Birla Institute of Technology & Science, Pilani
Pilani | Dubai | Goa | Hyderabad
Practice School Division

CHRONICLES

Electronics

PRACTICE SCHOOL - I

SUMMER - 2020

From the Desk of the Editor

It is my great pleasure to bring forth the 2nd edition of the PS-I Chronicles. This edition features over 1800 articles from PS-I students sharing their experiences during summer 2020.

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 faculty with the enhanced information about the type and nature of work carried out at various organizations.
- To transform the knowledge gained at the organization into class room teaching and also to identify the scope of deepening the collaborations with organizations.

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 would like to thank students for sharing their experiences during their stint at the organization. I would also like to thank Prof. Arun Maity and Prof. M. K. Hamirwasia for reviewing the articles and providing us the feedback. I would also like to extend my thanks to Mr. Om Prakash Singh Shekhawat, Prof. S. Murugesan, Prof. G. Muthukumar and Mr. Varun Singh of the Practice School Division, 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 psd@pilani.bits-pilani.ac.in or at anil.gaikwad@pilani.bits-pilani.ac.in.

Anil Gaikwad

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PS-I station: Aditya Birla Insulators - Electrical Power Systems, Halol

Student

Name: ANMOL SHARMA .(2018A8PS0781P)

Student Write-up

Short summary of work done: The project allotted to me was to digitalize a drying process. The work was mainly research-based. We were supposed to digitalize the readings of the device called “Penetrometer” in which we proposed various ideas to digitalize it, which would the reduce the human error while using the device and increase the company efficiency.

PS-I experience: PS-I is a good way to bridge the gap between theory we learn in the institute and what we face in an industry. The industrial exposure was first of its kind and helped in building an experience, team work and presentation skills.

Learning outcome: I learnt the professional approach of working. How to optimize and how industries take decisions by group discussions and how to gather and analyse information and prepare a report.

PS-I station: ALW Lighting India Pvt. Ltd. - Optical systems, Ludhiana

Student

Name: RAJA ARAVIND REDDY MANIMALA .(2018AAPS0475H)

Student Write-up

Short summary of work done: Studied about efficient ways of lightning design from research papers, journals, articles, books to understand them as well as document them for future use for the company. Also, worked on a ray tracing software called “Ansys Speos” to simulate optical systems and to try to make them more efficient.

PS-I experience: It was pretty decent. My mentor was a BITS alumnus and he was very supportive during the entire thing.

Learning outcome: I learnt how to communicate with industry professionals and what to prioritise while working on a project.

PS-I station: AURUM SMART TECH - DSP, Pune

Student

Name: PRANAV MAHAJAN .(2018A3PS0420P)

Student Write-up

Short summary of work done: Even though the project alloted to me according to the preference list was in the domain of digital signal processing, the project that I had to work on was designing the software for recognition and decoding of QR codes for embedded use. We had to implement libraries available online and tweak them for our purpose. This turned out to be a difficult process as debugging took a lot of time.

PS-I experience: The project had two other students from Goa campus, so we had to work together under the guidance of the industry mentor. We held regular meetings where the mentor resolved certain problems that we were facing. We hit some development slumps because we were unable to find a way to debug at certain stages.

Learning outcome: I learnt how the process of software development works in real environments and how to deal with certain problems faced.

PS-I station: AURUM SMART TECH - Image processing, Bangalore

Student

Name: NEELAY SHAH .(2018A8PS0400G)

Student Write-up

Short summary of work done: Developed an image processing pipeline for reading QR codes.

PS-I experience: Lots of debugging mixed with sporadic successes.

Learning outcome: Learnt about low level software development.

PS-I station: AURUM SMART TECH -Embedded systems, Bangalore

Student

Name: PUNEET MIGLANI .(2018B5A30894P)

Student Write-up

Short summary of work done: Worked to code microcontroller for a fast RFID card system.

PS-I experience: Good.

Learning outcome: Learned to code microcontroller at a beginner level, SD_card and camera interfacing with MC.

PS-I station: Birla Science Centre - Embedded Systems, Pilani

Student

Name: WAHIB SABIR KAPDI .(2018A3PS0247G)

Student Write-up

Short summary of work done: We built a smart mask incinerator that can be controlled via a mobile app.

PS-I experience: Fine.

Learning outcome: I learnt how to use React Native, Firebase, Blender and Figma.

Name: BHARAT GUPTA .(2018A3PS0446G)

Student Write-up

Short summary of work done: We were given the task to think of an idea that will help in tackling any issue related to COVID-19. The group came up with 3 different project ideas and each idea was worked upon by 2 students. Our project was to make a wearable device based on ESP32 micro controller and a mobile App which would help people to maintain physical distancing in crowded places using Bluetooth Low Energy (BLE) and the mobile app would also help in contact tracing and sending out notifications to people.

PS-I experience: Experience was quite good. I got to learn how to make an app using React Native and using firebase as a backend service. We also got to work with ESP32 which is bluetooth and wifi enabled microcontroller, which was used to make a wearable device.

Learning outcome: React Native (App Dev), Firebase (Backend), ESP32 (Microcontroller), BLE (Bluetooth Low Energy) Communication protocols both as APIs and microcontroller libraries.

Name: JASDEEP SINGH .(2018A3PS0526G)

Student Write-up

Short summary of work done: The project focuses on creating a wearable, low cost and low energy device and a mobile app for the Birla Science Center. The project was devised keeping in mind the accessibility of smartphones to the people of the village, Pilani and the current situation of this epidemic, COVID-19. The low energy wearable device will be useful for the people who do not carry smartphones while the app is for the people who carry smartphones. The purpose of this project is to help maintain 'social distancing' amongst the visitors of the Museum or any other place with a sizable footfall. This is ensured by creating a device and an app which triggers an alarm when a visitor is close to another by a distance of 3 feet and less. For the device to be energy efficient, the technology we could think of was Bluetooth Low Energy (BLE). I have used Arduino IDE to develop the code which I want to load onto the microcontroller, ESP32, so that it works according to the requirements for this project. We initialise names of the low energy wearable device and advertise its name, so that when scanned, it displays the names of the Low energy wearable devices along with other BLE devices. While initialising the names of the devices, I had ensured to give the same name (let's say 'Device') to all the wearable low energy devices. Scan for all devices and then filter for those devices (Smartphones and the LE Smart device) which have the name 'Device' (as mentioned). For those devices, we get the RSSI values and TX power, from which we can calculate the distance between any two BLE devices using a formula. So, when the name of device scanned, is 'Device' and the distance between the two devices is less than 3 feet, then an alert would be generated by vibrating the vibration motors and making the LEDs glow.

PS-I experience: My PS-1 station at Birla Science Center has provided me with good opportunity and has guided us on how to pursue the project and had also helped us in times when needed help regarding the project. It has been a good experience working on this project to develop this device and app.

Learning outcome: We have learnt a lot during our PS-1. It has helped us improve problem solving and critical thinking skills by analysing and visualisation through appropriate documentation / observation. We have learnt how to work on possible solutions for an identified problem, with professional standards. It has also taught us to develop appropriate organizational attitudes and values. Through PS-1, we have acquired soft skills like team management, teamwork, leadership traits and social skills, particularly to communicate with industry professionals.

Name: CHITRE TANAY MILIND .(2018B1A30933G)

Student Write-up

Short summary of work done: We used microcontrolers to build a remote controlled face mask incinerator.

PS-I experience: Pretty easy. Could do it without much trouble. Learnt a few things. Not too much work to do.

Learning outcome: Learnt microcontroller programming.

PS-I station: CEERI - App/AR Development, Pilani

Student

Name: BODDUPALLI NIKHIL .(2018A7PS0106G)

Student Write-up

Short summary of work done: My project was "Android application for managing project finances". We had to create an application for collecting project finance data from the scientists and display it to the administrators in the required format using charts and diagrams. We used Adobe XD for designing the application, android framework for building and firebase for handling the backend activities like user authentication and database functions.

PS-I experience: My experience of working with CEERI Pilani was quite good. It really helped me to understand how courses at college like OOP and DBMS are actually used in software development.

Learning outcome: I learnt to create Android applications using Android studio and using Firebase to handle the backend functionalities for the application.

Name: TANISHQ NANDAN .(2018A7PS0195G)

Student Write-up

Short summary of work done: Tried making RL models to help drones learn navigation.

PS-I experience: Nice, but lot of delays in the timeline. Couldn't finish everything planned. But that might be expected from it being off-site.

Learning outcome: Learnt a lot about different RL algorithms.

Name: TENNETI SUDHEER KUMAR .(2018A7PS0199H)

Student Write-up

Short summary of work done: App development: Collaborating with our team, developing application using Android studio, working at our own pace, quiz on our domain as well as on the organization, seminar on our work and plans, group discussion on random topics, making a final report on the work done.

PS-I experience: This PS-1 was remote, so there wasn't any physical in-person experience. But the remote PS-1 gave us a pleasant experience. Meets were conducted online and the progress of our work was looked upon regularly. The evaluation components helped us in creating necessary skills required in an industry.

Learning outcome: About the PS-1 station:

1. The station already worked on the allocated project domain for a few years now and our mentor expects new ideas from the students.
2. Emphasis is on individual and genuine work rather than secondary sources.
3. Clarifying all queries about the project and its demands required in the future.
About the project domain:
1. Aims at visualization of data and packing that information into an application that helps the customers.
2. A basic experience on Android studios / visual studios.
3. We have to throw out any kinds of success on the project (reports) in publications.

Name: SAI NAGA SHASHANK SRIRANGAM .(2018AAPS0347H)

Student Write-up

Short summary of work done: The entire PS-1 was offering various projects in various different fields. My field was Augmented Reality (AR).The project was to develop an AR app that helps the user understand how to maintain certain machines. The project required decent knowledge in Unity, Vuforia Plug-in for unity and blender software to develop and animate basic 3D models. The project had an Air conditioner maintenance tutorial. The tutorial starts when the user targets any AC present in his / her house. The tutorial creates an AR experience by creating a 3D AC model and positioning it over the original AC and the necessary animations and texts are played to tell the user how the AC in maintained.

PS-I experience: It was good experience to come up with a project (my first project) that was required from an industry-point of view and develop the project within the given duration and also meet the necessary deadlines well within time

Learning outcome: It was my first time using AR to develop an application and hence I had to understand Unity, it's interface, how to use Vuforia and learn a little bit of c# to work with scripting. Apart from technical knowledge we also had group discussions and presentations aimed at improving our soft skills

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Name: R HARISHANKAR .(2018AAPS0392G)

Student Write-up

Short summary of work done: The domain of my work was AR / APP development. After going through all the projects CEERI had to offer, I chose to work on the project " AI in industry 4.0 applications". It was more like a study oriented project and initially we were asked to read several articles on the topic. Then, we found a particular article on blockchain applications in industry 4.0 and realised that we could make a web app for an entire car manufacturing industry for data exchanges amd transactions. The subsequent days were spent in learning web app development using Python, website designing and the working of blockchains. We were able to successfully develop the web app by the end of our PS-1.

PS-I experience: The experience has been quite good despite the complexities brought in by the covid situation. The other project members really helped in the success of the project as we coordinated well and distributed work according to our strengths. Timely meetings held with the PS-1 guides helped a lot in refining our work and they provides us with all the necessary study materials which saved us our time. Overall, I would say that our project was well planned and carried out.

Learning outcome: I learnt about Blockchains, programming in Python, AI / ML and web app development as part of the project.

