to make different types of machine learning models and about various python libraries like numpy, matplotlib and sklearn.
Learnt about how to cope up with deadlines.
Learnt about how to work and communicate in a professional environent.
Learn about how research organisations work.
Learnt about how to work as a team.

Name: VEDANT MATHUR .(2020A7PS2047H)

Student Write-up:

PS-I Project Title: DEVELOPMENT OF CUSTOM GUI FOR JITSI MEET VIDEO CONFERENCE

Short Summary of work done: IGCAR uses a self-hosted instance of the JITSI Meet video conferencing app for their in-house communications. However, Jitsi Meet does not provide an option for host controls, such as choosing a different layout. Our project added this new feature to the existing Jitsi meet, which provided four new other layout options to be used by the users. Our newly added layouts will help the organization conduct video conferencing in a more user-friendly manner.

PS-I experience: My two months intern at IGCAR was very informative and practical oriented. Scientists at IGCAR are very supportive and helpful in explaining doubts raised by us while research. Knowledge gained from courses at BITS was applied in the research work along with practical considerations. I found every person at IGCAR self motivated and was eager to work hard

Learning Outcome: We learned about web development tools like HTML, CSS, and Javascript. We gained knowledge about the working of Jitsi APIs and how to integrate them within our project. We also gained experience working at prominent institutions such as IGCAR. We learned a lot from our mentor. He imbibed in us a spark to pursue research in the future as well.

Name: KHUSHIL KATARIA .(2020A7PS2086H)

Student Write-up:

PS-I Project Title: Development of custom Graphical User Interface for Jitsi Meet Video Conference

Short Summary of work done: IGCAR uses a self-hosted instance of the JITSI Meet video conferencing app for their in-house communications. However, Jitsi Meet does not provide an option for host controls, such as choosing a different layout. Our project added this new feature to the existing Jitsi meet, which provided four new other layout options to be used by the users. Our newly added layouts will help the organisation conduct video conferencing in a more user-friendly manner.

PS-I experience: My two months intern at IGCAR was very informative and practical oriented. Scientists at IGCAR are very supportive and helpful in explaining doubts raised by us while research. Knowledge gained from courses at BITS was applied in the research work along with practical considerations. I found every person at IGCAR self motivated and was eager to work hard.

Learning Outcome: We learned about web development tools like HTML, CSS, and Javascript. We gained knowledge about the working of Jitsi APIs and how to integrate them within our project. We also gained experience working at prominent institutions such as IGCAR. We learned a lot from our mentor. He imbibed in us a spark to pursue research in the future as well.

Name: AASTHA SHAILESH PRAJAPATI .(2020B5A82284H)

Student Write-up:

PS-I Project Title: Application machine learning (ML) tool to screen gas sensing materials from literature: understanding structure-property-sensing correlation.

Short Summary of work done: The project focuses on the data analysis of a sensor array consisting of a semiconducting
metal oxide sensor named tin oxide (SnO_2) with various elemental modifications. These sensors are being used for their gas sensing capabilities due to changes in electrical resistance upon exposure to analyte gases/vapors. An extensive literature survey and compilation of data of SMOs that includes structure and electrical properties and their gas

sensing characteristics like sensitivity, selectivity, response time, recovery time, etc. need to be prepared by referring to varied research papers. An unsupervised ML model called Principal Component Analysis (PCA) is developed to pass this dataset for studying the correlation between structure, property, and sensitivity of the gas sensors using VOCs and analytes. Learning different types of plots like scree plot, scores plot, loadings plot and biplot. These plots were to be produced out of python sklearn library. I also made use of OriginPro to create better plots and pair plots. Reading upto 62 research articles and extract the relevant information and tabulate in a consolidated sheet.

PS-I experience: The experience at my PS-1 was fruitful. I not only read 62 research articles on various doping materials on gas sensors, but also learnt to extract relevant information from a research paper. Reading a research paper is an important part in a student life. Many of us sway away from reading them because they are dull looking and boring, but when you read them, you will come to know that you are on the path of acquiring years of knowledge in just a few time. The project gave me a quick start to machine learning. When I first randomly started using sklearn library, I could not make head and tails of what is going on behind the scene. This curiosity compelled me to look and study the linear algebra of the particular model and its geometric interpretation. I got to know how the machine learning models work and this got me started with this beautiful journey of ML. My mentor at IGCAR was very supportive. I am thankful to his countless efforts and constant help. All the evaluatives were conducted in a very smooth manner. The group discussions were of great help which helped me make connections with other students of sister campus. The webinars were insightful.

Learning Outcome: I learnt about the culture of working outside our student life. I came out of the comfort zone. The work and your persona needs to be very professional in nature. You need to be punctual and patients at the same time. I understood the working of a research centre and how hardworking their scientists are. It is inspiring to see everyone working hard. I really liked the environment and i still felt the lack of immaturity inside me, which needs to be removed. The project itself had innumerable outcomes in my life. The importance of reading research paper, behind the scenes of machine learning and analysis were priceless. Overall my learning outcome was an overall development of my personality in terms of approaching the mentors, communicating with the fellow colleagues and focussing on the work.

PS-I station: Matter Motors Pvt Ltd (onsite) , Ahmedabad

Student

Name: POOJAN NIKHIL GANDHI .(2020A8PS1541P)

Student Write-up:

PS-I Project Title: Cyber security of EV vehicles

Short Summary of work done: Data Analysis: Using data to enhance the components and performance of a vehicle and to predict its life cycle and maintenance periods for optimization of its components and enhanced longevity.
Cybersecurity: To identify the most prevalent cyber-attacks possible on vehicles, especially two-wheelers, and highlight their mechanisms and attack nodes and possible weaknesses in the system. Going through the potential threats, risk assessments and node analysis of such attacks. Moreover worked on it's preventive steps that a customer can adopt and the cybersecurity measures that the company can work on. Also includes the regulations and certification needed for a vehicle to be considered cybersecurity according to the government.

PS-I experience: This internship has helped me get an in-depth understanding of the various systems and components at work in a vehicle and the hardware, software, and design required to bring it to life. I have received a hands-on experience regarding the system design for software security modules installed in the vehicle. Also got the chance to work with the hardware team for cell and battery testing for the energy division of the company wherein learned about the various parameters required for a proper functioning battery and its assembly process.

Learning Outcome: During my final project, I worked with the cybersecurity team that had tworked on the security of two-wheelers and how they can be implemented. Also the meeting of government standards was important.
This internship has helped me build a stronger understanding of the importance of electronic systems required to run the simplest machines and has led me to develop an interest in my field of study.

Name: ABHINAV HARSHA ADYA .(2020A8PS1796P)

Student Write-up:

PS-I Project Title: S32K and KW45 based implementation of Digital Key

Short Summary of work done: There are 8 steps in completing any PCB: Problem Formulation, Technology Research, Block Diagram, Choosing appropriate parts, Making of a schematic, hardware implementation of the schematic, coding and finally making of the PCB. We completed 4 out of the 8 steps in this process. Our PS-2 seniors will be taking up the rest of the project to complete it by the end of their PS-2.
Apart from this I also got the opportunity to work on 3 side projects:1 involving the display module of the bike, the other 2 being a proto involving the telematics and infotainment system of the bike

PS-I experience: It has been a wonderful experience here at Matter, where I learnt and interacted with more people than I could have ever expected. It was definitely worth it to have taken an offline PS-1. I genuinely got that industry exposure that PS aims to deliver.

Learning Outcome: I learnt a lot about Electric Vehicles in general. I read a lot more about communication networks and the various technologies that are currently in user for Authentication. I also learnt and improved my soft skills. I understood how buzzing the atmosphere here is at a startup and how fast paced everything is at this firm.

PS-I station: MELSS , Chennai

Student

Name: HARSHAL NAYAN RATHI .(2020A7PS0085H)

Student Write-up:

PS-I Project Title: OEE software

Short Summary of work done: OEE
This highly popular standard of efficiency is used to check the efficiency of machines in various lines using IoT. Can be used in manufacturing lines or for miscellaneous devices connected to the server.
Estimating software developing
Developing a useful software tool using an application of IoT, and various programming languages, such as MongoDB, Django, Python, CSS, HTML, MongoDB, Django, JS, …etc
With the help of this software, we will easily and efficiently be able to estimate the productiveness of all the machine lines (or miscellaneous objects) with a server, which

will estimate all of the things and return a detailed value. This will also be shown on a LED display, with all the OEE values.
Front-end
My objective was to work on the front-end model of OEE application software.
This was be done using standard languages like HTML, CSS, ReactJS, NodeJs, and JS,…

PS-I experience:
In a word, it was enjoyable. I made many friends and got valuable colleges from different branches of BITS. I contacted many mentors and had group meetings supervised under them. Thank you.

Learning Outcome: Experience and Learning Outcomes:
I learned various skills throughout this project, including understanding and in-depth application of them. Some of them are-

- Hard Skills-
  - Designing a web page, from creating to designing(HTML, CSS, JavaScript)
  - OEE
  - Various templates and features to make site users interactive.
- Soft Skills-
  - Public speaking and elocutions.
  - Planning and exchanging ideas.
  - Knowledge of modern affairs.
  - Empathy and Group communication.
  - Communicating with superiors.

Name: DEEPANSHU MISHRA .(2020A7PS0255H)

Student Write-up:

PS-I Project Title: OEE Software Development

Short Summary of work done: On the first day of the PS we were assigned a Web Dev project. We had to create a Web App which takes the input from the hardware machines and calculate their Overall Equipment Effectiveness(OEE). We had to keep track of the OEE values in order to keep an eye on the efficiency of the machine over a period of time. We had to do web dev using Django framework as backend, HTML,CSS & JS as Frontend and MongoDB as our Database.

PS-I experience: So we were assigned the project on the first day of the PS-I, We had to create the application in the span of 8 weeks. There were no hard deadlines for the project review. So all of us were working according to our own pace. The mentor was super helping and got learn about the Python Web Dev from the project. The Overall PS-I experience was very nice and chill.

Learning Outcome: Web Development using python

Name: ABHIRATH N B .(2020A7PS0260H)

Student Write-up:

PS-I Project Title: OEE software development

Short Summary of work done: We had to create a web application capable of calculating the overall equipment effectiveness (OEE) and storing it in a database. The technologies used for the front-end are HTML5, CSS3, and JavaScript. The languages used for the back-end are Django and Python.
The database used was MongoDB. The team's goal was to create software capable of doing the same. We split ourselves into three sections to work on the three (3). I was allotted the back-end of the project, along with two others. All of us worked together with the help of GitHub.

PS-I experience: I was allotted the back-end of the project, along with two others. All of us worked together with the help of GitHub. Due to a previous project I did, I was able to work on the project efficiently and was able to contribute more. With our group's help, we could complete and submit the project on time. We optimized our front-end for more clarity and a user-friendly UI. The mentors were helpful, and we could create our project quickly due to their guidance. Our PS faculty was also really early with our submissions, enabling us to manage our time efficiently.

Learning Outcome: I learned how a firm works in real life, which was the main motive of this internship. I learned about a new concept that I had never known about before, which is OEE. I was also able to improve my speed and manage time more efficiently. I also improved my decisiveness, which will come a long way in my life. I learned a lot about GitHub and its work, which will aid me in the future.

Name: SUBRAMANIAN V .(2020A7PS1371G)

Student Write-up:

PS-I Project Title: OEE Software Development

Short Summary of work done: All the students in the PS in my station had to build a web application which calculates and displays the OEE(Overall Equipment Effectiveness Score) to the user based on the inputs given from the production line. We have split into three groups the frontend, backend and database. I was a part of the frontend group. Here, I worked with the frontend of the project, where I built what the user sees and interacts with using HTML, CSS and JavaScript.

PS-I experience: The PS is my first internship and I'm glad I got some real time work experience. It was a pleasant experience.

Learning Outcome: Got to brush my frontend web development skills. (HTML, CSS and JavaScript). Learnt what. OEE is and how significant it is in equipment design. Referred to the Python and Django documentation. Learnt writing professional reports and diary keeping. Worked on a full-fledged project. Learnt to work in teams.

Name: RAHUL GANESH .(2020A7PS1685P)

Student Write-up:

PS-I Project Title: OEE Software development

Short Summary of work done: Developing an interactive web-application that allows users to calculate, store and analyze OEE of machines and production lines

PS-I experience: It was simple, not so hectic. The project was not so hard, the concept of OEE was new and after we learned it was pretty straightforward.

Learning Outcome: Teamwork, dealing with industry-like work experience, schedules and deadlines

---

Name: RISHIRAJ DATTA .(2020A7PS2075H)

Student Write-up:

PS-I Project Title: OEE software development

Short Summary of work done: Overall Equipment Effectiveness(OEE) is a standard measure of performance to indicate the utilization of machines. However, calculating OEE is time-consuming, and data must be entered into the sheet regularly, demanding the operator's time. So we were asked to make a user-friendly web application which would take necessary information about the machine from the user and display its OEE score with remarks on the factory's steps to improve the OEE score. We used HTML and CSS for the front-end, Django for our back-end and Mongo DB for the database.

PS-I experience: My PS-I experience was excellent. It was very professional and felt like being part of a critical project. We were under the supervision of our PS faculty in charge and the mentor from the PS station; as a result, we were a bit under pressure, but on the brighter side, we completed the project on time and learned many new skills.

Learning Outcome: I worked at the back-end of the web application; as a result, I had to brush up my python skills. I learnt a new framework Django. I also had some work in database and front-end. So, I had to revise HTML and CSS and learn Mongo DB from scratch. Apart from the technical skills, I also learned many soft skills. I learnt how to work as a team. My communication skills improved. I learned to maintain a weekly report and diary and learned how to write a project report.

PS-I station: Military College of Electronics and Mechanical Engineering , Secunderabad

Faculty Name: Mithun Mondal

Faculty Write-up

Military College of Electronics and Mechanical Engineering was established with three faculties: Faculty of Electrical and Mechanical Engineering (FEME), Faculty of Electronics (FEL), and Faculty of Industrial Engineering and Logistics Management (FILM) to meet the need for proper resource management to meet the needs of the field army in both peace and war. The institute is credited with introducing modern management techniques to the Indian Army.

The industry looks for knowledge of Artificial intelligence, IOT, sensor technology, knowledge of programming softwares, such as MATLAB, C++, Python, etc.

Student

Name: AAYUSH ATUL HEDAOO .(2020A3PS0547H)

Student Write-up:

PS-I Project Title: Automatic attendance monitoring by using car/bike number plate detection at entry gate.

Short Summary of work done: This project makes use of pyTesseract OCR and openCV libraries of Python.
Raspberry Pi controls the camera modules present and entry gates.
A database contains details of registered vehicles.
Workflow-
Raspberry Pi controlled camera captures image
Image Processing
OCR converts image to text and numbers
Maintaining database accordingly

PS-I experience: Our project was to design an ANPR (Automatic Number Plate Recognition) system using Python, which includes the OpenCV and Pytesseract libraries. A database is also developed to keep a record of attendance details. Learned basics of Raspberry Pi.
Good experience of group work, learning presentation and report making skills. Worked under guidance of highly qualified military officials of MCEME.
Overall had a good experience working with MCEME as an intern.

Learning Outcome: Learnt Python, OpenCV, Tesseract OCR, presentation skills, report making

---

Name: KHUSHI P S .(2020A3PS1089G)

Student Write-up:

PS-I Project Title: WLAN(802.11) simulation using gnu radio

Short Summary of work done: Objective:
WLAN (IEEE 802.11)
transmitter & receiver
simulation using GNU
radio/ MATLAB
1. Study of WLAN tx and rx tech: Source coding, modulation, error correction tech.
2. Realization of each block using simulation software.
3. Transmission of video & image, analysis of waveforms.

PS-I experience: It was a good one

Learning Outcome: Learnt some stuff about communication systems

---

Name: SUHANI MAHAJAN .(2020A3PS1798H)

Student Write-up:

PS-I Project Title: Automatic attendance monitoring by using car/bike number plate detection at entry gate

Short Summary of work done: The goal was to create a CV-based algorithm to recognize automobile license plates from a real-time video feed and maintain a database with employee and vehicle information to track when vehicles enter and exit the main gate. Also, note the unauthorized entries.

PS-I experience: The faculty in charge and mentors from the station were supportive throughout the duration. I regularly interacted with mentors, who provided valuable suggestions on the subject matter and project implementation.

Learning Outcome: I learned about the Automatic License Plate Detection Method using Optical Character Recognition and image processing.

Name: GAURAV SINGH .(2020A3PS2133H)

Student Write-up:

PS-I Project Title: Object tracking in real-time for an Operator defined Region of Interest(RoI) using OpenCV and Python

Short Summary of work done: We first worked on understanding the essential differences between Object Detection and Object Tracking, and how we can say that Detection always precedes Tracking. Then we conducted a thorough literature review of object tracking algorithms on OpenCV, such as MedianFlow. CSRT, MIL, KCF. We also then deployed these algorithms on the OpenCV platform and implemented a common video for all 4, to clearly understand the differences between them. Then, we researched the AI-based Yolo v4 detection algorithm in DeepSort that used pre-trained datasets and classes that ran within tracking algorithms with the help of TensorFlow in real-time, conducting a literature review of the same. Finally, we deployed this on Google Collab, which has a free GPU environment, and got our required results.

PS-I experience: Even with the online mode of operations, our PS faculty in-charge made sure that all the necessary communication regarding the evaluations and other commitments were streamlined via Google Classroom. We also received suitable projects for the same, and the Project Mentor was responsive to our queries.

Learning Outcome: Having been completely new to Python, this PS-1 enabled me to work on OpenCV and Python and learned how these tools together can be used on different images and videos. The research on the different tracking algorithms also taught me the finite differences in the purposes that each of these serves. Also gained an initial insight on pre-trained AI-models that can be directly deployed on CPU.

Name: REDDY REDDY HEMANTH REDDY(2020A4PS0905H)

Student Write-up:

PS-I Project Title: CV Based Drone Detection by using COTS Algorithms

Short Summary of work done: We worked on the project 'CV-based Drone Detection by using COTS algorithms.' To start with, we comprehensively studied the CNN architecture from various research papers and online sources. Next, we identified the deep learning algorithms currently available for object detection. We understood how algorithms like Faster R-CNN, Mask R-CNN, SSD, and YOLO work. Next, we prepared a dataset of around 800 drone + bird images and annotated them. Finally, we trained the YOLOv5 algorithm on our dataset on Google Colab at 60 epochs. We achieved an overall mean average precision (mAP) of 0.872 on this dataset.

PS-I experience: The overall PS1 experience was enjoyable. Our faculty in charge and project mentor at MCEME guided us throughout the project. They constantly gave feedback on our work and suggestions to improve our project further.

Learning Outcome: I got acquainted with computer vision and deep learning concepts and learned how convolutional neural networks work. I also learned how to train a neural network using machine learning frameworks like PyTorch.

Name: PATEL ROHIT HITESH(2020A4PS1990G)

Student Write-up:

PS-I Project Title: Position Control of a DC Motor

Short Summary of work done: The work done was studying and selecting a controller methodology which could be best for the system provided. Also a PRBS input signal was to be produced using MATLAB which could test of any anomalies in the system by showing it in the output signal. Lastly a position control along with direction was to be done using MATLAB and Simulink so that the program made could operate the DC Motor using Arduino.

PS-I experience: The experience was very good. The PS instructors of the college were quite helpful and helped with the project whenever needed. Got to learn a lot of new things. All in all was a wonderful experience.

Learning Outcome: Being a Mechanical student, the learning was quite new. Various aspects of core electronics and electrical such as Arduino, programming on MATLAB and Simulink, various controller methodologies were learnt and subsequently implemented.

Name: AMOGH PATWARDHAN .(2020A8PS0331G)

Student Write-up:

PS-I Project Title: Use of USB Webcam for accurate Range Estimation of Object of unknown dimensions,in the view frame

Short Summary of work done: We had to work on a methodology for range estimation of objects using webcam.OpenCV was used to develop the model. Distance of objects of known dimensions was calculated where as a method was given by us to calculate the distance of objects of unknown dimensions.Velocity of approach of objects was also formulated.

PS-I experience: It was a good experience and the mentors at MCEME are very helpful and supportive.We were a team of 3 students in a group.There were 9 such groups in the station.

Learning Outcome: Learned Python programming and use of OpenCV

Name: ANURAG MISHRA .(2020A8PS0535P)

Student Write-up:

PS-I Project Title: Simulation of AI-based health monitoring system using QPSK communication protocol on MATLAB

Short Summary of work done: The main objective of our project was simulate. We were asked to simulate a QPSK communication model on MATLAB. We had to go through various MATLAB directories and had to come up with a code that could modulate and demodulate a signal sent over a channel. apart from this we were also asked to study about various sensors used in health monitoring.

PS-I experience: The PS experience I had was very good. Our team had regular sessions regarding the project on hand. Our PS faculty and the mentor were very helpful. They provided us with advice and assistance whenever we needed. This project has helped me understand how to work in a team.

Learning Outcome: I was able to learn about the working of sensors and the components used in a communication model. Apart from this I also learnt about various MATLAB library which help in simulating a communication protocol.

Name: PRITISH SURESH DAKHOLE .(2020A8PS0804P)

Student Write-up:

PS-I Project Title: WLAN (IEEE 802.11) Transmitter and Receiver Implementation using GNU radio

Short Summary of work done: We had to research and study about implementation of communication protocols and their simulation using GNU Radio companion. After running the simulations, we also had to test out the programs in the lab. Briefly, we studied about Software Defined Radios, experimented with GNU Radio and read a lot of research papers online regarding this. We were able to implement some programs and sent them to lab for actual transmission since this was in online mode. MATLAB was also used to understand some of the concepts.

PS-I experience: The PS faculty assigned to us was helpful. Our industry mentor was also fine. Researching about the topic was difficult due to the lack of resources and online situation also posed some problems. But overall, I was able to learn a lot of things.

Learning Outcome: Tech stacks we learnt include GNU Radio and MATLAB. We were able to learn about communication systems and Software Defined Radios. I was also able to improve some of the soft skills like communication skills and report writing.

Name: L SHIVA RUDRA .(2020A8PS1246H)

Student Write-up:

PS-I Project Title: CV based drone detection using COTS algorithm.

Short Summary of work done: Our work involved the following:
1)To compare the existing solutions and which one is best fit for which scenario.
2)To identify challenges involved in drone detection in case of partially visible or blurry images.
3)From the available study and comparison, to suggest solution that is a best trade off between false alarm and miss, for various ranges and sizes of drones.

PS-I experience: It was good. The faculty mentor helped us a lot. The PS mentors guided us through our project. I am thankful for them for making it easy even though it is in online mode.

Learning Outcome: I learnt about various drone detection algorithms and various softwares related to machine learning.

Name: ANISH DEVNOOR .(2020A8PS1344H)

Student Write-up:

PS-I Project Title: Real Time Object Tracking with OpenCV and Python using an operator defined region of interest

Short Summary of work done: We are able to track any object in a video in an operator defined region of interest using the opencv library and python.

PS-I experience: The experience was great. I learnt a new programming language and multiple skills. The teachers were prompt with their replies and always solved every query, whether big or small.

Learning Outcome: I learnt a new programming language, I also learnt a lot about the sensing technology in the army.

Name: TARUN RAJKUMAR .(2020A8PS1447H)

Student Write-up:

PS-I Project Title: CV based drone detection using COTS algorithm

Short Summary of work done: It was to study various deep learning algorithms and determine the most efficient one by comparing their performance metrics. Then we needed to develop a drone detection model using deep learning and we used the Yolov5 algorithm for that. Our objective was to train a computer model to detect drones in different background conditions and differentiate it from similar looking objects like birds. We prepared a drone dataset and trained the model using google colab.

PS-I experience: The PS mentor was helpful in guiding us to use the right tools for our project. It was initially challenging because the concepts were new but I managed to understand them with the guidance of the mentor.