Name: THUKRAL SHAURYA MANISH .(2018AAPS0554G)

Student Write-up

Short summary of work done: We developed neural network model which would denoise accelerometer sensor data and use this to classify structures into three categories: safe / needs further inpection / unsafe for the purpose of structural health monitoring.

PS-I experience: It was a highly enriching experience. We got to interact with industry experts and gain first-hand industry exposure. We obtained a sound understanding of the working of a reserach organization and the kind of projects it undertakes.

Learning outcome: Through PS-1, I was able to improve my communication, teamworking and leadership skills. On the technical side, I gained fluency in the use of Python and Matlab along with sound knowledge of different ML algorithms.

Name: NEEL SHASHIKANT BHANDARI .(2018B1A70084G)

Student Write-up

Short summary of work done: App development project, healthcare app for MNC's and organization.

PS-I experience: Amazing industry exposure and exposure to various fields including app development.

Learning outcome: Learnt Java, XML, Json, SQL and Firebase console.

Name: NEEL SHASHIKANT BHANDARI .(2018B1A70084G)

Student Write-up

Short summary of work done: Created healthcare application for MNC's and corporations.

PS-I experience: Amazing experience with faculty and mentor.

Learning outcome: Java, XML, Firebase console, JSON and SQL.

Name: NIHARIKA GUPTA .(2018B1A70657P)

Student Write-up

Short summary of work done: Established the baseline architecture of a deep learning model intended for the classification of COVID-19 and pneumonia patients. This was done by implementing a research paper containing a model for classifiying 14 thoracic diseases.

PS-I experience: The idea of remote PS-1 seemed to be very inefficient at first but it turned to be actually productive and a good learning experince enhancing my technical as well as soft skills.

Learning outcome: I got to learn about the field of deep learning both in theory and practice.

Name: SHRIRAM R .(2018B3A70948H)

Student Write-up

Short summary of work done: The project was based on the autonomous navigation system of drone. For this, we learnt Robot Operating system which is a platform to interact with robot nodes. We used Gazebo- a simulation world and PX4- a flight controller to interact with our drone. We have set up a pipeline for testing our RL algorithms in Gazebo. We have used mavros with px4 at the base to control the drone accurately in a Gazebo environment. We built a 'DroneController' class on top of mavros functions to support high-level control for getting the pose and sending directions to the drone from a gym environment. It consists of functions for moving the drone to a particular location, like a PID controller. Next, we interfaced the gym environment with Gazebo in order to receive pointcloud data and send direction commands to the drone. The 'DroneController' class has been tested and shown to work very accurately in simulations. We also finished writing a Double DQN and tested it on the simpler available OpenAI Gym environments like the racecar environment, where it gave promising results, showing that the agent is quite capable of learning adequate actions on its own.

PS-I experience: It was a nice experience overall. I got to see and learn many things I have never seen before. There were a lot of learning outcomes and it helped me improve my presentation and communication skills.

Learning outcome: We have learnt about ROS, simulation engines like Gazebo and autopilot software stack like px4. We also learnt about Markov decision processes and reinforcement learning or Q-learning concepts in general.

Name: SIMRAN KAUR SODHI .(2018B4A70845P)

Student Write-up

Short summary of work done: Over the course of PS-1, I implemented an augmented reality application for enhancing the experience of visiting the Saraswati temple in Pilani campus. The application opens with a menu screen having two 2D buttons: START and EXIT. Pressing START opens the camera. On identification of an idol or statue, the relevant information on a plane surface and an animation made in Blender software is augmented nearby using Unity and Vuforia. The application is built using Android SDK. The user can quit the application by pressing EXIT.

PS-I experience: It was good learning experience.

Learning outcome: I got to learn how to use Unity, Vuforia, Blender and Android SDK. I also improved my soft skills.

Name: RATHI ROHIT BHOJRAJ(2018B4A70870P)

Student Write-up

Short summary of work done: Our group worked on developing an Android app for declaring the health status of employees to HR / security in MNCs and offices. The App had two entry points: 1. Login as an employee and login as HR / manager. Employee was

asked to fill an employee form where he / she was asked some basic details and then the data given by the employee was stored in our database. HR / manager of the company could see the data of employees of his company and then he was provided with an option to ask the employee to either work from home or work from office and then this work status was directed to the employees as a notification. Also, employee would receive a notification to update necessary fields on daily basis such as his body temperature and has he / she visited a containment or red zone, etc.

PS-I experience: Our PS-1 was conducted in a remote mode due to global pandemic crisis. I had a decent CG to choose between a government institute, start-up and a reputed company. However, personally I preferred CEERI because I have heard positive reviews on it through seniors and they also mentioned that in CEERI work is properly coordinated by faculty and mentors which indeed came to be true. My experience at CEERI was amazing. There was a lot to learn about the research carried by the scientists there. Also, the faculty and mentor really motivated us in pursuing the project. Also, prior to project selection we were properly guided about the project. This really helped a lot in choosing a project.

Learning outcome: During PS-1, it was for the first time that I had been working on a group project. I can say for sure, that I am benefitted by working in a group. Working in a group helped to reduce the workload on an individual. Also, my group- mates, provided a constructive feedback on the work done. Initially, I was worried whether I would be able to work properly in a group and also with the ones whom I don't know. Then, in a week or two, we got accustomed with it. Another learning outcome which I feel is important is soft skills. I am a kind of shy guy who doesn't like to talk much. In PS-1, we had interactions with faculty and mentor every week. Initially, I asked my other group-mates to convey on my behalf. But gradually I started to speak out and group discussions believe me are the best to improve your spoken language.
The most important learning outcome from my sight is, I have gained confidence in myself. Before, the start of PS-1, I thought would I able to do well in an Android project. For me it was a fresh start. Also, I was not good at programming and then when I actually started Android development, I worked on some basic projects which boosted my confidence. Now, I personally feel that I can work with any CS-IS related projects.

Name: BHAVYA MAROO .(2018B4A70905P)

Student Write-up

Short summary of work done: I was part of the Industry 4.0 project team at CEERI, Pilani. The project on which I worked was the application of blockchain technology in Industry 4.0. We initially studied the various uses, advantages and limitations of Blockchain technology in industry 4.0. Then, we explored the supply chain of the car manufacturing industry and how we can advance it by using blockchain at various stages of the supply chain. For the practical implementation, we created a web application using Python, HTML and CSS that showed the working of blockchain in various stages of the car manufacturing industry.

PS-I experience: It was an exciting project and the experience during this online mode of PS-1 was pretty good. The aim of PS-1 of giving industry exposure was well-achieved. It also helped me in developing better communication skills through activities life group discussions, etc.

Learning outcome: I learnt about blockchain technology, Industry 4.0 and role of blockchain in improving the cybersecurity aspect of future industries. I specifically learnt about the use of blockchain in the supply chain of the car manufacturing Industry through the web application we created.

Name: KUSH MEHTA .(2018B5A70956P)

Student Write-up

Short summary of work done: I was provided with the opportunity to work on a project of my choice in the Augmented Reality domain allotted. I worked on home furnishing mobile application through which a user can preview his house by placing a set of furniture through AR at desired locations to choose the perfect furniture for the house. The user could select a furniture from a predefined set and place them. They could select multiple furniture and test their appearance. The user could finally take a photo of the arrangement selected and view it at a later stage to buy it. The framework which was used for the project was Unity 3D, Vuforia SDK and Visual Studio Code (C#). Everything was done from scratch including AR development and coding.

PS-I experience: Although, we had work from home PS-1, I found the experience to be quite unique and enriching. I got to know about the organisation and the types of project they indulge in. I got to know new people who were part of the same domain and the way each one would interpret a particular problem was quite intriguing to watch. The CEERI mentor as well as PS-1 faculty were very supportive and helpful throughout the journey

and provided with all the necessary materials required. It served as a great opportunity to learn new software and programming language. There were seminars and group discussions to help enhance soft skills.

Learning outcome: I learnt to work on the Unity platform and create Augmented Reality using the Vuforia plugin. I majorly worked on the ground plane detection feature of Vuforia. I also learnt C# programming from the basics to be implemented in the project. I had zero prior knowledge about the domain and the softwares but ended up creating a functional application from scratch.

PS-I station: CEERI - Deep learning / Machine Learning, Pilani

Student

Name: ATHARVA ANAND JOSHI .(2018A3PS0515P)

Student Write-up

Short summary of work done: The project we worked on was 'Explainable Artificial Intelligence (XAI) for Medical Imaging applications'. Our aim was to develop a model which can efficiently distinguish between normal, COVID-19 affected and pneumonia affected chest x-rays and also explain the reasoning behind the decision made, using deep learning and explainability techniques. These techniques focus on highlighting the key element in the data which led the model to its conclusion, for example specific portion of an image which led to its classification. The dataset used for training is CheXpert-v1.0. The key procedure involved first pre-processing the dataset, training our architecture over this dataset, finetuning our model over the covid chest-xray dataset and finally applying the explainability algorithm. The model was implemented in Keras and image processing techniques were applied using OpenCV, PIL and the Lungs-finder library in the pre-processing step.

PS-I experience: The work-from-home PS-1 had its own limitations, yet it was managed well. I got great exposure on how research organizations function, how they work towards converting ideas from the laboratory environment to system prototypes that can work in the real world. I am glad that all my project mates were equally motivated and hard-working. This, along with our mentor's guidance truly enhanced my overall PS-1 experience.

Learning outcome: PS-1 has certainly helped me strengthen my knowledge in Image Processing and Deep Learning using open-source libraries: TensorFlow, Keras and OpenCV. Learnt to use Google Colab efficiently to train models and GitHub to store our work. Besides these technical skills, online seminars, group discussions and report writing helped improve my communication and writing skills. Also, I developed the habit of maintaining a diary for tracking my progress.

Name: AYUSH UPADHYAY .(2018A3PS0553P)

Student Write-up

Short summary of work done: The project was prediction of Air quality of the Delhi NCR region during lockdown using Deep Learning models. What our group did was train DL models on 3 algorithms and then statistically verify which of them was the most suitable for forecasting air quality, taking PM2.5 concentration in the air as a standard metric for air pollution. The models were ARIMA (Autoregressive integrated moving average) model, SVR (Support vector regression), and LSTM (Long short term memory systems). They were trained on the official government data and finally it was shown that LSTMs were the most suitable for future prediction of PM2.5 concentration.

PS-I experience: The experience was fairly pleasant. I really liked my project and learnt about an entirely different field which I always wanted to know more about. The PS-1 had its own limitations being online, the industry experience and the gaps in communication between the group members and the mentors being the most noticeable challenges.

Learning outcome: Learnt how to train Deep Learning models using Python and its associated libraries and the Tensorflow and Keras framework. Gained an experience in handling huge amounts of official data. In addition to this, inculcated soft skills like public speaking, professionalism as well as virtues like cooperation, team spirit and leadership.

Name: HETH JAGDIP SHETH .(2018A7PS0110G)

Student Write-up

Short summary of work done: CapsuleNetworks are a relatively new form of architecture presented in 2017 by Professor Hinton. In this research project, we applied the Capsule Net architecture on Kannada MNIST dataset. We tried various changes like using a deconvolution layer for decoder, increasing dimension of DigitCaps layer, using NAdam optimizer, data augmentation and ensemble network to achieve 98.63% accuracy on test set and 91.21% accuracy on DIG set. We then, implemented a CNN and did a trade-off analysis between CapsNet and CNN and found that CNNs are much faster and achieved higher accuracy on the test set (98.72%). However, they achieved slightly lower accuracy (90.5%) on DIG set.
PS-I experience: PS-I was good experience. I was given the opportunity to explore new field and the chance to work on a project which I was truly interested in. I was able to work collaboratively and I learnt a lot.

Learning outcome: I learnt deep learning. I learnt how to build and train deep learning model, how to make predictions. I learnt how to use various libraries like Tensorflow, Keras, OpenCV, etc. I also learnt how to perform literature survey and how to apply theory to a practical scenario.

Name: KARTIK KUMAR .(2018A7PS0165G)

Student Write-up

Short summary of work done: The domain of our project was Machine / Deep Learning and was aimed at prediction of COVID-19 growth in India. We first read some literature related to infectious disease modelling provided by our mentor at CEERI. We also read about various disease mapping dashboards like the widely used Johns Hopkins dashboard. We then, developed some basic statistical models using the national and state data like exponential, logistic, SIR, SEIRD and ARIMA. These models were then compared using their predictions for 7 days using the time series data. We then implemented slightly advanced statistical models like exponential smoothing, Holt's Winter's and Holt's linear model. Moreover, we implemented time series forecasting models using Deep Learning. We used Long Short Term Memory (LSTM) and Gated Recurrent Unit (GRU) to make our models. We then obtained the 7 day predictions and compared all the models. Finally, we created an ensemble model using the LSTM and GRU. We trained these models and deployed them on a dashboard.

PS-I experience: PS-1 at CEERI was great and novel experience. Even though, it was remote project, the mentors we had at CEERI were wonderful and helpul to us at all times. Our PS-1 instructor was also very helpful and available at all times. My fellow group members were very helpful and all of us became good friends at the end of our internship. All in all this was a great experience.

Learning outcome: My major learning was structuring and implementing various DL models using platforms like Tensorflow Keras on real world data. This PS-1 opportunity helped me explore the ML / DL domain which I always wanted to do. Our primary focus was RNNs but I even learnt about CNNs, NLP and even fundamentals of Reinforcement learning.

Name: SWAPNIL AHLAWAT .(2018A7PS0178G)

Student Write-up

Short summary of work done: Deep learning-based classification of coronavirus affected patients and pneumonia patients. Developing a model using deep learning methods that classify coronavirus and pneumonia affected patients from healthy individuals using their chest X-rays. Also developing Explainable AI (XAI) methods for explaining the reasons or symptoms on the basis of which the model has classified. First, we brushed up our Deep Learning and its libraries knowledge through courses on Coursera. We were then divided into 4 sub-groups:- Data segmentation (cropping out lungs from X-rays), CNN-based classification model, Attention-based classification model, Explainable AI. I chose to work on the Explainable AI part where I had to find AI methods that can explain to doctors and patients the basis on which the model is classifying. Next, we did an exhaustive literature review to find out models / methods that can be used for the project. After presenting all the work, we came across to mentors, one model / method was chosen for each sub-group to implement. For explainable AI, we chose guided Grad-CAM which is a saliency method for making Convolutional Neural Network (CNN)-based models more transparent by visualizing the regions of input that are “important” for predictions from these models. It’s a combination of guided Backpropagation and GradCAM. The last phase was to implement these models / methods in TensorFlow & Keras. We were able to successfully implement our guided GradCAM by the end of PS-1. It helped us in finding out shortcomings in our model’s classifications and, later on, provide an explanation for the predictions.

PS-I experience: PS-I was a great experience. This was the first time when I got the chance to do some quality work in the field I was truly interested in. I was able to work

collaboratively and learnt a lot. We were given adequate exposure to what is expected of us in the professional world, both in terms of technical capability as well as behaviour. I got exposure to the research field and to the whole process that a scientist undertakes when embarking on a research project. This experience has made me more well-rounded student who is capable of applying theory in practice.

Learning outcome: I learnt the practical implementation of various deep learning models. I also learnt lot about a completely new field, Explainable AI, from scratch and its importance in deploying a model for the real-world application. I also worked with various Python libraries such as Keras, OpenCV, Matplotlib, etc. Most importantly, I learnt how to perform an exhaustive literature review and how to apply theory to a practical scenario. On the non-technical side, I learnt how to work in a team, how to set small but significant deadlines and reach them. I understood how the research industry works and the behaviour expected from professionals.

Name: RISHIT MAYUR PATEL .(2018A7PS0189G)

Student Write-up

Short summary of work done: Our project title was "Surveillance of COVID-19 patients using drones". We worked on autonomous vision based landing of drones which would act as delivery drones for food and medical supplies to the citizens. We also worked on object tracking using drones for the surveillance of COVID-19 patients.

PS-I experience: Well, CEERI Pilani is a great PS-1 station to work at especially if you want to learn and implement new topics / ideas and do research oriented work. Of course, due to the pandemic situation, there was a bit of hindrance to the communication with CEERI mentors but still the experience on the whole was fun and enriched with useful knowledge.The mentors and our PS-1 faculty were helpful in providing us with necessary material and ideas regarding our project topic.

Learning outcome: As far technical skills are concerned, the work experience helped us learnt about softwares / packages like ROS, MAVROS, PX4 and a few computer vision libraries. Apart from that, we learnt concepts of Reinforcement Learning, Deep Q-learning in particular, dealing with neural networks and their implementation using TensorFlow / Keras. We also improved our communication skills, team work spirit and industrial / professional work ethics along the way.

Name: R ROHIT .(2018A7PS0224P)

Student Write-up

Short summary of work done: Developed deep learning pipeline to classify CXR images as (COVID-19 +ve) vs (COVID-19 -ve and pneumonia) vs (normal) patients. First stage was to train our classifier on a large chest X-ray dataset after incorporating suitable pre-processing techniques. Second stage was fine-tuning our model on a smaller dataset. In the third stage, we incorporated interpretability to our model using algorithms like GRAD-CAM and LIME.
PS-I experience: It was a good experience.

Learning outcome: XAI is an emerging field and has attracted lot of attention from the DL community. I was able to learn a variety of interpretability-giving algorithms each with different scope such as model-agnostic, locally interpretable etc.

Name: ADITYA DESHMUKH(2018A7PS0246P)

Student Write-up

Short summary of work done: I worked on the project "Unsupervised deep learning techniques for detection of anomalies in Videos". We worked on the UCF-crime dataset, it is a vast dataset with over 120+ hours of videos, of labeled data, like normal, arson, theft, etc. Our job was to design and implement a model that could identify the video clip as anomalous or normal. We developed a generative adversarial network-style model for the same. This model was coded in Python (Keras / TensorFlow and OpenCV mainly). Our model consisted of a 3-D convolutional autoencoder as the generator and a 3-D CNN as the discriminator. While the preprocessing part consisted of a multi-threaded code to segment video clips into 16 frame segments and saving them as a TFRecord and shuffling the data. We trained the model on a subset of data on Kaggle and tweaked some hyperparameters. The model achieved satisfactory results with the test set.

PS-I experience: I learnt lot of things from my PS-1 experience. It provided me with a platform to apply my theoretical skills in the practical world. The exposure and overall-development one gets through PS-1 are unparalleled.

Learning outcome: This project has given me a lot of exposure as to how research work is done and broadened my career prospective. I was able to work on my machine learning and deep learning concepts and improve my understanding of the same. I learnt to code in Keras / TensorFlow and OpenCV as well as work on various platforms like Kaggle, Google Collab, GitHub, etc. This project not only helped me improve my technical skillset but also team building and soft skills. It also helped me develop a scientific temperament. The various webinars provided us with platform to interact with industry experts and listen to their viewpoints on the industrial domain. They also provide us good industry exposure.

Name: SIDDHARTH S .(2018A7PS0265G)

Student Write-up

Short summary of work done: The project that we did attempted to use CNNs and ANNs to estimate the structural health of a building. We used these ML algorithms to detect damage that a building may have sustained in the event that accelerometers sense any vibrations. We also compared the performance of these algorithms using testing datasets. We identified which algorithm gives us better results.

PS-I experience: This experience was very valuable. CEERI Pilani offered me a project in Machine Learning. At a time when I wasn't sure what I wanted to pursue and wanted to try different things, CEERI enabled me to do so. I don't think that I've ever learnt so much in such a short time. It also gave me an invaluable insight into the inner workings of a research institute. Overall PS-1 was a valuable experience.

Learning outcome: I learnt about the theoretical aspects of machine learning. Initially, I had the perception that machine learning consisted of only Neural Networks. However, through doing this project, I learnt that there are so many more methods such as SVM, KNN, decision trees and so on. I leant to code in Python and learnt how to use many libraries such as SciPy, NumPy, Matplotlib, Pandas, TensorFlow/Keras, Scikit learn and so on. I did some more in-depth learning about Convolutional Neural Networks and Reinforcement Learning through watching online lecture series. I gained practical skills in implementing ML algorithms using TensorFlow in Python. I learnt that in certain situations, we may not be able to easily get a good, varied and large dataset form the internet. In

some situations, the only practical way to get a large dataset is through simulations. I learnt to program in MATLAB and learnt how we can create a dataset through MATLAB. I leant what the qualities of a good ML training dataset are and applied them to my dataset. I also learnt how to program an application with a simple GUI which was new to me.

Name: SAUMIL AGARWAL .(2018A7PS0268P)

Student Write-up

Short summary of work done: Detection of diseases by analyzing different health parameters (such as ECG, EMG, pulse, etc) using machine learning.

PS-I experience: It was a good learning experience.

Learning outcome: I learnt about machine learning and deep learning.

Name: KULKARNI HRITHIK VENKATESH .(2018A7PS0278H)

Student Write-up

Short summary of work done: Analysis of air pollution in Delhi-NCR during lockdown using various time series forecasting models like ARIMA, SARIMA and LSTM along with Support Vector Regression, linear and logistic regression. The error in forecasting was found out and the best model was further optimised to give better results.

PS-I experience: PS-1 was good experience but it would have been great if it was not virtual and rather actual working experience with the scientists at CEERI Pilani. The mentors were good, supportive and gave guidance on going about with the project one week at a time. The frequency of interaction with the mentor was again not great due to online mode but overall it was a fine experience.

Learning outcome: A better understanding of Machine Learning algorithms along with the implementation of a deep learning model LSTM. Data handling and pre-processing of weather and pollution data with the help of Numpy and Pandas. While gathering data, we also learnt about web crawling using Python scripts. Other models such as ARIMA, SVR and Regression gave us different ways of analyzing the data. Soft skills such as presentation of the project to a knowledgable crowd of scientists and coordinating with fellow project members to enhance the spirit of team work. We could create a project which has a social and environmental impact and has some impact on our daily lives.

Name: PARVEEN .(2018A7PS0623H)

Student Write-up

Short summary of work done: Developed an Android app in integration with Deep Learning model which can predict abnormal heart sounds using digital stethoscope.

PS-I experience: WFH PS-1 is overall a nice experience as you can do work as per your own pace except the situation where you're not able to access internet facilities. NO internet honestly equals absolute frustration.

Learning outcome: Apart from the knowledge of ML / DL and Android frameworks, the understanding of how your efforts (if honestly given) can also contribute to the project ongoing to achieve something big was my major learning outcome of PS-1.

PS-I station: CEERI - Digital Signal Processing & Communication / ML / DL, Pilani

Student

Name: ARASANAPALAI SRIKANTH NAVYA SRI .(2018A3PS0134H)

Student Write-up

Short summary of work done: Mine was a group project (consisting of 4 members) - " Signal Processing Techniques to eliminate noise in accelerometer sensor". My instructor was Prof. Abhijit Asati and mentor was Prof. Solomon Raju. I was assigned the topic of Curvelet Transform. I have studied the mathematics behind Curvelet Transform for signal denoising and have implemented it in MATLAB. Every week, I submitted diary, attended both quizzes, gave presentations, participated in group discussion and submitted the final report.