Learning Outcome: I learnt some basics about deep learning and object detection. I also learnt how to work in a team. Apart from that I learnt how to use tools like google colab for deep learning purposes.

Name: PRATIK MOHAN .(2020A8PS1801P)

Student Write-up:

PS-I Project Title: Ip and Mac spoofing detection in intranet environment

Short Summary of work done: My work involved studying and review various reasearch papers and articles on spoofing detection algorithms. Then we had to write a suitable python code to perform detection. It was done more as a proof of concept rather than an actual solution for the mceme.

PS-I experience: My ps experience was great. The faculty in charge was helpful and understanding. The researchers from mceme were also great. They solved our doubt and guided us properly thorough out the course duration.

Learning Outcome: I learned computer networking, packet manipulation, python programming for networks and various algorithms.

Name: RAHUL VARSHNEY .(2020AAPS1756H)

Student Write-up:

PS-I Project Title: Design of SDR based HD video communication

Short Summary of work done: The project's objective was to design a transceiver for secure and high data rate transmission of HD video through software-defined radio (SDR) using GNU RADIO Companion software. We took live video through a webcam and compressed it using AVC/H.264 video compression tech using the Gstreamer tool and designed and implemented GMSK modulated video transceiver on GNU RADIO Companion. As part of the learning process, we took courses online on wireless communications, software-defined radios, digital image and video processing. I got to implement it all on GNU RADIO Companion at varying scales using python coded toolbox, Gstreamer tool, and Compression codecs as a part of the project or the learning process.

PS-I experience: It was very educational and gave deep insight into different fronts of the
world of communications, various problems faced and how they are being tackled.I got hands on experience of how work is done in the industry and how they value practical implementations much more than the theoretical aspects of the project.

Learning Outcome: I learned digital communications fundamentals, studied wireless communications, and studied how SDR hardware works. I also studied image and video compression, focusing on AVC/H.264. Used a new software GNU RADIO Companion and various tools.

Name: KOTA VENKATA BHARGHAV .(2020B2A82088G)

Student Write-up:

PS-I Project Title: computer vision based drone detection using COTS algorithms

Short Summary of work done: the project allotted to me was 'computer vision based drone detection using COTS algorithms'. There are many solutions available for drone detection. solutions are fit or have imitation regarding the detection depending on size, range, background, single or multiple drone, etc. We were expected to compare the existing solutions and which one is the best fir for each scenario. Also we tried Identifying challenges involved in drone detection in case of partially visible or blurry images. From the available study and comparison, we suggested the solution that is best trade off between false alarm and miss for various ranges and sizes of drones.

PS-I experience: The practice school-1 experience was quite smooth because of the allotted faculty and project guides. The practice school faculty gave regular updates in google classroom and held evaluative components on time. The project guides weren't very responsive during the initial stages of the internship but the project took on a good pace after the midsem presentation. The MCEME dean was also very friendly and gave us good motivation to contribute to the defense sector of our country. Overall the internship was fulfilling and challenged very modern problems.

Learning Outcome: I learnt how to use python notebooks in google colab and also studied various deep learning object detection algorithms like YOLOv5, R-CNN etc. I also compared various algorithm speeds after varying various parameters and tried to find which one would be best for what situations.

Name: ANSH MAHAPATRA .(2020B5A30945P)

Student Write-up:

PS-I Project Title: Use of USB camera for range estimation of objects of known and unknown dimesnion

Short Summary of work done: We were expected to develop an understanding about various monovision range estimation techniques and implement the ideal case. We were then expected to find a mathematical model to calculate the velocity of approach of an object towards the camera and find a method to implement it for both, objects of known and unknown dimension.

PS-I experience: The guide at the station held regular meets to brief us about the intricacies associated with our topic and helped us better understand the methodology.

The PS instructor was also punctual is carrying out all the evaluatives and constantly pushed us to do our best.

Learning Outcome: Fluency in coding in Python, Using libraries such as OpenCV and Haarcascade to implement the model, develop a mathematical edge in problem solving

---

PS-I station: Pacify Medical Technology Pvt. Ltd - Mechatronics , Mumbai

Faculty Name: Joyjit Mukherjee

Faculty Write-up
Pacify Technologies Pvt. Ltd.: This station works on the development of a Skin Spray Gun that can be used on skin injuries like laceration and burns to significantly reduce the healing and hospitalization time. The projects involved various design aspects of the Skin Spray Gun in Mechanical, Electronics, Instrumentation, etc. as well as web design, data collection and marketing.

Industry looking for in a -I intern

The technical industry look for some specific basic knowhow from the students in terms of the courses they study that are kind of pre-requisite for the projects they might execute. Like the Cement sector is looking for knowledge in Machines and Power system from an EEE student and Instrumentation and DCS from an ENI student. Projects allotted by Pacify Technologies required varying skills like mechanical design, web design, etc. in the students.

Student

Name: MMN PRATHEEK .(2020A8PS0803H)

Student Write-up:

PS-I Project Title: Innovation of Novel Skin Spray Gun

Short Summary of work done: My project was to develop an electronic air pressure control system for the skin spray gun. The existing pressure control system was a mechanical one known as a pressure regulator. First i learned about how the pressure

regulator worked and it's operating principles and all the components and stuff. The second was spent on trying to develop an electronic alternative.

PS-I experience: The overall experience was really great. The mentors were really helpful and friendly. It was a great learning experience

Learning Outcome: I got to understand some of how the subject is applied in industry. Like the real life application of the subject taught to us was really interesting and knowledgeable. The industry experience I gained is also very valuable and gave me a good picture of how to decide my future career

---

Name: NIKITA TAWANI .(2020A8PS1803P)

Student Write-up:

PS-I Project Title: Proximity sensing system without using a microcontroller (proximity sensing distance is 10-20cm)

Short Summary of work done: Around 10 lakh people every year suffer from moderate or severe burns and spend 1-3 months in hospitalization and it adds to a lot of expense and majority of these patients are from rural areas who cannot afford an expensive treatment.
Pacify Medical Technology introduced a Skin Spray Gun which is the best solution to all these problems.
There is a certain distance at which the skin spray gun has to be kept in order for the process to be efficient and to provide safety to the skin of patient's skin. This distance is about 10-20cm from the patient's skin.
For this we need a sensor to detect the distance from the patient's skin. The skin gun has to be kept in hand and therefore there has to be a continuous measurement of the distance so that the doctor's know when it is the right time to start the process.
I searched about various sensors and came to a conclusion that laser sensors would be the best fit for this process. Then I did a research on the bandwidth of light which will be appropriate. Then I studied about the circuit of a laser sensor.

PS-I experience: It was a great learning exposure and I understood that how much of technical work is involved in medical as well as well its importance.

Learning Outcome: I learnt about various types of sensors, how to select appropriate lasers keeping in mind the technological as well as medical aspects and also about their circuit.

Name: ANIKA CHHABRA(2020B1A31231P)

Student Write-up:

PS-I Project Title: Safety and Biology

Short Summary of work done: I worked on product development. My project was to find a fluid with a high viscosity that can be used with the skin spray gun. Additionally, I also did some research on Competitor devices.

PS-I experience: My experience at Pacify was amazing. It gave me good exposure to the biomedical industry.

Learning Outcome: I learned a lot about product development and the biomedical industry.

Name: AFFAN NADEEM QAZI .(2020B1A41918G)

Student Write-up:

PS-I Project Title: Use of AI in assessment of viability of wound bed

Short Summary of work done: Our team was assigned to work on the topic of assessment of the viability of wound bed using image detection. We worked on image detection using OpenCV and worked to classify the wound bed as compatible or not for the grafting procedures using these techniques

PS-I experience: The PS1 experience was great and our mentors were very helpful and it was a great learning experience.

Learning Outcome: I got to explore various areas of regenerative biology with which I was unfamiliar. I also learned data analysis libraries of python like NumPy, Pandas, Seaborn, and Matplotlib. I also got introduced to OpenCV and learned a lot in that regard too.

Name: DHRUV KHURANA .(2020B3A30760P)

Student Write-up:

PS-I Project Title: USE OF AI IN THE ASSESSMENT OF WOUND BED COMPATIBILITY

Short Summary of work done: The first 2 weeks we started revising our Python knowledge and started learning OpenCV. Then for the next few weeks we split our work and I started researching various research papers which had already been published in this field. These papers gave us an idea about how to start building models for image recognition of wounds/injuries. We concluded our time in PS1 by finding and writing some code which could do object recognition.

PS-I experience: The faculty in-charge and the Pacify coordinators both were extremely friendly and were willing to help at any stage of the process. There were no strict deadlines and we could complete the work at our own pace. Overall the experience at Pacify was great.

Learning Outcome: Apart from the technical side I learnt how to work and coordinate with my peers.

Name: ADITYA AGRAWAL .(2020B5A42010P)

Student Write-up:

PS-I Project Title: Assessment of wound bed viability using AI

Short Summary of work done: Pacify Medical's main product was a skin spray gun meant to be used in skin grafting. Our project was to code an Image Classifier using image processing libraries in python like OpenCV, Keras etc. We researched on image processing and the available technologies that are currently in use. We also built up our knowledge of Python coding and OpenCV using youtube, geeksforgeeks and other websites. After building a simple Object Detection model, we researched on Classification and Automation to improve the functionality on our project.

PS-I experience: It was my first corporate internship and I learnt a lot about the importance of discipline in the workplace. Our mentors were helpful and provided ample resources as and when we needed them. It was overall a good learning experience.

Learning Outcome: I got well versed in Python and OpenCV through my project, also working on a document scanner as a mini project at the same time. This helped me to grasp the concepts used in the language and the library. Apart from that, I went through several research papers to see other image classifiers and their efficiencies. I learnt a lot about Neural Networks (CNN in particular) as well to be used in the classification part.

PS-I station: PNT ROBOTICS & AUTOMATION SOLUTIONS , Dombivli / Kharghar

Student

Name: PARTH SETHIA .(2020A3PS0341P)

Student Write-up:

PS-I Project Title: Fabric Pattern Classification and Automated Labelling Projects

Short Summary of work done: Wrote various scripts for the Company for data augmentation to create greater number of samples for training.

PS-I experience: It was a good experience and exposure in an industry.

Learning Outcome: Learned about the various techniques used for training of models for image recognition. Also, have enhanced team spirit, time management skills and communication skills. Apart from that documentation techniques also improved.

Name: RAAGHAV DUBEY .(2020A4PS2017H)

Student Write-up:

PS-I Project Title: design of a automated scrubber, design of a scara robotic ar,m

Short Summary of work done: made designs for both of my projects in fusion 360 and creo parametric and included hardware components such as stepper motors and lead screws into the design.

PS-I experience: got to interact with the people from the company and got to discuss ideas and designs with them. Our industry mentor was very helping and helped us a lot in our projects.

Learning Outcome: got to refine my skills in CAD software.

Name: SAYANTAN PATRA .(2020A4PS2297H)

Student Write-up:

PS-I Project Title: Mechanical design of a robotic arm

Short Summary of work done: A CAD model of a 4 DOF robotic arm is done using SOLIDWORKS and it has certain functions that it can fill spaces in a A4 cloth with some given liquid.

PS-I experience: It was quite interesting and for me it was really useful.

Learning Outcome: I got a overview of CAD that is quite important for a mechanical engineer. Moreover I got a industrial overview and practical experience of our mechanical CDC Mechaniams and Machines.

Name: SAYANTAN PATRA .(2020A4PS2297H)

Student Write-up:

PS-I Project Title: Mechanical design of a robotic arm

Short Summary of work done: A CAD model of a robotic arm was designed using Solid Works. Also servomotor and bearings were attached in the robotic arm. The working pattern of the robotic arm was like it can fill spaces on a A4 size with a liquid.

PS-I experience: It was quite interesting and I learned industry based knowledge from this

Learning Outcome: I Checked my efficiency to design a CAD model which is vey important for a mechanical engineering student. Even I was able to test my theory based knowledge and convert it into practical knowledge that was learned in the mechanical CDC Mechanisms and Machines.

Name: SHREYA KHUBBER .(2020A8PS1807P)

Student Write-up:

PS-I Project Title: Business Development - Client and Investment decks

Short Summary of work done: My work involved making brochure for the various robots at PNT Robotics. Additionally I was also assigned work related to investor and pitch decks for the company.

PS-I experience: It was a good learning experience. The mentors were really nice and supportive.

Learning Outcome: I learnt how to design in Figma, enhanced by business thinking skills and also got a chance to learn how pitch decks are made.

Name: BHARAT KASHYAP KARRI .(2020AAPS0319H)

Student Write-up:

PS-I Project Title: Fabric Pattern Recognition

Short Summary of work done: Computer vision task as object detection. Multiple methods were implemented: Tensorflow application, YOLOv5 implementation. YOLO architecture was introduced by the mentor. Following that augmentation and methods to increase the dataset using small number of input data was implemented. OpenCV was also used in some parts for augmentation.

PS-I experience: The mentor was very friendly and clear. Work given was clear and there was regular communication between us.

Learning Outcome: YOLOv5 as an object detection algorithm, Augmentations using the albumentations package, OpenCV

Name: SAMKIT JAIN .(2020ABPS1853P)

Student Write-up:

PS-I Project Title: Designing of different robotic arms

Short Summary of work done: For the design group, we had 2 projects to choose from in the beginning. I took designing of a liquid dropping mechanism in which I designed a CAD model of a mechanism that could reach any point on a A4 sized sheet and switch liquids. The other project after the completion of the first one was a SCARA robot, we had to modify it and come up with a modification that would make it more efficient.

PS-I experience: The overall experience was good, mentors were quite supportive and quite active for this particular PS station, we had meets almost 3 times every week for updates.

Learning Outcome: Learnt about different robotic mechanism, industrial robots, comparing stepper and servo motors. Got to know about the possible problems in implementation even of a simple design

---

Name: HEMANT KUMAR .(2020B2AB1618P)

Student Write-up:

PS-I Project Title: ROS SLAM Navigation of ADO Robot

Short Summary of work done: The project aims to develop the ROS architecture for ADO and simulate it in
the gazebo and Rviz environment. The simulations are then used to develop ADO's navigation stack and implement path planning and Simultaneous localization and mapping techniques for ADO to achieve autonomous navigation in crowded commercial regions.
It also involves developing movement algorithms for ADO arms to allow them to pick and place objects. Gazebo and Rviz simulation allows us to test and debug the results of these algorithms in a virtual environment with real-world physics.

PS-I experience: I am a full-time student at the Birla Institute of technology and science. This was the first time that I was working and studying simultaneously at the same time. Though it is challenging, I strived to achieve the overall efficiency of managing workload and performing better under pressure and deadline constraints. This would definitely help me go a long way in my future endeavors.

Learning Outcome: At this Internship, I would be exposed to different curriculums such as Robotics, Computer vision, etc. This would allow me actually to explore the specialized field that interests me the most. By working closely with professionals and interacting with them daily
allowed me to work on my interpersonal and communication skills, I was able to enhance my interpersonal skills in a professional environment.

Name: ANISH KUMAR MISHRA .(2020B5AA0690H)

Student Write-up:

PS-I Project Title: Fabric Patterns Classification

Short Summary of work done: I worked on an Ai powered web app which identifies and classifies objects based on what it is (pillow, table cloth, etc.) and tags them according to their themes(like christmas themed pillow) and shows similar products to the customer.

PS-I experience: The PS was in online mode, so there was no login or logout time, the environment was good and the industry mentor was very helpful and approachable.

Learning Outcome: image classifications, object detection

Name: VALLURI AKHILESH KAUSHIK .(2020B5AA0960H)

Student Write-up:

PS-I Project Title: VOICE-BASED, TOUCHLESS, INTERACTIVE KIOSK FOR ADO

Short Summary of work done: Used multiple Google Cloud Platform services to be able to:
1) Listen to user (Using multiple low level libraries in Python)
2) Respond to wake-word when called (using Porcupine SDK from Picovoice)
3) Convert from speech to text (Using google speech to text)
4) Translate text into required language (Using google Translate)
5) Understand intent using Google Dialogflow
My work mainly consisted of improving the current model and migrating the codebase to the recent versions. Most libraries had migrated since the last codebase commit to more recent versions which introduced breaking changes.
I also needed to create and train wake words so that the robot responds as soon as its name is called.
To do all this I first needed to learn and understand how the libraries worked, and then spent time making simple personal projects using those libraries to get a hang of them.

I then needed to be able to use these services on the google cloud platform. For this I needed to understand and experiment with cloud computing and the basics of how to operate Google Cloud Platform.
I then proceeded to take over a company GCP account, add all the required services and enable billing after which I was able to make requests to the GCP API. This bought the application to a working state.
I then proceeded to learn about DialogFlow CX which is the community enterprise version of DialogFlow to be able to later integrate into the project.

PS-I experience: I learnt a lot of new topics and understood how code is maintained in large projects with minimal effort. The PS instructors were very prompt and very ready to understand our problems and help us out wherever needed. The instructors gave precise requirements for projects and guided us through the process if we were stuck. I enjoyed working at PNT.

Learning Outcome: The major aim of the project was to be able to use Google Cloud Platform and it's services among other Software Development Kits in a development environment to be able to make an application which performs requests on voice and text data. I learnt how to use cloud computing services and integrating software which performs extremely different types of tasks to make a readable, maintainable application. I also learnt about denoising techniques and NLP just to be able to understand the services better.

PS-I station: Prama Instruments Private Limited (onsite) , Mumbai

Student

Name: MIZAAN KANADIA .(2020A3PS1784P)

Student Write-up:

PS-I Project Title: Occupancy Sensor/Single Axis Solar Tracker

Short Summary of work done: We were assigned two projects, building an occupancy sensor which would toggle power supply to any given space and designing a single axis solar tracker to obtain maximum sunlight. I primarily worked on the former.
To meet the requirements, we implemented a TensorFlow Lite object detection model on a Raspberry Pi 4 to detect humans/pets through the camera after having tried different

methods such as using the Panasonic GridEYE sensor to extract thermal data with operation on Raspberry Pi Pico.

PS-I experience: Having never worked with electronics hands on before, it was a very new experience for me. I got to work with real practical complex electronic components such as the Raspberry Pi board. Most of what we did, we had to figure out on our own through googling so there was a lot of improvisation hence overall, we learnt a lot about the specific components we were working with and the general practices in the electronics industry. We had to integrate a lot of technologies to achieve the end result which was an enriching experience

Learning Outcome: I learnt quite a bit about the practical aspects of various electric components and the standard industry practices in dealing with new components. I gained insight on the working of the Raspberry Pi 4 and the AMG8833-GridEYE sensor. I also learnt about TensorFlow Lite, a different implementation of the heavy software and programming in MicroPython and Arduino IDE

Name: MIZAAN KANADIA .(2020A3PS1784P)

Student Write-up:

PS-I Project Title: Occupancy Sensor

Short Summary of work done: We worked on two projects: An occupancy sensor which detects stationary lifeforms also and a Single Axis Solar Tracker

PS-I experience: All the time spent onsite gave us a taste of what a career in core electronics would be like. We were familiarized with the standard industry practices and learnt about the practical aspects of the concepts we study about in the electronics coursework. There was a lot we had to figure out for ourselves and the experience of working with a team to create the final products for our projects was enriching in itself

Learning Outcome: Having never worked with electronic components practically, the learning curve was steep for me. I learnt about interfacing Raspbian systems and using Arduino IDE as well as MicroPython for programming. Along with interfacing, I learnt how to operate machine learning models on Raspberry models and I had the experience of working with the relatively new TensorFlow Lite framework catered for such tasks

---

Name: DASMOHAPATRA AKANKSHA BIPIN .(2020A8PS1777G)

Student Write-up:

PS-I Project Title: Occupancy Sensor and Single Axis Solar Tracker

Short Summary of work done: Used ML to build a Raspberry Pi 4 based Occupancy Sencor using an HQ Camera. Made 3 different kinds of Single Axis Solar Tracker based on Raspberry Pi Pico, Arduino Nano, and an ESP module.

PS-I experience: The staff at Prama was really welcoming and helpful. They helped us with whatever they could. We got to learn a lot not only on the technical side of things, but also soft skills like communication, teamwork, etc.

Learning Outcome: I learnt a lot of new technicall skills like TensorFlow Lite, MicroPython, etc. At the same time, I also got to apply whatever I had learned in my course curriculum.

Name: SAKSHAM SUBHASH YADAV .(2020A8PS2156H)

Student Write-up:

PS-I Project Title: Solar Tracker

Short Summary of work done: Projects:
Firstly, we were given a circuit schematic and asked to design a soft switch.
Then, We worked on making three different prototypes for the commercial Solar Tracker.
1. Single-Axis Tracker Using Photoresistors
2. Using EEPROM to store Solar data and use it later(Raspberry Pi Pico Based Product)
3. Using Real-Time Solar Data from Weather Website to use to optimize Tracker (ESP8266 Based Product)
Lastly, We built an Occupancy Sensor for conserving electric energy using a Tensor Flow Lite Object Detection model operated on a Raspberry Pi 4.

PS-I experience: The offline PS was a great learning experience. We got to interact with the ongoing project developments that were going on. We learned how things work in the industry and how we are supposed to go about a project in the industry.
The industry mentors were very helpful and guided us throughout the project.

Learning Outcome: 1. Completed 2 projects
2. Worked on Raspberry Pi Pico
3. Worked on ESP8266
4. Worked on Raspberry Pi
5. Worked on sensors and actuators
6.Worked on TensorFlow Lite

PS-I station: Pyrotech Electronics Pvt. Ltd. , Udaipur

Student

Name: V S M BHARAT KUMAR MAJETI(2020A3PS2137H)

Student Write-up:

PS-I Project Title: Wiring process improvisation

Short Summary of work done: All the products that are manufactured from a factory or an industry are made
with the help machines and power for manufacturing and producing which involves many wiring processes so our ps station pyrotech has decided to work on a project which makes younger minds like us understand various wiring processes under going in the industry and making us an opportunity to give suggestions for improving them by allowing us to work on a project on mcc schemes and their wiring process improvisation.

PS-I experience: It was a good experience to work, in an industry for 2 months I have gained research experince while doing my PS-1 in Pyrotech Electronics station. The experince might have been better if PS had been offline, as that would have helped me more in understanding how industry works.

Learning Outcome: • Acquired knowledge on Motor Control Centre and how it's applications in
industry.

• Learnt different wiring processes useful for manufacturing purposes in the industry
• Gained research experince and industrial exposure
• Learnt professional report writing and diary making
• Gained knowledge on various fields through seminars conducted by Practice school division

---

Name: ASHUTOSH KARANAM .(2020AAPS1441G)

Student Write-up:

PS-I Project Title: Flat Packing of Sheet Metal Panels/Enclosures

Short Summary of work done: The logistics involves the integration of information, transportation, inventory, warehousing, material handling, and packaging, the logistics effect on design factors cannot be disregarded. The flat - pack' concept is based on transportation of large amount of products with a minimum volume to ensure the yield of cost reduction. My project was researching the design efficiency and delicacy of flat pack

PS-I experience: I learnt researching about different topics while taking into conditions both direct and indirect factors, such as why aluminum screws should be used with copper sheet metal, which may be something what might not be taken into consideration at all but is still important in the lifespan of the build

Learning Outcome: Learnt about:
Advantages of flat-packing
How to design an enclosure
Preferred materials for enclosure
Current industry examples from Modutec
How IKEA uses flat packing in furniture
Possible implementations in metal enclosures
Improving sheet metal parts

Name: BHAVI JAIN .(2020B2A82091G)

Student Write-up:

PS-I Project Title: Flat Packing of Sheet Metal Panels/Enclosures

Short Summary of work done: A product's design can influence production, packaging, storing and distribution
and all of these factors can provide lower costs and higher profit margins. The accessibility is constructed through systems of logistics. During the product development process, the reflection of the logistics strategy is a major part which makes the concept unique within the product-logistics-packaging framework. The integration of logistics and the packaging concept in the design process creates this uniqueness. Flat-packing allows faster assembly, flexible modifications, easy storage and greater economy of scale making it cheaper and easier to manufacture, transport and storage.