PS-I experience: I was happy to be alloted a renowned PS-1 station like CEERI. I got an opportunity to learn from instructor Prof. Abhijit Asati and mentor Dr. Solomon Raju. I had good interaction and exchanges with my team members who are from Goa Campus. I could hone my presentation skills. Overall, it was nice experience, learning and exposure for me.

Learning outcome: I have learnt about Curvelet transform used for signal denoising and implementation in MATLAB.

Name: SARAIYA AMAN SMITESH .(2018A3PS0454G)

Student Write-up

Short summary of work done: Project title: 'Detection of n-COVID-19 patients by analyzing heart sound signature using digital stethoscope'. The main work for the project was to develop a deep learning based classification system that takes recorded heart sound using digital stethoscope as input, process it, and classify it as either normal or abnormal. For easy access using smartphones, the system was integrated with an Android application.

PS-I experience: The experience was good, got to learn some new skills.

Learning outcome: Deep Learning Architectures.

Name: VIKRAMJEET DAS .(2018A7PS0280H)

Student Write-up

Short summary of work done: Build a deep learning based system to analyze and diagnose abnormalities on heart sounds from a digital stethoscope and present the results using a handy Android app. This work would later be used to diagnose COVID-19, subject to dataset availability.
PS-I experience: Good work. Pleasant experience. Great learning.

Learning outcome: Experience with deep learning techniques and android development.

Name: M JAI SIDHARTH .(2018A8PS0660G)

Student Write-up

Short summary of work done: I worked on signal processing techniques for denoising accelerometer signals. My project was part of larger task of deploying accelerometer and other IoT devices for structural health monitoring of buildings. The initial work was to gain surface knowledge of various discrete signal and image processing techniques including the Discrete Fourier transform, Discrete Wavelet transform and contourlets transform with special emphasis on the underlying mathematics. The specific task assigned to me was to propose a modification to the contourlet transform (which is designed for 2-D input signals) to denoise 1-D signals. The implementation of the denoising algorithm was done on MATLAB.

PS-I experience: The project helped me gain insight into the most popular signal processing techniques currently in use. I took some time to get adapted to the work-from-home nature of the internship but me and my groupmates made use of platforms like MATLAB drive and held frequent Google Meet sessions to collaborate on our work.

Learning outcome: I got adapted to the work-from-home mode of the PS-1. I improved my public speaking skills through seminars and group discussions. I gained lot of knowledge about signal processing techniques and their implementations. I honed my coding skills in MATLAB.

Name: VAIBHAV AGRAWAL .(2018AAPS0367G)

Student Write-up

Short summary of work done: CEERI offered 35 projects this year. I have chosen "Signal Processing techniques to eliminate the noise in accelerometer sensor" because I find this closely related to the acads and my branch. We were asked to first develop the algorithm on MATLAB and then finally coded in Python. We were given with signal processing techniques namely-Fast Fourier transform, Discrete Wavelet transform, Double Density Dual Tree DWT, Curvelet transform and Contourlet transform to read and then we were asked to develop 2nd and last two methods (i.e. 3 method) to develop on MATLAB (means develop for the most suited parameters) and then finally code in Python. Denoising of noisy signal is incomplete without filtering or thresholding, so yes, our algorithm have those sections too.

PS-I experience: It was my first hands on experience in industry. We were asked to use advanced signal processing techniques to reduce the noise of accelerometer sensor and this was a problem which they faced since years. It was a great experience to do a project which will have a real life impact. It was overall so good, so nice.

Learning outcome: We learnt how to work in a team, we had to do extensive research and then come up with a feasible solution. Technically too, I used the academic knowledge in the projects. We understood how an industry functions.

Name: T AKSHAYA .(2018AAPS0423H)

Student Write-up

Short Summary of work done: My project dealt with designing an electromagnetic sensor. It was to be used in applications like measurement of radiation from cellphone towers (For 5G cellular networks), radiation from home appliances; Fixation of a safety limit for radiation exposure on human bodies.

PS-I experience: It was a good learning experience.

Learning outcome: Technical skills: COMSOL multiphysics, Ansys HFSS, Literature review.
Soft Skills: Debating, presentation skills, communicating, team work, etc.

Name: APARNA BUDHWAR .(2018B4A70857H)

Student Write-up

Short summary of work done: The project I was allotted was 'Deep learning based detection of COVID-19 patients and pneumonia patients'-from ML / DL domain. The project demanded building a classifier for corona / pneumonia patients detection and also working on explainable artificial intelligence (XAI) so as to provide the basis on which the model is classifying a patient as COVID-19 / pneumonia positive or healthy. I worked on the XAI part of the model, for which we had to implement guided Grad-CAM that considers lung abnormalities like opacities, consolidations etc as an important features for classification.

PS-I experience: It was decent learning experience. I had no prior knowledge about deep learning or XAI, but gradually learnt about it. I gained valuable knowledge about the ML / DL domain and was able to apply it during the implementation of the model.

Learning outcome: I learnt about machine learning, deep learning and artificial intelligence. I learnt how to implement XAI tools like guided grad-CAM in the model using tensorflow and keras API. I also got an understanding about how deep neural networks and convolutional neural networks work, via online learning platforms and various research papers.

Name: ROHAN AGARWAL .(2018A7PS0123G)

Student Write-up

Short summary of work done: I was offered Machine Learning project of detecting n-COVID-19 patients analysing various health parameters in CEERI, Pilani. The project seemed to be quite far-sighted as such datasets were neither freely available on online open sources nor with our mentor at that time. First few weeks were spent off in an exhaustive research for some relevant dataset but failed. However, I used that time getting familiar with several deep learning techniques side by side which would be used in later stages of the project. We planned to incorporate five health parameters but failed to find a dataset covering all of them. Later, with consent from our mentor, we simplified our project to base our model only on one health parameter ECG to analyse the functioning of a patients heart. Overall, PS-1 was great learning experience enabling me to explore my experience in the field of Machine Learning and Data science.

PS-I experience: Due to work from home policy, I could not get much Industry exposure from PS-1. However, I gained quite few technical skills as well as work ethics in this short duration. Though there was little confusion and chaos in the beginning for everyone being new to the system, things smoothed down after a while. Regular weekly meetings with the mentor helped to keep us disciplined and stick to our work plan. As our project was based on predicting n-COVID-19 using Deep Learning, we struggled a lot for searching revenant datasets and in the end, settled for a simpler and easier project. Besides, all these problems, I felt I had many takeaways from this experience in terms of Machine Learning, professionalism, work ethics under much experienced mentor and team work with fellow students.

Learning outcome: Being completely new to Machine Learning, I found PS-1 as great opportunity to explore the same. For the project, I completed several Deep Learning courses on Coursera and also learnt about different feature extraction and data preprocessing techniques through several research papers. Above all, I feel I learnt how to approach a new problem statement, search for relevant datasets for the project and formulating a basic idea to develop in future. Further, I learnt about several optimisation techniques in terms of memory usage and computer power.

PS-I station: CEERI - Industrial Control & Automation, Pilani

Student

Name: SOBAT SINGH .(2018A3PS0313P)

Student Write-up

Short summary of work done: I was alloted Industrial Control and Automation as the domain under which our project was to design an antognistic SMA actuator model using MATLAB and control it using machine learning.

PS-I experience: We had weekly meetings with our mentor at Ceeri and the PS-1 faculty wherein we presented the work that we had done throughout the week and task for the next week was given. Overall, it was decent experience where got small insight into how things work at CEERI.

Learning outcome: Got familiar with MATLAB and basics of machine learning and neural networks. And also, developed some basic communication skills.

Name: ISHITA AGARWAL .(2018A3PS0352P)

Student Write-up

Short summary of work done: My project aimed at implementing a reinforcement learning algorithm for resolving parameter optimization problems of Proportional Integral Derivative (PID) controllers. Due to lack of self-tuning PID parameters in conventional PID controllers, the structure and learning algorithm of an adaptive PID controller based on reinforcement learning was proposed. The solution of first / second-order ODE was simulated via scipy.integrate.odeint and a PID velocity control system was simulated using python. Actor-Critic learning will be used to tune PID parameters effectively. The Actor realizes the mapping from the system state to PID parameters, while the Critic evaluates the outputs of the Actor and learns from TD (Temporal Difference) error.

PS-I experience: I had great experience working with CEERI. Since this year PS-1 followed a remote model due to the COVID-19 situation, we used various tools like Canvas and Google meet to communicate with the industry mentor and fellow team members. These tools ensured the smooth flow of work. I got exposure to recent developments in the field of Artificial Intelligence, Machine Learning and Electronics. I also gained insight into the research activities being carried out at CEERI.

Learning outcome: I learnt about control systems and tuning methods with more emphasis on PID controllers. I also gained exposure to Machine Learning, especially Reinforcement learning: MDPs, Q-Learning, Actor-Critic Method and TD Learning.

Name: HARSH VARDHAN MEHER .(2018A3PS0605H)

Student Write-up

Short summary of work done: I was assigned a research project, in which I had to go through 6-7 research papers / theses done by other researchers on the relevant topic. I and my team had to learn up on the assigned project by ourselves and could consult our mentor in case of doubts. We were assigned a head scientist at CEERI as our mentor. We held weekly Google meets and discussed on the work done and the work yet to be done. We had to create a mathematical model of an actuator, on SIMULINK and implement a deep neural network for aiding it's functioning.

PS-I experience: It was wholesome experience. I learnt about working with a team, completing deadlines, getting help when stuck and many other soft skills.

Learning outcome: I learnt mathematical modelling on SIMULINK, visualising mechanical model digitally using Python coding knowledge to implement a deep neural network.

Name: PUTHA VENKATA ROHITH REDDY .(2018A3PS0636H)

Student Write-up

Short summary of work done: We as a team worked on modelling the SMA actuators and applying Deep Neural Networks to it to predict the displacement of the actuator.

PS-I experience: It was an amazing experience. Both PS-1 mentor and faculty allotted were extremely helpful in the entire project.

Learning outcome: I learnt about simulink modelling, SMA actuator workings and tensorflow.

Name: SHAH VISHWA VIPULKUMAR .(2018A7PS0109G)

Student Write-up

Short summary of work done: We worked on building Deep Learning models for structural health monitoring. We first familiarised ourselves with deep learning by completing courses from deeplearning.ai. After thorough literature review, we shortlisted the approaches that we would be following. The project aims to take accelerometer data and finding out the drift ratio or displacement in a multi-storey building, which can help in structure evaluation aftermath like an earthquake and categorize the safety state depending on the displacement to know if the building is safe, needs further inspection or has to be evacuated. In one approach, we denoised the simulated noisy signals using FFT, CNN and ANN and compared the output against pure signals. In the other approach, we directly classified using CNNs and ANNs and got better accuracy. We used Scipy, Keras, Tensorflow and Matplotlib libraries.

PS-I experience: I had co-operative and helpful team and I learnt lot from other students. My PS-1 instructor and Mentor were also very helpful in this online mode of learning. I had good experience with my PS-1 station and I got a chance to work on project in the domain I was interested in.

Learning outcome: I got an in-depth knowledge about Deep Neural Networks. I learnt the implementation of algorithms and various libraries like Keras and Tensorflow. Literature review gave me a detailed insight in this domain and how to practically apply this concepts in real life scenarios. I got a good exposure to how research industries work and what is expected.