PS-I experience: During my time till now, working on this project, has taught me various technical
and social skills. I have had the opportunity to interact with and learn from many talented individuals. I was able to leverage their immense industry experience to improve my work. Talking to them on daily basis, taught me how to conduct myself in professional setting which will be really helpful for my career further. This opportunity also helped me learn how to navigate through corporate world to solve day to day issues and work as a team member in such a huge corporation. I was also able to improve my problem-solving skills.

Learning Outcome: During the course of my work here at Pyrotech I learnt many things, from
importance of packaging by studying and reading about different panel enclosures, its efficiency and navigating my way through the corporate world to exceed the expectations from me.

PS-I station: Samsung Semiconductor India Research (SSIR), Bengaluru

Student

Name: PATEL VRAJ TRUSHAR .(2020A7PS0988P)

Student Write-up:

PS-I Project Title: Foundry Software Solutions

Short Summary of work done: Learn in depth about kernel and drivers. Create a module in Rust Orogramming Language.

PS-I experience: Great. Mentor was good got opportunity to grow.

Learning Outcome: Leant about kernel and drivers. Learn a new programming language (Rust). Gained experience on how the industry functions and gained practical industry knowledge.

Name: ISHAAN SRIVASTAVA .(2020A7PS2071H)

Student Write-up:

PS-I Project Title: UFS Product Qualifications

Short Summary of work done: A storage device is any type of computing hardware that is used for storing, porting,
or extracting data files and objects. Storage devices can hold and store information both temporarily and permanently. They may be internal or external to a computer, server, or computing device. Storage devices are one of the core components of any computing device. They store virtually all of the data and applications on a computer, except for hardware firmware which is generally managed through separate read-only memory or ROM.
New solid-state drives and storage devices store data in a way that's different from the traditional platter hard drive.The main motive of the project is to work on newer features and models of the UFS
technology in order to bring better performance using lesser power and lesser human intervention working closely on the automation of the device. Hence the testing of the features on the software domain for better optimization and continuous benchmarking was practiced.

PS-I experience: It was a all round development course. From honing communication skills to technical skills there was lot to learn from.

Learning Outcome: Learnt about storage devices of secondary storage type including SSDs and UFS storage. Moreover learnt how to create real-life test case scenarios for better optimization of the device.

Name: AAYUSH MILAN PAURANA .(2020B3A70803P)

Student Write-up:

PS-I Project Title: Adding ADC IP support on the Exynos4210 SoC IN QEMU Emulator and Porting An Existing Driver to Rust

Short Summary of work done: The first task I had at SSIR was to write the ADC Driver for the Exynos4210 SoC on QEMU in C. The second major task I had was to port the existing ADC Driver for Linux to Rust.

PS-I experience: My allotted mentor at SSIR was supportive and extremely helpful. He continuously asked me for updates every week, and made sure that any doubts I had were cleared as soon as possible. I learnt how to write system drivers and understood many concepts about how the drivers were implemented with the kernel.

Learning Outcome: 1) Learning how to work with deadlines
2) Presentation Skills and Report-Writing Skills enhanced
3) Learnt how to write system drivers, understood and implemented several concepts relating to the same

---

Name: GUNJAN BARUA(2020B4A72237H)

Student Write-up:

PS-I Project Title: Fault Modeling of the NAND C Simulator

Short Summary of work done: Learnt about the architecture and the working of NAND Flash memories, studied papers on the error patterns observed in them. NAND C

simulator is used to model the behavior of the hardware before it is manufactured. I designed and built a Fault Model for the company's simulator, using C programming in Visual Studio 2015. It injects errors into the data stored by the memory cells by keeping track of certain parameters and using them to evaluate the number of errors, modeling the real-time behavior of NAND Flash memory.

PS-I experience: I had an overall nice experience. The mentors were very helpful and patient with my work. They took out the time to explain about the project area in detail. The project was a bit challenging for me but went smoothly. Would have loved if I had got the opportunity to work onsite at the office.

Learning Outcome: Conceptual knowledge in the domain, programming skills, work culture.

Name: SHEJWALKAR ASHWIN HEMANT .(2020A3PS0429G)

Student Write-up:

PS-I Project Title: Methodology for Physical Design flow

Short Summary of work done: The first task given by my mentor was to understand the VLSI process in brief
and understand the different steps and its intricacies. After that he gave me a book named “Digital Integrated Circuits, a perspective” by Jan M. Rabaey to and instructed to go through certain chapters for understanding basic concepts and to familiarise myself with the different terms in the VLSI design process.
The second task involved Physical verification. In this task, I had to execute multiple Engineering Chnage Order (ECO) files to make changes to the physical layout. Some of these
files had operations such as adding inverters & buffers, sizing cells, removing certain gates, etc. While executing these files, there were certain errors which popped up such as cell overlap, misplaced cell etc. These errors had to be removed manually by working in the graphics user interface of IC Compiler 2.
The third task involved correcting Design Rule Check (DRC) errors as well as Layout versus Schematic (LVS) errors present in the physical layout. These involved removing shorts in nets, joining floating connections, aligning the vias which were previously misaligned etc.

PS-I experience: I had a great experience at Samsung Semiconductor India Research. Under SSIR, I recieved a golden opportunity to get hands on experience on working in the industry with talented individuals. I learnt new softwares such as Synopsys and got extensive work on Linux terminal. I also was exposed to the latest ongoing research in the VLSI industry . More importantly, the internship opened up a new field of interest for me and a possible career path which I could persue in the future.

Learning Outcome: I got a hands on experience about working in the industry.
Got to explore the VLSI Design domain.
Got hands on working experience in the Physical Design aspect of the chip manufacturing process.

Name: TANISHQ DOSHI .(2020A3PS0475H)

Student Write-up:

PS-I Project Title: Using UML Activites for SoC Design

Short Summary of work done: I was told firstly to study about UML and Object-Oriented Pragramming basics through the study material provided and youtube playlists. Then I was given blocks and asked to convert them into flowcharts. I was also given some questions. Then with the help of my mentor, we have created a project report on SoC design (System-On-Chip) using UML by using various types of blocks, diagrams and flowcharts. We were also told to make seminars on relevant topics and have group discussions.

PS-I experience: It was a good and fruitful experience. Really learned a lot about company's work ethics and work culture.

Learning Outcome: I learned a new language (UML) and also learned a lot about Object-Oriented Programming. It was a very fruitful and knowledgable experience.

Name: PRATYUSH GUPTA .(2020A3PS1028P)

Student Write-up:

PS-I Project Title: Performance Verification

Short Summary of work done: Internship was divided into 2 parts: Learning and Task implementation.
Task was to design a communication protocol and test its performance.
Done using Verilog

PS-I experience: It was a good experience. Mentor at SSIR was quite helpful.

Learning Outcome: Learnt Verilog and its implementation at synthesis level.

Name: MANIK TAVINDER SINGH ARNEJA .(2020A7PS0119H)

Student Write-up:

PS-I Project Title: Multivariate Time Series Analysis & Anomaly detection

Short Summary of work done: I had to understand Time Series Analysis in detail along with its implementation through Python. The work required a lot of mathematical concepts (precisely Probability theory and Multivariate Statistics) to move along with. I had to study the work done by the team in the Univariate phase and had to extend certain inferences to the multivariate phase.

PS-I experience: It was a good learning experience honestly. I was fortunate to have got good mentors that were actually very interested in making sure this experience was a success for both them and me. Fortunately my company mentor was very patient with me throughout the process.

Learning Outcome: My knowledge in probability, statistics and deep learning grew multifold. Data Analysis as a whole genre of technology was something new to me and I thoroughly enjoyed working on it.

Name: Agrim Rai(2020A7PS0960G)

Student Write-up:

PS-I Project Title: Running benchmarks on GP-GPU-SIM

Short Summary of work done: My work with Samsung includes testing of GPGPU benchmarks comparing it with actual GPU

PS-I experience: I was free with the way I wanted to approach the problem, with the initial direction given by my mentor. The organization was supportive throughout the process.

Learning Outcome: 1.Working on Large Code Base:
2. Exposure GPU architecture
3. Improving my communication skills.

Name: HEMESH GUPTA .(2020A7PS1688P)

Student Write-up:

PS-I Project Title: OneQA test automation

Short Summary of work done: My work was to make a framework in pytest and jmeter for the testing of a SSIR website which was under development. I wrote multiple testcases in python to test the functioning of the website.

PS-I experience: I learned a lot. I get to explore many new things and also how got the exposure of how industry works. I was a good experience.

Learning Outcome: I learned jmeter, pytest, oops in python, and database management.

Name: PARASHAR PRANJAL RAJIV .(2020A7PS1695G)

Student Write-up:

PS-I Project Title: Super Resolution using Deep Learning

Short Summary of work done: During the entire tenure of the PS-1 internship here at Samsung India, I was exposed to the latest developments in the tech world. I was given the task of reading and studying various courses on Super resolution and image processing.
The project was on the overall enhancement of mobile phone photography and the aspects of deep learning used in achieving the same.
It also taught me the fundamentals of Deep Learning and Artificial Intelligence. It was an unique learning experience where all the knowledge gained was by a pragmatic and hands-on facility. An immense amount of work has been done in the field of computer vision and image processing, however, there is a long way to go and very exciting models lie ahead of us.

PS-I experience: It was a great experience. I was introduced to the topic of super resolution imaging. During the tenure of this internship, I was given with immensely great opportunity to learn and implement various Super Resolution. I am interested in the field of Machine learning and Deep Learning, this internship gave me an opportunity to explore the fields of my interest.

Learning Outcome: During the Practice School Internship, I have learned the following technical skills for incorporating the project:

- Python:
  - Practice school gave me an opportunity to delve into the usage of the Python language.
  - I learnt about its various implementations in Machine Learning models. The power and ability of this language exceeds every other language in almost all respects.
- Convolutional Neural Networks (CNN):
  - There was an immense focus on CNN. This is a sub-branch of Deep Learning. A convolutional neural network, or CNN, is a deep learning neural network sketched for processing structured arrays of data such as portrayals.
  - To achieve this purpose, my mentor had suggested me to complete the Stanford CS231n course.
  - Various Algorithms were taught and helped me explore Machine Learning.
- Deep Learning:
  - To work on Super Resolution, adequate knowledge of Deep Learning is a must.
  - The project was extremely important in introducing various methods employed in Deep Learning. The internship also helped in learning about some widely used algorithms like K Means and KNN.
- Image Processing:

○ The internship was a great opportunity to learn and grasp knowledge about the ever-growing field of computer vision and image processing.

Name: PRANAV V C .(2020A8PS1114G)

Student Write-up:

PS-I Project Title: Low-Speed I2C Implementation in Verilog HDL

Short Summary of work done: Learnt about the working mechanism of I2C protocol. Designed and simulated the protocol on verilog using ModelSim.

PS-I experience: Had a great time with my mentor, who was also a BITSian. Throughout my PS-1, I learned a lot about the digital and analog domains. I got a good overview of how design is done in the industry and learnt a lot along the process.

Learning Outcome: Learnt to use different softwares such as ModelSim, VLSI Electric and LTspice. Along with an understanding of verilog HDL. Understood the mechanisim of I2C protocol and its widely used applications.

Name: UTKARSH RASTOGI(2020A8PS1457H)

Student Write-up:

PS-I Project Title: Design an AXI Read Slave

Short Summary of work done: I was in the Memory solutions team at SSIR working in the Design Architecture team. The project that I was working on was titled as- Design an AXI Read Slave. It dealt with the high-level learning of Verilog HDL, ASIC Design flow, Finite State Machines, and knowledge of various protocols like Valid-Ready Protocol along with AXI protocols. My final project/assignment was to design and implement an

AXI Read Slave which could return the values stored in the RAM on various signals such AR Ready, AR Valid, R Ready, R Valid to the Master.

PS-I experience: My experience at SSIR was very nice in the aspect of learning. Though it took more than one week for SSIR to give us our login credentials but my mentor was very supportive and helpful. He cleared all my doubts with utter patience which helped me learn a lot both quantitively and qualitatively as well.

Learning Outcome: I learnt about Verilog HDL, concepts of digital design dealing with Finite State Machines(FSM),implementing various kinds of hardware's, designing a 16 bit RAM .Lastly learnt about protocols which help in communication between various components of the memory such as Valid-Ready Protocol along with AXI protocols.

Name: PATIL ADITYA KIRAN .(2020AAPS0205G)

Student Write-up:

PS-I Project Title: Standard Cell Library Design

Short Summary of work done: I was allotted Foundry division in Samsung semiconductor India Research. I initially started by reading up on VLSI Design Flow and ASIC Design. I learnt about CMOS logic family and worked on gate level implementation in Virtuoso Cadence Software. Simulation of 28nm node gates were carried out for verification and finding parameters like delays. HSPICE was used for simulation and I learnt to interpret and code in HSPICE environment. Basic LINUX programming was also required. Later, I had to learn python scripting using python programming language and NumPy. So in short, the project at Samsung works on designing a basic standard cell library for 28nm chips using Virtuoso Cadence and Spice simulations. The designs are at a transistor level and use CMOS (Complementary Metal Oxide Semiconductor) technology.

PS-I experience: Practice School provided with me a good experience to work hands on field of VLSI Design, and provided me good exposure to challenges in this field as early as in my second year.
The scope of the project was to learn more about Integrated circuits, VLSI design and Application specific Integrated circuits. So far, the internship has taught me a lot in these fields, especially in practical industry applications, which could not be attained in college studies. I gained a hands on experience in working on Cadence, Spice and Verilog in a Linux environment.

Last but not least, I also learnt about and experienced the ethics and practices of a professional working environment, a lesson that I shall carry with me regardless of the field I choose to pursue.

Learning Outcome: My learning outcomes from the internship and Practice school in general are summarized as below:-

- Gained a profound insight into the chip design, VLSI and foundry field in electronics. Reading up on ASIC Design and in general, VLSI Design flow helped link college curriculum with real life practical applications and the problems in them.
- Basic understanding of CMOS VLSI Design technology. Understanding gate level building with transistors and their modelling in terms of widths, bias voltages of body, gate and drain, and transfer characteristics.
- Basic understanding and simulation of CMOS inverter, its sizing and various parameters like tphl, tr, tf, tr 30-70, tf 70-30.
- Basic understanding of combinational 2- input CMOS logic gates like AND, NAND, OR, EXOR, NOR and using them to express Boolean functions. Designing the aforementioned gates in Virtuoso cadence in 28nm technology.
- Familiarizing with standard industry simulator and using it to measure all standard essential parameters. Most importantly verifying the circuits in simulations and creating the CDL, circuit description language, which consists of netlist of the circuit elements (In this case all the MOSFETs interconnected and biased with proper voltages).
- Understanding how different delays work and measuring them in PSpice with attempt to minimize them.
- Learnt python scripting using NumPy, pandas and python programming

---

Name: SIDHAANT SACHIN THAKKER .(2020AAPS1047G)

Student Write-up:

PS-I Project Title: Automating Verification and Analysis of Electronic Simulator Reports To Improve Error Identification and Resolution Time

Short Summary of work done: Identifying, debugging and resolving errors and warnings during simulation is an essential and time-consuming part of hardware development. Any errors that slip through during the simulation and testing phase will materialize in the fabricated product and lead to immense wastage of both material and intellectual resources, as the fabricated chips may have to be entirely discarded and rebuilt. In this project, the team has worked on the creation of a system to automate the process of

identifying and resolving errors, by performing an analysis of the reports generated by the simulator software and using machine learning techniques to group them by cause, malfunction, etc.
With the implementation of the system designers will not have to sift through thousands of lines of error messages, and will easily be able to identify erroneous components and fix them, saving the company time, and by extension money spent on intellectual resources, that is traditionally required to fix them.

PS-I experience: Working at multinational company like Samsung was definitely an enriching experience, and I am extremely grateful to the PS Division for this amazing opportunity. I was able to learn so much about how companies operate and delegate work, and how different teams synchronize their efforts to create a final product. I had the opportunity of working alongside distinguished individuals, who had years of experience in the industry, and was able to learn a lot about life and work in the electronics field. I was not only able to greatly improve my technical knowledge but also my communication skills, and overall I had a really positive experience.

Learning Outcome: I learnt how to work with reports of Cadence and SPICE-based simulations. I substantially improved my grasp of the Python programming and scripting language, as well as its associated libraries such as NumPy, Pandas and SKLearn. I learnt about and implemented a TF-IDF integration for the pipeline in Python from scratch. I was responsible for creating the section of the pipeline that fed into the K-Means clustering module and for this reason, I learnt how it works, and was successfully able to create a working prototype of these techniques.

Name: PATNI TANAY PANKAJ .(2020AAPS1745G)

Student Write-up:

PS-I Project Title: Automating extraction and analysis of simulation reports: Python Scripting

Short Summary of work done: I was responsible for building an automatic script to extract a set of information from log files which are created after a simulation run. This data would be further analyzed for performance monitoring and potentially improvement. The script goes through all the sub directories in the given directory and identifies all the log files. Once the log files are identified the script is supposed to extract all the information which are point of interest. These data is then stored in a csv file format.

PS-I experience: The experience at SSIR was very insightful. I was able to improve both my technical and social skills. The people here are very talented and working under them was a wonderful learning experience. I got to experience working how it is to work in a huge organization and how a large company functions smoothly. Overall I am extremely lucky to be able to work at such an esteem organization like SSIR.

Learning Outcome: I improved my technical and social skills a lot. I was able to strengthen my knowledge in python and was able to grasp the knowledge of scripting completely. I also learnt how to conduct myself in the corporate world. I learnt how to be a part of the team and make my contribution when working for a huge company.

Name: SHREYAS THIMAPPA BINDUMADHAVAN .(2020B3A30837H)

Student Write-up:

PS-I Project Title: Web Development using React

Short Summary of work done: Developed a web application for internal use in SSIR using React library; I had little/no exposure to web development, so my project involved learning basics of web development in HTML, CSS and JS. I then moved onto learning React and and some libraries in React to implement the required design.

PS-I experience: If you are from a CS background/ have tinkered with web development, should be a breeze. If you have little/ no exposure, need to be highly motivated to learn new concepts on your own from the Internet and take up initiative with your mentors.

Learning Outcome: Was a great introduction to web dev with React; sparked interest in learning more about web dev as a career.

Name: AYUSH GUPTA .(2020B3A70838P)

Student Write-up:

PS-I Project Title: UNDERSTANDING THE FLASH STORAGE AND PREPARING DOCUMENTATION OF FLASH RECOVERY ALGORITHMS

Short Summary of work done: I learned about the building and working of flash storage devices. I learned about flash recovery algorithms and how they are integrated into flash storage devices. I prepared the documentation of different flash recovery algorithms that will be used in the upcoming Samsung storage devices. These algorithms were heavily dependent on machine learning algorithms, and so it required me to deeply understand these ML algorithms. I also learned how to prepare python scripts to automate the task of generating cpp files from excel data.

PS-I experience: PS1 helped me to understand the challenges faced during website development. I also got the chance to communicate with different professionals from the company and got a few insights of the corporate culture.

Learning Outcome: I learnt how to be independent, self-reliant and find resources on my
own to ensure that the work assigned by the station was completed. The deadlines helped me try my best and apply whatever I had learnt in the most effective manner.

Name: ALAMURI SIRI CHANDANA .(2020B3A70854H)

Student Write-up:

PS-I Project Title: Feature Management System

Short Summary of work done: Each QB ID have a specific Build Command, Chipset type, Branch and Features . It becomes a herculean task to search manually for QB IDs that have a specific feature. We made a webpage to display information about these ID's in a table.
This webpage that I've developed helps in searching for QB IDs so if there arises a situation where a specific QB ID's feature or branch or chipset type is to be determined this program can take the QB ID as input and then display the Build Command, Chipset type, Branch and Features . This is saving in precious time which otherwise would have been used to manually find information. When a large scale of QB IDs are needed to be examined it not only requires more time but also more people reducing the efficiency.
We used React js a JavaScript library to make this webpage with HTML, CSS and JS.
We use React hooks and props to make this webpage work.

PS-I experience: It was good to see how a real industry works and be a part of its project. But it would be better if it was offline so that we can work in that environment. It was nice to work under samsung's mentors and gain knowledge.

Learning Outcome: I have learnt HTML, CSS, JavaScript, and also React js and made a webpage using all these.

Name: SURAJ VIJAY PHALOD .(2020B3A71959P)

Student Write-up:

PS-I Project Title: Super Resolution and Computer Vision (SoC Development)

Short Summary of work done: I worked on Deep Learning Computer Vision algorithms for a very specific technology called Super Resolution at Samsung. Right from building neural networks from scratch and training the same, we worked on a lot of different technologies and algorithms. This also involved reading up about a lot of different technologies and research papers to understand and appreciate the engineering behind all the systems.
Since a lot of technologies are still at the research level, a lot of the work and discussions done there were confidential.

PS-I experience: It was a very enriching experience in terms of working with one of the biggest tech companies in the world. Since we were part of the research wing of Samsung, we learned a lot about how research in such MNCs functions. It was an encrypted system end to end and there was very high security and confidentiality in the way we worked, and all the workflow was very systematic and organized.
My mentor was in the USA, and we used to have regular calls to discuss progress on project work.

Learning Outcome: I learned about Computer Vision and Deep Learning algorithms from basics to implementation level.
Learned about the mathematical background of several Computer Vision algorithms and how they are coded and executed in the real world.
Deep learning models and Machine Learning algorithms in images.
Learned and implemented networks in Python and used a variety of libraries in the same.
Also, read up a lot of documentation and research papers pertaining to Computer Vision and Super Resolution.
Implementation of GANs and setting up the same right from scratch.

Name: DIMPLE(2020B4A70632P)

Student Write-up:

PS-I Project Title: Generate binary files from a set of macros and port eMMC codebase using excel into UFS.

Short Summary of work done: Firstly, I learned about the basic concepts of card storage architecture that is host interface
layer, flash transfer layer and flash interface layer. The way by which Nand-raw flash memory works. Then about firmware (It held in non volatile memory devices such as ROM, EPROM, etc). I learned how to prepare an FIL context binary application (that is to prepare a CPP application, which generate a binary file from a set of macros.) Then I ported eMMC excel into UFS, that is excel script to be modified and to take relevant data from a text file (UFS File) and generate the cell distribution. This can be done using visual basic. UFS or Universal Flash Storage is a recognized flash storage specification for digital
cameras.

PS-I experience: I learned a lot about memory storage devices such as eMMC , UFS, Firmware, Flash memory, etc. Apart from that, I learned more about visual basic as well and some advance tools of excel such as macros.

Learning Outcome: I learned cpp, how to generate binary file from a set of macros, learned about eMMC and UFS card and how to port one's code into another.

PS-I station: Shalaka Connected Devices LLP - App/AR/VR , Pune

Student

Name: AKHIL A BINU .(2020A3PS0560G)

Student Write-up:

PS-I Project Title: Edge computer development

Short Summary of work done: By the end of the project we have developed a fully functional python based edge computer for the IIot network. The edge computer can communicate with the sensors and hardware and store the data received to a cloud or to a database using the MQTT protocol. A menu driven program was implemented so the users can make the edge computer do different functions based on the option selected. Finally the data stored in the database can be analysed for any anomalies in sensors or hardware used in the shop floor. Complete documentation of the code is done at the end of project and submitted so that other team members from the company can analyse and make use of the edge computer we devolped.

PS-I experience: This PS-1 with shalaka connected devices was a really produtive one. I learned to wrok as team player. The company members were really helpful in sharing the different aspects of Iot industry and this helped us in completing the project much easily.

Learning Outcome: Learned different protocols such as MQTT and build a python based edge computer. Also the PS-1 session made me realise the importance of documentation. Got an idea about different steps involved in making a product within the company.Learned time management.