Name: ANIRUDH NAGARAJ .(2018A7PS0216G)

Student Write-up

Short summary of work done: The project was based on using Machine Learning techniques for leak detection and localisation in an IoT-enabled Smart Water Grid. Our

group initially studied scientific literature on leak detection and localisation techniques in water distribution systems, including various deep learning techniques for the same. It was decided to implement Artificial Neural Networks for leak detection and localisation. Python (Keras) was used for developing the neural network model. A water grid was simulated using EPANET, a hydraulic modelling software. Based on approaches followed by research articles, leakages of varying sizes were simulated at different junctions of the water grid. The generated simulation data, consisting of parameters like pressure and flow was exported as multiple Excel files. Using the NumPy and Pandas libraries of Python, data was extracted from the excel files and converted into usable, balanced dataset for training the neural network. Leakages cause variations in pressure values. Hence, using pressure values from the junctions of the water grid, the neural network was able to predict leakages with a good accuracy. It was also inferred from the prediction results that detection of small leaks is difficult, since the variation in the parameter values is not significant. A scheme for leak localisation was proposed.

PS-I experience: I had a good experience working with our mentor, our faculty and my group members. Our CEERI mentor and PS-1 faculty were highly supportive throughout the course. They provided valuable inputs and guided us in accomplishing the goals of the project.

Learning outcome: I learnt about deep learning and neural networks, data preprocessing, wrangling and analysis and leak detection and localisation methodologies. I was exposed to professional working standards and work ethics. I gained a grasp on finding and reading research articles. I was able to improve my soft skills and presentation skills. I also learnt LaTeX for preparing the PS-1 report.

Name: HARSH SHARMA .(2018A7PS0230P)

Student Write-up

Short summary of work done: Developed an AR app which allowed the user to see tutorials for maintenance and operation of machines by augmenting 3D animations on the machine.

PS-I experience: It was good, I learnt a lot.

Learning outcome: Learnt how to use Unity and Vuforia.

Name: AKSHIT PATEL .(2018A8PS0094P)

Student Write-up

Short summary of work done: The main aim of the project was to design closed-loop control of Electric tricycle for the disabled and elderly. Mathematical and physical models for actual BLDC motor used in E-trike were derived. Modeling of BLDC motor was done in MATLAB SIMULINK. Closed-loop control was done with the help of both normal and advanced PID controllers like self-tuning Fuzzy PID constants and with genetic algorithm.

PS-I experience: I am satisfied with my experience. I had lot of interaction with both the CEERI team and BITS faculty which were very supportive and knowledgable. Learnt how to use classroom theory at work and how a problem should be approached professionally.

Learning outcome: MATLAB-SIMULINK, Various PID techniques and Optimisation techniques.

Name: JABADE ADITYA MANDAR .(2018A8PS0436G)

Student Write-up

Short summary of work done: Developed a complete closed-loop control system for the Electric tricycle using varied methods. Firstly, we made a comprehensive study of the BLDC motor used. We did a literature study of various hub BLDC as well as conventional motors used in the industry and made comparative study. Further, we constructed a mathematical model of the motor and derived its transfer function. The next big task was to estimate all the parameters of the motor using experimental techniques coupled with analytical equations. We were successful in analysing all the physical and electrical parameters (R,L,J,B,Kt,Ke) along with the planetary gear box system. This completed our plant analysis. Next, we moved on to developing the controller. We started with manual tuning of PID by MATLAB – Simulink for both the mathematical as well as the physical model. Further, we moved on to create ‘Fuzzy controller’ based on a robust rule base. This was also supported by PID tuning by Genetic algorithm for 3 different cost functions. In this entire study, we thus obtained speed control of the motor.

PS-I experience: My experience at CEERI, Pilani was a great one. I got introduced to the industry level projects and could work on one. PS-1 helped me to gain an insight into the world of research and gave hands-on experience of working on very good project. The course was brilliantly curated with thorough evaluation components and interesting guest lectures. The seminar sessions helped me develop my soft-skills along with interesting Group discussions. To sum up, I could get good exposure of the industrial and research world.

Learning outcome: I learnt the following technical skills: Mathematical modelling, in-depth MATLAB-Simulink skills, advanced control systems and power electronics fundamentals. I also developed my presentation, discussion skills thanks to the soft-skill based evaluation components like GD, seminars.

Name: MANAS AGARWAL .(2018A8PS0470G)

Student Write-up

Short summary of work done: We learnt about different types of codes such as polar and LDPC codes for 5G technology. We learnt about different mathematical approach for the same and also learnt about the hardware architecture for polar codes.

PS-I experience: It was very great both faculty and industry mentor were very helpful. We have time to time meeting for discussions and doubt clarification.

Learning outcome: We learnt mainly about polar codes and different approaches to perform polar encoding of message BITS and how can optimize it also after PS-1, we are in touch with our industry mentor, so that we can learn and optimize the hardware architecture for the polar encoders.

Name: MADDHA ABHINAVA .(2018A8PS0844H)

Student Write-up

Short summary of work done: After the project was allotted, mine being 'Tuning PID controllers with Reinforcement learning', the team started off by getting familiar with RL and policy gradients and PID controllers. We worked on code to implement a PID controller. We discussed a research paper on similar lines that used fuzzy logic to get a better understanding of what essentially we need to include in the code to tune the PID parameters. In the last week, to finish with the code, we worked on RL module of the code using the concepts of TD learning, experience replay and Actor-Critic policy.

PS-I experience: Although remote PS-1 seemed intimidating at first. I settled with the idea and got incredible help from Dr. Prasant Pattnaik, Dr. Rakesh Warier and the industry mentor Dr. Samarth. CEERI being a research centre helped me immensely as I wish to go in a similar direction pursuing AI. Also, I should add that the team I belong to had very accommodating and understanding colleagues and I think our team work was amazing, without which being so, we would have had a hard time.To sum it up, it was all I'd ever wished for.

Learning outcome: About PID controllers as an extension to what we learnt in II-II, reinforcement learning (Q-learning, Deep Q-learning, policy gradient and more), soft skills, working in a team, and a great platform to implement all this.

Name: SAWANT YASH SANDEEP .(2018AAPS0297G)

Student Write-up

Short summary of work done: The project alloted to me was simulation of metal-oxide gas sensors. The primary goal of this project was to create a working model of metal-oxide semiconductor gas sensor using COMSOL multiphysics. Other objective of this project was literature review about metal-oxide gas sensors.

PS-I experience: It was my first hands on experience in an industry. It was an excellent experience for students who seriously devoted attention and earnestly worked on thier projects.
Learning outcome: We learnt about metal-oxide semiconductors, gas sensors, fabrication processes and simulation of physics models.

Name: SNEHIL GUPTA .(2018B4A30112P)

Student Write-up

Short summary of work done: The title of the project was "Tuning a PID Controller using Reinforcement learning". We started with first creating a simulation of a PID controller in Python and then created a OpenAI gym like environment for the PID controller, so that it can be tuned by a Reinforcement learning agent. We used CACLA (Continuous Actor Critic Learning Automaton) RL algorithm for training.

PS-I experience: The overall experience of online PS-1 was good, weekly talks were conducted by the PS-1 station wherein industry leaders used to give us industry exposures. Also, the mentor and faculty were mostly available online to solve any doubts.

Learning outcome: We learnt modular programming in Python, since we had to build a openAI gym like environment for PID controller, later on we learnt about Reinforcement learning, CACLA algorithm and Pytorch to tune the PID environment that we created.

PS-I station: CEERI - IoT, Pilani

Student

Name: KHAN UBAID MD SHAFIQUR REHMAN(2018A3PS0541H)

Student Write-up

Short summary of work done: The work required was to implement a Machine learning algorithm, Convolutional Neural Networks, using reconfigurable hardware, i.e. FPGAs (Field Programmable Gate Arrays). To incorporate applications, image classification and video anomaly detection was done using Python. For the hardware part, various architectures were studied to maximize efficiency and minimize time taken. Algorithms to offload heavy computational calculations, matrix multiplication on hardware were used. Algorithms were fed into Vivado software and then optimized for RTL implementation.

PS-I experience: The PS-1 helped in getting outside exposure. The faculty and mentors helped us in achieving the goal of our project.

Learning outcome: We familiarized ourselves with the various aspects of Deep learning and Hardware platforms like FPGA and ASIC and and then implementing these concepts using Python. The work produced a parameterizable architecture capable of executing multiple CNN convolutional layers. Software implementation of CNN was done using Python. For incorporating an application, video anomaly detection was used. The hardware implementation was done using Xilinx ISE software which required coding in VHDL. This included the coding for matrix multipliers, for which conversion of convolution to matrix multiplication was understood.

Name: PRABHUTVA AGRAWAL .(2018A7PS0115G)

Student Write-up

Short summary of work done: I worked under Mr. Pramod Tanwar, Principal Scientist at CEERI, Pilani. The name of my project was IoT-AR: Implementing Augmented Reality in Internet of Things applications. The project aims to incorporate three widely used technologies: IoT (Internet of Things), Android application development and augmented reality development into one application. Using various services and platforms, the application displays the real-time temperature of a location in an Augmented view inside an Android smartphone.

PS-I experience: The PS-1 was useful learning experience. I have gained new knowledge, skills and I got to learn about the professional practices that are involved in the making of a product. I got insights about how the process of development proceeds and various industry standards. This opportunity has given me new insights and motivation to pursue further in the domain of application development and Internet of things.

Learning outcome: 1. Working with Unity3D engine and Vuforia engine to create an AR application.
2. Combining AR, IoT and Android app development into one project.
3. Creating Android plugins for Unity.
4. Sending sensor data to a web server.

5. Calibrating and collecting GPS sensor data for accurate Geofencing.
6. Writing documents like SRS (Software Requirements Specification), installation manuals and block diagram for a product.

Name: S SAI VINEET .(2018A7PS0168G)

Student Write-up

Short summary of work done: The project aimed at developing a Reinforcement learning agent that could tune a PID controller automatically. We started by implementing PID simulation environment in Python using scipy and then implemented a gain normalisation scheme from a research paper. Then, we implemented an RL algorithm called CACLA from another research paper (Van Hasselt 2007) and trained it. We also analysed the behaviour of the agent.

PS-I experience: My PS-1 experience was delightful. It was full of learning and I feel like I have developed my soft skills on the way as well.

Learning outcome: I learnt how to work on a shared codebase, how to distribute work in a software project, how to read and understand research papers and how to implement them. I also learnt how to debate and discuss ideas with your team and mentor. Apart from these general skills, I also learnt technical skills such as Reinforcement learning and control systems, which will surely help me in my career.

Name: AYUSH KATIYAR .(2018A8PS0545G)

Student Write-up

Short summary of work done: I am working on Smart Water Grid for leak and brust detection project in Industrial Control and Automation. I worked on determinening the right sensor and integrating it with hardware such as microcontroller with analogue to digital converter. I also sent that pressure data over LoRa network so it could be stored at server. Then, my teammates would perform machine learning to determine leak position.

PS-I experience: Got to learn about CEERI, Pilani and work done their.

Learning outcome: Learnt C programming how sensor's work.