Name: MOHIT GUPTA .(2020A3PS1021P)

Student Write-up:

PS-I Project Title: Edge Computer

Short Summary of work done: Our project involved programming an edge computing software for Shalaka Connected Devices' proprietary network. It required basic Python programming knowledge to help connect the sensor network developed by the Embedded Systems teams to the cloud servers. For the networking we used the MQTT protocol, which is specifically designed for data transfer from IoT devices. The tasks they assigned to us were majorly software tasks and our final product was a software that allowed the user to read data collected by the sensors on any remote computer and send instructions based on the collected data back to the network.

PS-I experience: It was a good learning experience as both of our mentors from the company were extremely helpful and approachable and were able to answer all of our queries as well as clear any misunderstandings we had.

Learning Outcome: The main learning outcome for me personally was that working on this particular project deeply enhanced my knowledge of the Python programming language. The mentors encouraged us to understand the working and documentation of various libraries before we implemented them in our program. Also, we learnt about how industrial IoT companies work with regard to design, development and documentation of their products. I also learnt a lot about the MQTT protocol, which was something new to me.

Name: RITVIK RAO .(2020A3PS1232P)

Student Write-up:

PS-I Project Title: Media Controller for ReMoNet IoT

Short Summary of work done: The objective of our project is to create a Media Controller by implementing
Python on the Linux operating system. This system will receive, process, and display the data collected by the sensors. The system uses the MQTT protocol to receive/send messages. Data read from the sensors is sent to the Controller through the MQTT server, which in turn processes the data and converts it into meaningful data in the form of graphs and tables. Our team will work on creating this interface as well. Since the last quiz, several new elements have been added to the project. We will be using the inbuilt python VLC module which will allow us to remotely play videos/media whenever required. Pause/Play controls will also be available to use. Another newly added feature is the ability to immediately broadcast a message/connect to the radio in case of an emergency. Once the message is broadcast, the server automatically returns to whatever it was doing at the time of interruption.

PS-I experience: Working in a professional environment helped me understand the differences between academia and corporate life. It also allowed me to understand a domain that I was not familiar with.

Learning Outcome: I gained an understanding of IOT cloud protocols, primarily MQTT. It also helped in expanding my knowledge of python. I also learned about documentation and it's importance.

Name: SUMEDHA PANJA .(2020A3PS1766G)

Student Write-up:

PS-I Project Title: Edge Computer For Remote Monitoring Network (ReMoNet) IIoT

Short Summary of work done: The project's main aim was to design an Edge Computer for the company's Remote Monitoring Network (ReMoNet) IIoT. The edge computer will collect data from the sensor nodes/sensors networks present on the Industrial Shop Floor, then process the raw data received from the sensors and send it to cloud servers/clients for advanced cloud computation, data analysis and data visualization. The edge computer can also receive control commands from the clients on the cloud side and relay them to the respective sensor node/sensor network.

The edge computer is a Linux Operated machine, and the programming language utilized for implementing the edge computer is Python. To ensure edge computing features are implemented, an application layer IoT protocol, known as the MQTT Protocol (Message Queue Telemetry Transport) Protocol, is utilized for the same. MQTT protocol is implemented using an MQTT Broker that will help to subscribe to topics or publish messages to subscribed topics.

In the given project, the task was to do the necessary sensor interfacings to receive sensor data, store the sensor data in a database, publish sensor data to the clients on the cloud side whenever required, and subscribe to a topic so that the edge computer can receive control commands from the cloud side and relay the control commands to necessary sensor nodes/sensor networks.

PS-I experience: PS-I experience was a good experience for me since this was the first time I got industry exposure. I got an insight into software used for implementing IIoT applications, which was quite interesting and informative. The learning curve was great, and the step-by-step approach to implementing the project objectives was pretty good.

Learning Outcome: I learned about the product development cycle taking place in the company and the various steps involved in developing a product. Learnt more about Python-its various libraries, modules and IoT protocols and how they can be used to interface the sensors and receive/send data. I also got an insight into what is needed to prepare documentation of the product that has been developed.

Considering the soft skills, I learnt a lot about working in a team and effective communication when working in a group. I was also able to improve my presentation and report writing skills.

Name: Hrishikesh Eknath Patil(2020A3PS2095G)

Student Write-up:

PS-I Project Title: Media Controller for ReMoNet IIoT

Short Summary of work done: Designing of a multimedia controller in Python programming language for remote control of VLC player via MQTT protocol. The application supports remote audio-visual playback of local, cloud and youtube videos, basic playback controls and emergency video or text announcements.

PS-I experience: It was a fun experience learning about the different standards that are present in the current industry, with introduction to advancements made in technological aspects of it. Building an application in python language allowed me to learn about how versatile a program can be, making it easy to control a lot more appliances than one can imagine just with a few lines of code. This helped me gain insights into the different possibilities which are unlocked when programs are brought into the picture.

Learning Outcome: I can make better choices regarding software decisions, and can also build python applications more easily than I would have otherwise been able to.

Name: GAURAV BASU .(2020A8PS0441G)

Student Write-up:

PS-I Project Title: ReMoNet Environment Management System

Short Summary of work done: Developed drivers to interface sensors with microcontroller and then send data to an Edge Computer. Done in Embedded C using Texas Instruments Code Composer Studio IDE.

PS-I experience: This was in remote mode, so we didn't get to work with the actual sensors in-hand, but Shalaka had told us to remotely connect to their PCs which had the hardware setup. Good learning experience.

Learning Outcome: Few technical Skills like I2C communication, Embedded C Programming, etc.
Soft skills like Business Communication and Presentation, Teamwork.

Name: SHAH SOMARDH RAJIV .(2020A8PS1806G)

Student Write-up:

PS-I Project Title: Environment Management System Monitoring and Control for ReMoNet IIoT with Cloud Connectivity

Short Summary of work done: The main goal as devised by the Hardware embedded systems team at Shalaka was to
design an environment management system using Ethernet/ Wi-Fi as the communication interface between the sensor nodes and the edge computer.
We spent time understanding the hardware used in the project (TM4C1294XL, LM 75 and BM1383BMLV(Pressure Sensor)), we developed the required software to take input from sensor nodes and to forward it to the edge computer we used Texas Code Composer studio IDE and TivaWare SDK to interface with TM4C1294XL development kit and developed drivers for it to communicate with sensor nodes and the Edge computer.
Our final aim was to create a complete system from ground-level sensors to the cloud, which
was achieved by the collective efforts of all groups working together, group 3 was mainly involved in developing the I2C drivers and Ethernet drivers.

PS-I experience: It was a really great experience wherein we learned the intricacies behind everything that is required to achieve the aim of developing a final product.

Learning Outcome: Improving problem solving and critical thinking skills.
Developing appropriate organisational attitudes and values.
Acquiring soft and social skills, particularly for communication with industry professionals.
Building synergy between all team members as well as all teams in order to achieve a common go

---

Name: CHAITANYA CHAUHAN .(2020A8PS1815P)

Student Write-up:

PS-I Project Title: Environment Management monitoring and control, embedded system for (Relay and Mobility Network) ReMoNet with Bluetooth authentication and data transfer.

Short Summary of work done: The aim of the project I am working on is to create an Environment Management
monitoring and control, embedded system for (Relay and Mobility Network) ReMoNet with Bluetooth authentication and data transfer. The idea behind this is to simply create an Environment managing system for say, a shop floor level operator, this system should be sensitive towards the aspects of environment relating to proximity to an objective and the ambience of light, and needs to be able to give feedback, based on the output it senses. The method of input received needs to be such that it can be given locally, by the operator himself, and it needs to have a Bluetooth based authentication and preferably an application based interface for ease of operations. We use a software called anydesk to connect to the Shalaka machinery, and then use the code composer studio by texas instruments to develop on their platform and import relevant headers from the libraries, and build the project using a proper version of the compiler. To handle the informational flow from the sensors and drivers, we use datasheets provided to us by Shalaka itself.

PS-I experience: It was a great learning experience wherein I learned about the practical applications of the courses I have learnt theoretically. The Faculty mentor, was very supportive at each step of the way, and the PS mentor of Shalaka did an amazing job of teaching us the concepts of IoT while still enabling us to find our own way through the project.

Learning Outcome: Learned a lot about IoT, IIoT, C, C++, how corporations of small scale function, the hierarchy of small scale organizations, team building exercises, and functioning in teams.

Name: Saloni Prabhu(2020AAPS1023G)

Student Write-up:

PS-I Project Title: Environment Management System Monitoring and Control for ReMoNet IIoT with Cloud Connectivity

Short Summary of work done: For our project the main area of work was on the embedded systems hardware connections and its applications. We built a sensor node system which takes the environmental information as input such as temperature and pressure, and sends the processed data to an edge computer with cloud connectivity using an Ethernet port. This data can be viewed on a user interface or a mobile application by connecting to the same Ethernet line.
Since the PS1 program was online the majority of work was done on coding using the simulation platform Texas Instruments Code Compose Studio. We coded the drivers for each respective sensor using I2C protocols and processed the input data to the required output format. We also programmed the main logic file which would send the required information when a command is received from the user. The final task was to create proper documentation and a user guide for our product.
The working of the system is as such: The sensors constantly take in climate readings which are stored in a variable. When the user enters a command to receive climate data from the sensors, the collected input data is made available on the edge computer using UART protocols and sent to the cloud via Ethernet.

PS-I experience: My PS1 experience was very good. The company mentors were very supportive and enthusiastic about teaching us the inner workings of the industry and genuinely wanted us to get hands on experience on the kind of work they do. They kept consistent meetings to check our progress and helped us with any problems we faced while doing the assignments.
Our college mentor was equally supportive and he guided us by teaching us how to find proper resources and journals to expand our knowledge.

Learning Outcome: C/C++ programming for Embedded Systems development.
Understanding how to use various tools like Texas Instruments Code Composer Studio and SDKs to create a software model of a device.
Choosing appropriate hardware according to the project requirements.
Understanding the technological processes at the industry/organization level.
Seeking, visualizing, analyzing and recording data/information at every step of a project through appropriate documentation.
Developing appropriate organizational attitudes and values.
Acquired soft and social skills, particularly for communication with industry professionals.

Name: HARISH YUVARAJ G P .(2020AAPS1735H)

Student Write-up:

PS-I Project Title: Environment Management System Monitoring and Control for ReMoNet IIoT with Cloud Connectivity

Short Summary of work done: My work was mainly to develop drivers for sensor nodes and the edge computer for the Texas Instruments 1294 Launchpad board.

PS-I experience: The first month was fairly relaxed we were taught about IIOT networks and Product development lifecycle, we were then introduced to the peripherals that we would using and its use and data sheets were provided for us to study about the device and in the second month of PS we had to develop drivers for the devices with the help of data sheets. It was the good learning experience and gave us an good idea of how things work in the industry.

Learning Outcome: I learnt how an IIOT network is implemented and how an device driver is written , we also learnt about different protocols like I2C,UART etc which is mainly used in embedded systems.

Name: HARSHVARDHAN SUNIL GOYAL .(2020AAPS2115H)

Student Write-up:

PS-I Project Title: Environment Management System Monitoring and Control for ReMoNet IIoT with Bluetooth Authentication and Data Transfer

Short Summary of work done: We design an Environment Management System Monitoring & Control for ReMoNet IIoT
using Bluetooth Authentication & Data Transfer for this project assigned to our team.
The resources for the project are Embedded System with Environment Sensors, Proximity
and Ambient Light Sensor, Local Digital Input, Output Relay Control, Bluetooth BLE interface.
This design consists of 2 Micro Controllers. The first controller takes data from all the sensors
& compiles it into a single package, which is then encrypted & transferred to the second microcontroller. This second controller uses Bluetooth to send final data package to the respective app of the device.

PS-I experience: It was informative, and a great learning experience. I learnt the importance of exploring and enjoying new fields in the study of engineering.

Learning Outcome: understanding IIoT and Embedded System development. Proper Documentation of the work.

Name: PRAROOP PRAVEEN AGRAWAL .(2020B2AA0722P)

Student Write-up:

PS-I Project Title: ReMoNet EnMS-2

Short Summary of work done: Collection of Data by sensors - embedded system and accessed through a edge computer via bluetooth.

PS-I experience: Experience was great, got to learn many new things, understood the environment of a workplace and their work culture.

Learning Outcome: Learnt to program the drivers
Program microcontroller to Texas studio code.
Understood the environment of a workplace.
Learnt to be more punctual.

PS-I station: SNS TECHNOSYS LLP , Pune

Student

Name: ADITYA SHIRISH KAMAT .(2020AAPS0197G)

Student Write-up:

PS-I Project Title: Spiro 2.0 development

Short Summary of work done: My project was to design a digital spirometer device which is a medical device meant to be used in hospitals and clinics. The device had a touchscreen display and the main objective was to design the graphical user interface for it. I got to learnt Python Kivy, SQL and Raspberry Pi.

PS-I experience: It was great first hand and practical learning experience which helped me gain insight about the work culture, learn about Embedded system design and UI/UX design and gave
me an opportunity to interact with professionals who are working in the industry.

Learning Outcome: Learnt about Embedded systems based on Raspberry Pi microcontroller and UI/UX design. I also learnt how to collaborate on a project with other students and mentors and understood the importance of presentation skills.

Name: UDAYAGIRI ADISHREYES KUMAR .(2020B5AA0915P)

Student Write-up:

PS-I Project Title: Spiro 2.0

Short Summary of work done: This project is all about developing a software for a device called digital spirometer and
integrating a microprocessor (Raspberry Pi) with the device to take the inputs and control the device. The device is capable of plotting real-time graphs, produce results instantly, and print the report as soon as the testing is completed.

PS-I experience: During PS-1 I learned a lot of things like new python modules and working with SQL. Also, I have got exposure to a real-time project. I got industry experience in companies. Also I got hands-on experience in app development and got idea that hoe the things work in developing device or web applications.

Learning Outcome: I became an intermediate level app developer after this project. I also learnt how to deal with SQL. I also learnt much of the python programming language.

PS-I station: WeSwap Mobility Solutions - IT , Indore

Student

Name: AGRAWAL MONIT MADHUR .(2020A7PS0120G)

Student Write-up:

PS-I Project Title: FLEET MANAGEMENT SYSTEM FOR BATTERY SWAPPING ECOSYSTEM

Short Summary of work done: My project comes under Cloud Development. We worked on enabling server-side infrastructure for managing IoT devices using Thingsboard. We tested our model in Thingsboard using MQTTBox, which creates virtual IoT devices using the MQTT protocol

PS-I experience: Very good look into the corporate culture, and corporate responsibilities, how to present your work. Learning Thingsboard has been a really useful experience and it plays a big role in cloud computing which most of the companies are now shifting towards cloud based platforms.

Learning Outcome: I have learnt a lot from this project so far, namely cloud infrastructure, how companies work, their culture, corporate responsibilities, how to present your work. Learning Thingsboard has been a really useful experience and it plays a big role in cloud computing which most of the companies are now shifting towards cloud based platforms.

Name: RAMAKANT PANDURANG TALANKAR .(2020A7PS0979P)

Student Write-up:

PS-I Project Title: Fleet Management System for Battery Swapping Ecosystem

Short Summary of work done: WeSwap Mobility Solutions is a startup aiming to set up automated battery swapping stations for EV's using IoT and Cloud. I was a part of their cloud team which is a part of their smart systems division.

o Designed and created a system for connecting and managing IoT devices and further processing the data.
o Received, validated and processed incoming data from IoT device and stored it to the database.
o Used Thingsboard IoT platform to carry out operations using Rule Chains, Integrations, Data Converters.
o Displayed the data by creating dashboards and carried out the operations according to incoming telemetry.
Work was not completely like a typical IT or CS job. It was more of an IoT side work , but enjoyed doing it.

PS-I experience: PS-1 gave me an opportunity to understand how actual work looks like and also how a startup functions. Got to learn new technologies as well as soft skills. Got to interact with co-founders of the startup on weekly basis.

Learning Outcome: Learned about IoT, Cloud in brief. Also gained experience in using Thingsboard IoT platform and got to know about the functioning of IoT devices. Got a brief experience with java-script as well.

Name: ARYA ABHAYA KULKARNI .(2020A7PS1683P)

Student Write-up:

PS-I Project Title: Backend App Development

Short Summary of work done: I was part of the app development project that the station conducted. Within the app development team I worked with two of my peers developing the backend of the app that was to be built. Our objective was to develop the backend which includes the servers,databases and APIs for an operator version of the app. Our first few weeks were spent in learning the required software for our tasks which included NodeJS and Express JS for building the servers and the APIs and Mongodb for developing the databases. Based on the screens developed by the frontend team, we worked on determine the flow of the app and subsequently began constructing APIs. This process took us a little over a month and eneded with us beginning our work integrating our backend with the frontend that had been coded by the frontend team.

PS-I experience: App development was something I'd only had a brief look at before the internship. Since web development (something I was quite familiar with) was quite similar to app development I was excited to begin my work with the team. The first few weeks were quite hectic as we're required to learn brand new softwares for the first time but it

was quite rewarding. Working in a corporate setting with strict deadlines improved the quality of my work. Furthermore, there was also a great improvement in my soft skills and leadership with us being required to make presentations and discuss our work with the company employees. All in all the internship was quite rewarding and a necessary step in my overall improvement both as person and as a developer.

Learning Outcome: Based on our projects where I worked in backend web development I learnt a great deal of new things along with developing my skills in things that I already knew. I learnt NodeJS, ExpressJS and MongoDB for the backend work along with the concept of APIs and how they work which is important for any developer. I also worked with one of our instructors in Project Management wherein I learnt how to use JIRA to keep track of all the tasks that the teams were required to finish along with taking notes of all the meetings that were held.

Name: ANTRIKSH SHARMA .(2020A7PS1691P)

Student Write-up:

PS-I Project Title: App Development

Short Summary of work done: The operator of the exchange station will utilize an app I developed for Android and iOS.
Flutter and Figma were used to develop this app's front end. The UI/UX was designed entirely from scratch using Figma for front-end development, and the code was implemented using Flutter in Android Studio. The app's key features are the Operator Login, Profile Section, Payments & Transaction Detail, Swapping Procedure, and Battery Slot Details.

PS-I experience: I've gained valuable knowledge in front-end app development that will help me create an application with Figma/Flutter. I now have a better idea of how to create an application from the start while considering actual users and circumstances. The startup founders organised regular meetings to guide us in the app's development.

Learning Outcome: I learned a lot about how businesses operate, how to design and develop applications, the difficulties developers encounter, how to integrate the many front-end and back-end components, and the value of having strong technical, interpersonal, and communication skills.

Name: SHASHWAT JAIN .(2020A7PS1702G)

Student Write-up:

PS-I Project Title: Android/iOS App Dev

Short Summary of work done: WeSwap aims to accelerate the advent of EV by building an ecosystem of interoperable battery swapping solutions for EVs (2- & 3-wheel vehicles) to solve critical resistive factors and provide a comparable alternative solution to conventional vehicles in every aspect. We developed an app(frontend+Backend) for the startup to facilitate the process of battery swaps.
I alongwith 2 of my fellow interns was assigned to the Backend team with 2 others taking care of the frontend aspect of the app.I worked closely with the co-founders, Regular weekly meets took place where we reported our progress and were assigned the next tasks alongwith discussions on doubts encountered.
I worked on Node.js(Express) ,MongoDb ,APIs alongwith some minor work in flutter. We are also planning to integrate ThingsBoard(Cloud) to existing setup.
The task assigned aided in my learning along-with the implementation .The working load was manageable though less than the 30 hours/week mentioned in the contract.

PS-I experience: The aim was to develop a cross-platform application(primary focus: Backend Development) for operators working in WeSwap's battery swapping stations and help them to motor vehicles, its details and details of batteries present in the vehicle that enters the station and display live details of batteries currently plugged in the station for charging. This application will give the operator information on the current charge, average and maximum temperature, issues with batteries and other details of the battery plugged for charging in the station. I worked closely with the co-founders, Regular weekly meets took place where we reported our progress and were assigned the next tasks alongwith discussions on doubts encountered.
It was an enlightening experience where I gained valuable insights and became acquainted with working in a Start-up, where I believe the learning is multi dimensional

Learning Outcome: I majorly worked on Node.js (Express.js), MongoDb for database management and APIs.
I learnt the difference between cross platform development and native app development and what are advantages and disadvantages of cross platform development over native development from a business point of view. I also became acquainted with JIRAboard a project management tool.
Working collaboratively as a team on tackling a real world problem under deadlines was an enlightening and insightful experience.

Name: GANGWAL SHOBHIT SANJAY .(2020A7PS1703G)

Student Write-up:

PS-I Project Title: Application Development for Operator

Short Summary of work done: Our project was to create cross platform application for operators working in WeSwap's Battery swapping stations. We used Figma for designing screens, Flutter for frontend and NodeJS for backend.

PS-I experience: Our Practice School experience with WeSwap Mobility Solution has been instructive and fascinating, which has helped in giving us a better knowledge of how teams manage big projects.

Learning Outcome: I learned how to create cross platform application using Flutter for frontend and create screen designs using Figma. I also learned to work in team.

Name: PIYUSH KUMAR SAHU .(2020A7PS2042H)

Student Write-up:

PS-I Project Title: Fleet Management System for Battery Swapping Ecosystem

Short Summary of work done: Work mostly comprised of developing a model in Thingsboard. This would serve as the backend cloud server for the app. From a higher perspective, our work would come under mainly IoT and Cloud Computing (this was less though). We did briefly touch upon cloud technologies like AWS and few distributed system technologies like Kafka engine, but most of our time was spent in creating rule chain models in Thingsboard and configuring the IoT devices to send data to the Thingsboard server. For the final task, we had to establish a connection between Thingsboard server and their Flutter app using APIs. Meetings usually took place once or twice a week, where we would discuss our progress and if any problems we are facing.

PS-I experience: The industry mentors have been really helpful and understanding. They guided us and gave feedback on each and every step where we could have improved. As a result, my PS1 experience was really good.
Just that the project area I worked on could have been better, but nevertheless I learnt a lot of things that I would eventually require in the future.

Learning Outcome: For someone like me who wants to become a software developer (as of now), the biggest outcome I would say is that I learnt how to use documentation really well. There was almost nothing available on the internet on topics like these, so we had to depend on their documentation extensively.
My knowledge on cloud systems like AWS, computer networks and IoT has definitely improved by multifold. Although, it was in online mode, I also gained lot of insights on how a startup operates.
I also learnt about the importance of effective communication and good presentation while working in a company.

Name: ARNAV J PILLAI .(2020A7PS2053H)

Student Write-up:

PS-I Project Title: Development on IoT Platform

Short Summary of work done: The goal of the company was to provide a service that can monitor the battery level of an EV and to swap it at nearby station. Tasks were assigned on a weekly basis along with meets which required a certain amount of self study for it to be done. The time spent on a particular task depended on how long it took to understand the concepts and usage of the software.

PS-I experience: It was useful since it gives an idea of what it is like to work in a profession environment as a team and it also helped us in learning about applying what we learn in theory in the real world.

Learning Outcome: How to communicate and process data received from IoT applications on a cloud server and also communicating from the server with a mobile app.

Name: PINGALE SAGAR SUBHASH(2020A7PS2062H)

Student Write-up:

PS-I Project Title: Android/iOS-based application development

Short Summary of work done: Our work was mainly to develop a flutter application that can run on android/iOS-based systems. The flutter application will have a backend made using Node.js and Mongo DB to store data.

PS-I experience: Weekly meet were held in which we had to explain and present what we did in the past few weeks. Initial few weeks was fast paced hence, focus during that time would very much simplify your next weeks. Mentors were very helpful and understanding and co-founders personally oversaw our work. One to two hours of dedicated time per day for PS would be enough for doing the weekly tasks.

Learning Outcome: I got to learn new stuff like flutter, node.js, mongo. Soft skills like presentation and communication very much improved.

---

innovate achieve lead

”

BITS Pilani
Pilani | Dubai | Goa | Hyderabad
Pilani-333 031, Rajasthan, India.
www.bits-pilani.ac.in

Practice School Division
BITS Pilani