Name: VEMPARALA LAXMI MANUHA .(2018A8PS0953H)

Student Write-up

Short summary of work done: The project allotted to me was "AI based IoT System Design". The domain is Machine learning / Deep learning. We have tried implementing the system design for structural health monitoring which refers to damage detection and characterization of structures like building and bridges.
1) First, we learnt the concept and code related to different Machine learning algorithms for regression, classification and clustering.
2) We have done literary research on Machine learning algorithms for Structural Health Monitoring (SHM).
3) We trained the classification model - "Support Vector Machines using kernels" to classify accelerometer and strain gauge sensor data and for error approximation and the regression models "Decision tree" and "Support Vector Regression" for noise reduction / extraction of original signal using data similar to SHM.
4) We also used the unsupervised Machine learning algorithms "K-means Clustering" and "Principal Component Analysis" for anomaly detection and error localization.
5) To collaborate all the Machine learning tasks carried out with Internet of Things, we used docker and containers to package the code of all the trained models.
6) We wanted to use the docker images and containers on Raspberry pi 4 which would complete the AI based IoT system design but couldn't do so because of the unavailability of the hardware components.
PS-I experience: My PS-I experience is an unforgettable one as the internship in CEERI was my first ever internship. To be able to communicate with the higher authorities of the company was overwhelming. I understood how work is carried out in a company and was able work in the same way with utmost sincerity. The constant support from our institute and industry mentors gave us a sense of relief motivated us to work better. I was able to gain lot of knowledge from PS-I and it was an enjoyable learning experience.

Learning outcome: I have gained knowledge about the domain of Machine learning at a greater depth and algorithms that can be used for different purposes in Python. I have learnt how to use the platform Google colaboratory and performed Machine learning

algorithm implementations for the first time on it. I've understood the usage and importance of dockers and containers. Apart from technical skills, I have also got better soft skills like communication and oration while preparing for multiple assessments. I was also able to improve my work ethics, time management and team-working skills.

Name: SIDHARTHA ASHOK JAIN .(2018AAPS0335G)

Student Write-up

Short summary of work done: Work was based on IOT at the edge using AI. It required developing IOT architecture that utilized containers for management of different tasks. Developed containers for handling IOT protocols at the edge.

PS-I experience: It was very interesting and challenging. Took some time to adjust to working online all the time. Industry exposure was not as good as expected, but it was great experience learning wise.

Learning outcome: Learnt about Docker and containers. Uses of containers in IOT and ML. Learnt about bash programming. IOT protocols and architecture development.

Name: KOTAMREDDY GANESH REDDY .(2018AAPS0353H)

Student Write-up

Short summary of work done: The ability to monitor and control the flow of water in real-time can be invaluable as one can detect and seal off leaks with minimal effort. The practical realization of such models, however, is easier said than done, as the outward simplicity of the system belies the complexity and magnitude of the problem. The design of a smart network capable of monitoring a given water distribution system must take into account the maximization of resource utilization while still providing near-comprehensive coverage over large areas, be able to stand the test of time, and still transmit essential data swiftly. The work done during PS-I is a humble attempt at finding a solution to a reduced version of the problem. Instead of seeking to monitor every aspect of the system,

we attempt to find a generalized model specifically optimized for the detection of leaks within the water distribution system. Modeling and simulation of the water distribution system have been conducted on the EPANET platform. The data generated from the EPANET simulations have been used for training the machine learning model, a deep neural network, capable of predicting leaks in the water grid. A scheme has also been put forth for leak-localization. MySQL has been proposed as a feasible local platform for data storage. The EPANET model will have to be validated by comparing it with real-life pressure data. Lora WAN has been proposed as the most suitable IoT based communication protocol with a module consisting of Lara WAN and Arduino with Lora gateway acting as an interface. Industry-standard sensors for collecting the pressure data in the network have also been proposed.

PS-I experience: PS-I provided a unique opportunity to interact with industry mentors and work with students of various disciplines to learn and gain experience about the concepts and techniques that are currently being used in the industry. Since this year, the PS-I is conducted online rather than the regular offline PS-I, this was my first experience of working on a project online. The interaction with an industry mentor and faculty instructor was mostly done through Google Meets which was a completely different experience as compared to meeting them in-person. the interaction usually took place with video off and only through the microphone. This type of interaction made it a bit difficult for me to express the concerns, doubts, opinions to the mentor and faculty instructor. There was no hands-on experience in developing the hardware which would have been possible if it would have been an offline PS-1. This made it difficult to show accurate results and physical implementations in the project virtually through google meets. But this gave us the experience to struggle for ideas and think out of the box to present the results and simulations to the mentor and instructor. The communication between the team members mostly took place through Whatsapp rather than direct face to face talk. This reduced the amount of interaction between us but everyone started asking the progress of each other's work which led me to the experience querying others confidently. The entire evaluation scheme put forth for the online PS-1 helped me complete the project gradually at a regular pace step by step. The evaluation components like quiz, dairy, seminar, project report helped me to continuously learn new things regarding my project and gain experience in writing dairy, report for planning and recording the concepts and progress in the project. The evaluation component like group discussion helped me to learn something unique about my project domain and helped me improve my soft skills. My entire PS-I was an excellent experience in putting forth an industry-standard project.

Learning outcome: My learning outcomes of the PS-I include learning of both the concepts in developing the project and components involved in recording the progress of the project. Concepts learned in developing the project: EPANET, water simulation and hydraulic modeling software can simulate water grids using pressure-driven analysis. Emitters in EPANET can be used to model leakages in the water grid. Any leakage will result in deviations in pressure, flow, and other parameters in the network. This fact can be used for leak detection and localization. MySQL is a feasible option for the storage of data generated by IoT devices and for exporting data in a format usable for machine

learning applications. Sensor placement is optimized to minimize costs. Sensors have been designed keeping power efficiency and reliability in mind. Industry-grade sensors have been proposed, controlled by easily-available micro-controllers like Arduino and Raspberry Pi in order to make a cheap sensor package capable of lasting for years. Lora Wan has been chosen as the communication protocol as it fulfills the requirements of the project the best out of commonly available options. Components learnt in recording the progress of the project: The evaluation components like quiz and seminar helped me to continuously learn new things regarding my project and the components like dairy and project report helped me to gain experience in writing a dairy and a report for planning, and recording the concepts and progress of the project. The evaluation component like group discussion helped me to learn something unique about my project domain and helped me improve my soft skill levels. The overall learning outcomes were the concepts, tools and techniques in developing a project from the beginning to the end.

Name: AMRITHA IMMANENI .(2018AAPS0627H)

Student Write-up

Short summary of work done: We studied the details and case studies related to IoT in agriculture, as well as image analysis in soil identification. We documented all the papers that we had read into a structured report. I designed a web app that returns the Munsell colour value of a soil image that is fed to it. This helps in soil classfication.

PS-I experience: PS-I was a great learning experience. It made me explore new avenues and pick up new skills under a deadline. I enjoyed everything that I did, right from tinkering with an Arduino to trying to learn web development.

Learning outcome: Learnt about farm management systems, smart agriculture and learnt how to build a website from scratch.

PS-I station: CEERI - VLSI Design, Pilani

Student

Name: ABHINANDAN SHARMA .(2018A3PS0095P)

Student Write-up

Short summary of work done: The title of our project was ‘FPGA Based System Design for Wireless Communications’. My work was to study about NR LDPC encoders and decoders for 5G Standards. The field of wireless communication and Linear Block Coding was explored thoroughly. Different encoding / decoding algorithms were understood and then implemented on MATLAB.

PS-I experience: Although this year PS-1 was WFH, I hardly felt the difference. I used implement different architectures on MATLAB, prepare for presentations and then formulate the reports. It was a very engaging and informative month for me.

Learning outcome: I improved my programming skills in Python and VHDL. I learnt a lot from Dr. Gaurav Purohit (my mentor), and his work on optimizing polar codes and convolutional encoders was very motivating for me. Beside this, I learnt lot while preparing presentations and reports, which will surely be beneficial for me in future.

Name: GANDHI AKSHAR NILESH .(2018A3PS0311P)

Student Write-up

Short summary of work done: The domain of my work was related to VLSI. I was allotted a project on the "Scaling of RF MEMS devices". Within this broad spectrum, I chose to work on the applications of RF MEMS switches for 5G. My project began with understanding the parameters, principles and functions of RF MEMS switches, after which I focused on the various avenues and challenges of commercial 5G deployment. As the project progressed, I was able to mature my mission statement to a singular goal, which was to design a capacitive RF MEMS switch that showed desirable behaviour at high frequencies. I finished my project successfully and was also able to indicate how my designed switch could be used in various ways for 5G deployment solutions, such as phase shifter for phased antenna arrays.

PS-I experience: I gained large amount of knowledge from the scientists and the faculty. I gained exceptional experience in the fields of electronic engineering through various meetings and webinars organised by the faculty. They also gave me the experience of effectively communicating during the work from home scenario.

Learning outcome: The invaluable insight provided by our mentor enabled me to sharpen my skills, broaden my academic scope and improved my problem solving ability. It exposed me to a professional atmosphere which instilled in me a sense of responsibility and gave me a taste of the research world. They helped me improve my career prospects through vast networking and connecting me to the experts.

Name: PIYUSH RAJ JHA .(2018A3PS0320P)

Student Write-up

Short summary of work done: I was assigned the designing and simulation of a bolometer for IR sensors. Bolometer is a device used to measure the power of incoming IR radiation. I was made model of bolometer in COMSOL using the knowledge I gained by reading up many research papers on the topic provided to us by our mentor. He guided us in the process and told us what tasks to complete. Dr Rahul helped us in gaining the skills required in COMSOL to make a resistor coil. Our instructor assigned to us helped us with everyday tasks and guided us whenever we were stuck. Overall, it was great experience working with the mentors at CEERI Pilani and I enjoyed the work provided to me thoroughly.

PS-I experience: It was great experience. We learnt many new things and gained many skills including soft skills. It was wonderful time collaborating with fellow team members in modelling a bolometer.

Learning outcome: I learnt about the working of bolometer. I also found out about the working conditions in an organisation. We learnt lot about the bolometer and the way it functions. We also learnt about the design choices that are made and the trade-offs involved with different design choices. We learnt about the applications of these devices in our everyday lives and also in the military field.

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Name: MEHADIA SANKALP NITIN .(2018A3PS0341P)

Student Write-up

Short summary of work done: My project was designing Einzel lens for Quadrupole Mass analyzer. First, I learnt about the basic theory of Einzel lens and Quadrupole Mass analyzer along with COMSOL multiphysics. Then, I simulated the lens on COMSOL and studied the effect of the various parameters on the focusing mechanism of the lens.

PS-I experience: Overall, it was good experience. I learnt lot of new skills both technical and soft-skills. My mentor was very helpful and guided me whenever I required his help.

My PS-1 Instructor was very supportive and we could ask for his help any time of the day and he would always respond. His insights in making slides and report were really helpful.

Learning outcome: I learnt about COMSOL multiphysics software along with many soft-skills such as email writing conduct, powerpoint presentation and slides preparation skills, group-discussion skills and much more. I also got an idea about working of research institutes.

Name: ISHITA AGGARWAL .(2018A3PS0343P)

Student Write-up

Short summary of work done: The project involved understanding the structure, principle and working of a metal-oxide gas sensors. When gas diffuses on the metal-oxide film, its resistance changes as a result of an oxidation / reduction reaction. The project involves modelling, simulation and analysis of metal-oxide gas sensor for detection of different gases using COMSOL. In this report, NO_2 based SnO_2 / rGO gas sensor has been modelled and analysed using mainly three techniques viz. NO_2 exposure model, heat transfer model and the chemi-resistor model. The graphs have been plotted using MATLAB.

PS-I experience: The PS-1 provided first hand experience in research field. It helped in building an experience, team work and presentation skills.

Learning outcome: Gained advanced knowledge of metal-oxide gas sensors, COMSOL multiphysics software and MATLAB.

Name: NIKHIL JAIN .(2018A3PS0455G)

Student Write-up

Short summary of work done: There were many projects which were available in the domain which I was alloted VLSI design. I was given the choice to fill my preference and got project from my preference list. My project was to do the Investigation of non-contact IR temperature sensors for COVID-19. There were 4 students including me in the project. We researched different types of thermal detectors which are available. Among these detectors, we researched for the best thermal detector, then we simulated the detectors on the software COMSOL and tried to modify the structure by changing its geometrical shapes and the material of the sensing layers to improve their working. I mainly focused on reducing the environmental effects on these detectors by researching different structural designs and then simulated them and checked different properties.

PS-I experience: PS-I experience was wonderful and helped learning in multiple spheres.

Learning outcome: I got to work in one of the prestigious research institutes of the country. It gave me an opportunity to experience and learn from the work culture. I learnt lot of technical things about my project. I also learnt how to present my work properly.

Name: YUGANSH DAVE .(2018A3PS0458G)

Student Write-up

Short summary of work done: The nature of work was entirely research based and considering the work from home nature of my PS-1, it was even more 'online searching / browsing' oriented. The project topic was Investigation of non-contact IR temperature sensor for COVID-19 detection. The sub-project allocated to me was investigation of sensing techniques for human body. So essentially, I was supposed to do intensive research on the most common temperature sensing techniques like microbolometers, thermocouples, thermopile sensors, LM35 etc. and based on my research recommend the appropriate sensing technique for the purpose at hand. To help with the research, I was also supposed to simulate these sensing techniques on the COMSOL simulation platform, which helped me in comparing their workings practically. The key points to consider while researching the sensing techniques were accuracy, precision, availability and most importantly cost effectiveness of the sensing technique for large scale implementation. Thermocouples and thermopile sensors are relatively older technologies with lower precision but extremely cheap and available universally. Microbolometers use the cutting edge MEMS technology but most of the cheaper variants are still in R&D stage. Researching on the specifics of these sensing techniques was one of the key ideas of the research. Aside from this, online youtube videos and tutorials had to been scanned for

more information on working of these sensing techniques. Several research papers were provided by the mentor on this topic which I had to go through in order to gain a better understanding of the project.

PS-I experience: The work from home nature of my PS-1 made it relatively unique. Although, the experience might not be as close to as a regular PS-1 would offer, but it did offer some valuable learning oppurtunities. The distant learning mode and managing to always interact with our mentor and PS-1 faculty online from time to time was good skill to learn. Aside from this, I was able to incorporate a lot of research aptitude in myself which I have actually been wanting to do for quite some while. The research was also on very trending topic - the current pandemic of COVID-19 and hence felt like it had a lot of value. The seminars were amazing ways to actually learn on how to do formal presentations and how to prepare for the same. The group discussion was also fun to do, especially since it was an online mode through Google Meet. The weekly diaries gave an oppurtunity to reflect on the work done in the previous week. To be able to actually interact with a scientist from CEERI, Pilani and able to know his research domain was an amazing experience. All in all, it was a pretty unique experience.

Learning outcome: The biggest learning outcome was the research aptitude I built over the course of 6 weeks. I gained massive insight into the sensing techniques available in the market and was eventually able to provide recommendation on the ideal sensing technique in current context. I improvised on some soft skills like communication and delivering presentations through online mode. The group discussion also enhanced the debating skills. I was able to learn lot about the work going on at CEERI, Pilani and about the research domains of scientists working over there. A very new and unique simulation tool called COMSOL was also introduced and I eventually learnt how to operate this complex platform and gain an idea of simulations practically through this tool.

Name: BHURE AROONDHATI SANJAY .(2018A3PS0528H)

Student Write-up

Short summary of work done: I was working on 'Pyroelectric Sensor Modelling' in VLSI domain. A pyroelectric sensor falls under thermal sensors that responds to rate of change of temperature. Due to change in heat flux through few materials, free charges are generated on the surface. That's about the basics. We used COMSOL multiphysics 5.5 to model. For starters, we modelled resistive coil of platinum on a glass substrate. It demonstrated Joule's heating. Later, pyroelectric sensor was modelled. It had sensing element and mechanical support. Dimensions were in microns. Our team of 3, each chose

2 different pyroelectric materials. We simulated model for different wavelength and radiation power. Simulation results were exported to MS Excel. We wrote MATLAB script to get plots for each material. Conclusions were derived, wavelength had no significant effect and current showed linear rise with increasing power. This gave sensitivity. Our project basically dealt with pyroelectricity, pyroelectric materials, types of IR sensor, PIR sensor, pyroelectric sensor, modelling, results, conclusions, applications and future scope.

PS-I experience: My PS–I experience was quite good. I am grateful to have received timely guidance from my industry mentor and allotted faculty. At the start, we had some orientations about all projects offered. According to our preference of project, we were allotted project. There were talks from experts, director and many notable personalities. For our evaluation component, we had quizzes, observations, reports, diaries and seminars. On the whole, I am happy with the remote model of PS-1. Although, on site internship would have been better.

Learning outcome: On technical front-I got to explore entirely new simulation software on my own. COMSOL provided many technical challenges every now and then. We referred to online discussion forum. We finally built virtual model of pyroelectric sensor. Later, we used MATLAB to obtain graphs and semi automated the process. We deduced conclusions from graphs. Soft skills- I had great learning experience with my team. Our faculty helped us refine our presentation and speaking skills.

Name: ASHWIN E .(2018A3PS0554H)

Student Write-up

Short summary of work done: I opted for work on Very Large Scale Integration (VLSI) design for PS-I at CEERI, Pilani. I was allotted project on the Investigation of Infrared temperature sensors for the purpose of COVID-19 detection. This project had four sub-domains. Of those, I was allotted optimization of the sensing layer of Bolometer. My work involved going through the research papers and other material provided by my mentor to come up with better sensing layer in bolometers. Initially, I compared the sensing mechanisms of bolometers, thermophiles and pyroelectric sensors. I later learnt about the fabrication processes like sputtering and vapour deposition. Then, I went through the already available sensing layers and worked on improving their efficiency. I also designed and simulated the bolometers on software called COMSOL multiphysics. I also worked on superconductors and MEMS technology for their use in detecting layers of bolometers. Later, I also got to work on Focal Plane Arrays (FPAs) and Read-Out Integrated Circuits

(ROICs). I researched the different structures of FPAs and how they can be tweaked in order to improve the efficiency, sensitivity and temperature coefficient of resistance (TCR) of bolometers. I also understood the circuital structure of ROICs and the improvements being made in terms of speed and processing power of ROICs.

PS-I experience: I had lot of expectations out of an esteemed institute like CEERI, Pilani. I am happy to say that the institute did live up to my expectations. I had the opportunity to meet and interact with the scientists of the institute and also learnt lot about the projects being done at CEERI. I also mentored by one of the most experienced scientists of the institute. In the process, I gained lot of knowledge in the field of smart sensors. My PS-I instructor was also very helpful and knowledgeable. Overall, I would recommend the institute for those interested in core electronics.

Learning outcome: I learnt lot about smart sensors, various types of temperature sensors available. I gained knowledge on IR radiations and how they are sensed, IR senors and bolometers. I also simulated the sensors on COMSOL multiphysics. I also learnt about ROICs and FPAs. I also got a flavour of the industry and learnt about the manufacturing of electrical components and an opportunity to work on superconducting materials.

Name: RISHAV DATTA .(2018A3PS0910H)

Student Write-up

Short summary of work done: My PS-I project was "Pyroelectric Sensor Modelling". I had to design pyroelectric sensor and carry out its simulation in COMSOL. We had to choose two materials as the pyroelectric film and vary the wavelength and power of the incident IR radiation. From there, we obtained the data for temperature vs. time, rate of change of temperature vs. time and current vs. time. Lastly, we had to plot maximum current vs power using which we compared the sensitivity of the two materials. Finally, the report making and seminar presentation was also done, which was test of communication and report writing skills.

PS-I experience: Working in CEERI was great experience. The institute is focused on Machine learning, Deep learning, Artificial Intelligence, VLSI design, IOT, Industrial control and automation. Scientists and mentors at CEERI were very approachable and helped in our work whenever needed. Faculty was also helped in our evaluation

components as well. The team that I worked with was focused and helpful in completing the project.

Learning outcome: I summarize my learning outcomes as follows,
1) Learnt to design primary pyroelectric sensor and the significance of its various layers.
2) Learnt about ray optics module in COMSOL, which we will be used in the simulation.
3) Learnt to analyze data in MATLAB and plot graphs.
4) Concluded that ZnO is more sensitive pyroelectric material than AlN.

Name: SRIRAM KODEY .(2018A4PS0671H)

Student Write-up

Short summary of work done: Pollution induced by toxic gases like NO_2, which are generated as a result of incomplete or improper combustion in automobiles or industrial zones, has become a major concern. As explained earlier, controlling and reducing the emissions of such NOX gases is the need of the hour and the use metal-oxide based gas sensors has been proven to be good method owing to their properties like:- very low cost, high sensitivity, fast response / recovery time, simple electronic interface, ease of use, low maintenance and ability to detect large number of gases. However, there is currently no model developed for the simulation of such sensors to accelerate the development and fabrication process as well as for the optimization of sensor design prior to prototyping, which is an important step because the performance of these sensors is extremely dependent on their design. We simulated a sensor developed and fabricated in a research paper, conducted simulations on the sensor that we have designed and compared the results.

PS-I experience: I got an oppurtuity to work with research scientist at CEERI, Pilani. I got exposed to the type of research going on at CEERI. It was really great experience.

Learning outcome: I've learnt about the importance of gas sensors and their applications. Working of metal-oxide based gas sensors, their properties, design and materials used. How to use COMSOL for simulation of these sensors to optimise the design prior to the fabrication.

Name: LANKAMALLA SRIKAR .(2018A4PS1035H)

Student Write-up

Short summary of work done: My project at CEERI, Pilani was about designing and simulating photonic crystal sensors. We had reviewed various research papers to understand photonic crystals. By observing and studying the optical properties of the photonic crystals, it has given us a way to build the photonic crystal based sensors. We then designed a basic photonic crystal sensor and simulated for the detection of adulteration in fuels-petrol & diesel. We also simulated for adulteration in edible oils-coconut & olive oil. A metallic layer below the photonic crystal was added resulting in higher sensitivity in most of the cases. Finally, gold nanoparticles were also placed for improving the detection. Gold nanoparticles placed along with metal layer with TiO_2 are the best model for detection of adulteration in all of cases giving highest levels of sensitivity. The major challenges were time constraint for simulations; obtaining data for desired applications and including various modules for study.
PS-I experience: The experience was very productive and rewarding. Scientists and mentors at the station were very approachable and helped in our work whenever needed. Faculty was also helped in our evaluation components. The team that I worked was focused and helpful in completing the project. CEERI gave me the exposure to research and helped me develop a clear vision as to the functioning of the government research labs.

Learning outcome: I learnt lot from this PS-I. I learnt about the functioning of a government research institute and its various labs and the work they do. I was also able to learn lot more through practical experiences about particular topic. I got familiar with lot of in-depth concepts related to my project and provided time and resources to implement it. I got to learn COMSOL software and perform simulations in it.

Name: BHAT SAISMRITHI SHYAMASUNDARA .(2018A4PS1036H)

Student Write-up

Short summary of work done: This project presents the design, development and simulation of photonic crystal based optical sensors. It has many applications that includes detection of various deadly pathogens, adulteration of food products, etc. The optical properties of the photonic crystals is studied and applied for the sensing purposes.

Lastly, testing the adulterated samples of diesel, petrol, coconut and olive oil were conducted. In the recent years, there has been significant development in the areas of MEMS and micro-opto-electro-mechanical systems (MOEMS) technologies. The expansion of the application fields can be expected to grow both in terms of academic and commercial interest.

PS-I experience: PS-1 at CEERI, Pilani has been an enriching experience with getting introduced to many new subjects under MEMS. I had been doing project with one of my branch mates on Opto-MEMS and using the optical principles of photonic cystals in designing and developing a sensor for the above applications. We were exposed to new software and new concepts. I also believe that if not this lockdown, we would have had great experience staying in Pilani and working in one of the labs at CEERI. The orientations conducted in the first week went on smoothly and we were allocated our projects. The expert talks given by the Industry professionals gave an insight to the inter-disciplinary fields of mechanical and electronics; Industry 4.0; AI used in industries; etc. Overall, it was fruitful experience to work under CEERI scientist and on the project.

Learning outcome: 1. Exposed to new concepts and software 2. Insight to new fields in the industry domain 3. Team management 4. Learnt about latest demands in an industry; how to approach problems and develop techniques / come up with ideas to solve them.

Name: GURUVAYUR VISHWANATH PREMANAND .(2018A4PS1048H)

Student Write-up

Short summary of work done: My project was based on the modelling and simulation of microheaters for the temperature control of substrates used in fluorescence based optical sensing. So, we tried to model various designs of microheaters (for example: Circular Spiral, Rectangular Spiral, Double Square Spiral, FAN shaped, etc.) on solidworks and simulated them on COMSOL software by appropriately choosing various boundary conditions like terminal current, temperature conditions, etc. and finding out their efficiencies and comparing them with each other. Simultaneously, we learnt about the fundamentals of fluorescence based optical sensing and the importance of temperature control in optimizing the fluorescence phenomenon for sensing.

PS-I experience: It was good experience exploring the fields of MEMS, VLSI and understanding how research is carried out in these fields.

Learning outcome: Learnt about the basics of fluorescence based optical sensing, simulation in COMSOL and how to tackle various errors in simulations.

Name: P SMRITI .(2018AAPS0415H)

Student Write-up

Short summary of work done: I was part of the team working on pyro-electric sensors modelling. Pyro-electric sensors respond to the temperature change produced by the incident radiation and give an electrical output. We started with understanding pyro electric effect and materials exhibiting the said effect. We also did literature study on sensor geometry, fabrication and various applications of pyro-electric sensors. Modelling of the pyro-electric sensor was done using COMSOL multiphysics and the model was simulated for the desired incident radiation properties. Our aim was to study the pyro electric behaviour when exposed to incident radiation and source power range. The simulation was done for six pyro-electrics and the results analysed to reach some conclusions about behavioural trends. For the pyro-electrics, sensitivity was found out with respect to power to compare the relative performances. Two softwares were extensively used, COMSOL multiphyscs for modelling and simulations and MATLAB for analysis.

PS-I experience: The overall PS-1 experience for me was quite satisfactory. It was probably the best we got with the present scenario. PS-1 started with number of orientations and interactions with the industry mentor and faculty. After the project allotment, the work began and throughout the duration, we received ample amount of guidance from our industry mentor. Most of the work was done in our own time. There weren't fixed hours, so that provided a lot of flexibility. It was little difficult to have regular interactions but that was expected given the remote model of working. On the whole, I had very pleasant experience working on the project and interacting with the mentor.

Learning outcome: Learning outcomes on the technical front mainly revolve around COMSOL. It was bit of struggle getting about COMSOL; some tutorials along with online resources helped a bit. The project outcomes add to the learning outcomes. It was great learning experience working with the team; coordinating over various platforms to get the work done.

Name: ABHISHEK MUKHERJEE .(2018AAPS0802H)

Student Write-up

Short summary of work done: My project was based on implementation of Neural Networks, and it was done in group of 3 students. I started by understanding Deep learning concepts- basically Deep Neural Networks and Convolutional Neural Networks. Our work included a code in Python to implement a CNN for an image classifier, which could classify the digits 0-9. This was followed by hardware implementation by coding in VHDL for matrix multipliers which would form the basis for DNN processing.

PS-I experience: Overall, the experience helped me realize, to some level, my areas of interest which I would want to pursue. I feel the mentors are helpful but only if one shows lot of dedication and interest in the work. The guidance I received was challenging in its own way, because the mentors expected lot from the student, and one has to search for ideas and do literature surveys by themselves. I think the learning outcome might have been little less because of work from home, but still I enjoyed myself throughout.

Learning outcome: I learnt about hardware for DNN Processing, ML algorithms and their applications, as well as Deep learning concepts. To implement, I learnt coding in Python from almost scratch and improved my coding in Verilog HDL.

Name: RUCHIR MATHUR .(2018B1A40617P)

Student Write-up

Short summary of work done: I have done deep learning project that was originally supposed to detect COVID-19 by measuring vital health parameter datasets (ECG, EMG, Pulse, etc.). But, since the relevant datasets are not present online in current state, we have shifted our project towards cardiac disease (arrthymia as of now) detection by training a neural network model on sample ECG datasets of both healthy and unhealthy patients. We hope to expand and adapt our model later to incorporate more features and detect more diseases, hopefully COVID-19 too.

PS-I experience: I am quite happy that I got project I was interested in. I have experience in Python and knew basics of deep learning. This project has not only tested these concepts but diversified my knowledge about various Python libraries and deep learning model. Sometimes, it is quite hectic as the mentor expects us to develop the model from scratch and meet the deadlines. Nonetheless, atleast I am grinding something while sitting at home.

Learning outcome: Industrial standard deep learning model development and Python programming. Realizing importance of neural networking in various aspects of biomedicine. Not much of development in communication since most of the work was done at home.

Name: HARSHIT SHARMA .(2018B2A30678P)

Student Write-up

Short summary of work done: The topic allocated to me was 'Scaling of LC Resonator for Healthcare devices' under the project 'Scaling of RF MEMS devices'. I started with improving my literature knowledge on topics relevant to the project like RF-MEMS, MEMS inductor and scaling laws. Then, I went on to learn ANSYS HFSS software. After gaining working proficiency in HFSS, I started with designing spiral MEMS inductor and a parallel plate capacitor in HFSS. Then, I simulated both the models and obtained several plots. I determined the value of certain attributes for both inductor and capacitor from the plots and compared them with the theoretical values. The scaling effects of both the models were also discussed.

PS-I experience: I had great time working under the guidance of some renowned scientists at CEERI, Pilani. The experience would have been better if it has been an onsite PS-1. I learnt technical as well as soft skills. The evaluative components were appropriately designed and spaced. My PS-1 instructor was very obliging and my industry mentor guided me at every step. They were constant source of motivation and helped me learn in time bound and organized manner.

Learning outcome: I gained literature knowledge about MEMS, MEMS inductor and scaling laws. I achieved working proficiency in ANSYS HFSS software. I learnt how to design and simulate a spiral inductor and a parallel plate capacitor in HFSS. I also improved my soft skills through evaluative components like seminars and report writing.

Name: KULKARNI ATHARVA ABHAY .(2018B5A40706H)

Student Write-up

Short summary of work done: Project on optimization of fluorescence detector.

PS-I experience: It was good.

Learning outcome: Research, optimization, analysis and modelling.

Name: DEEPSHIKHA SHARMA .(2018B2A30595P)

Student Write-up

Short summary of work done: The project allotted to me was scaling of RF-MEMS and the individual topic allocated to me was design and comparison of RF-MEMS and normal antenna. First, I engaged in a literature review to gain the theoretical knowledge about my topic. Later, I worked on Ansys HFSS software to design and simulate a normal antenna (probe patch feed antenna) and RF-MEMS antenna (having a cantilever beam in addition to probe patch feed antenna). In the normal antenna, to check the dependence of antenna parameters like peak directivity, peak gain, peak S11 value and radiation efficiency, the value of relative permittivity was varied from 1 to 12, and the dimensions of the patch were also changed to keep the resonance frequency constant at 2.45GHz. At the end, the result plots (S11 plot, 2-D polar plot of radiation and 3-D polar plot of gain) were compared for the antennas. RF-MEMS antenna was found to be more efficient and the reasons for the same were also discussed.

PS-I experience: It was good experience overall, although learning could have been better PS-1 been onsite instead of being remote. My PS-1 instructor was very helpful, and my industry mentor also guided me well. I learnt lot of technical as well as soft skills.

Learning outcome: I learnt how to use Ansys HFSS software, and use it to design and simulate antennas. I also learnt how to compare the plots of antennas. Comparisons were drawn between RF-MEMS and normal antenna and the reasons why RF-MEMS antenna was better also discussed.

PS-I station: Eclipse Instrumentation Pvt. Ltd., Thane

Student

Name: RAM ASHIYA .(2018A3PS0418P)

Student Write-up

Short summary of work done: I prepared a report on Fluorescence Guided Surgery Systems in medical imaging domain. We also conducted an in-depth study on Laparoscopic and Endoscopic surgery, especially technical research on the product market.

PS-I experience: WFH PS-1: Company was very busy with their work, canvas lms was intuitive and user-friendly. There were some communicative inconsistencies, which had to be clarified but overall was an enriching experience.

Learning outcome: I learnt the technical aspects of my project research sector, professional soft skills for presentation and data visualization. The medical imaging sector is a challenging one, with major products being imported into Indian diagnostic clinical facilities. Fluorescence imaging is a difficult niche for aspiring corporation to enter.

Name: PARTH AGGARWAL .(2018A8PS0041G)

Student Write-up

Short summary of work done: I worked on project to find the best wireless technology used for camera in operation theatre lights. I learnt about different transceiver and devices.

PS-I experience: It was great. Although, being remotely connected, we were not able to physically implement technologies and were not able to make the best use of it. The mentor was very great and helpful.

Learning outcome: I learnt the basic structure of company and atiquates to work on team. Also, developed communication skills to participate in group discussion. It overall, increased my productivity.

PS-I station: Electrono Solutions - Electrical Power Systems, Bangalore

Student

Name: SARVESH GUPTA .(2018A3PS0337G)

Student Write-up

Short summary of work done: My project was to develop a setup to measure human temperature for fever detection using panasonic infrared grid eye sensor at door entry / exit. Main aim of the project was to increase the accuracy of the sensor using blackbody device.

PS-I experience: My PS-1 experience was amazing. Dr. Chalapathi and Dr. Vivek kept the track of every member of the group by keeping meeting everyday. They guided us in each and every step. Overall, it was an amazing experience.

Learning outcome: I learnt about infrared radiation, blackbody device, different sensors and also learnt Fusion360.

Name: ROHIT SINGH BHADAURIA .(2018A3PS0356P)

Student Write-up

Short summary of work done: The project allotted was Microgrid. The first work was to decide on the project topic by analysing different IEEE papers. Once the topic was decided to be multi-objective optimisation of hybrid AC / DC microgrid, then a paper was developed in IEEE format. The mathematical model was computed using citation from some IEEE papers. Then, MATLAB-SIMULINK was learnt for developing model to be used for verification of the mathematical model. After this, different models were inspected and final model was developed. Finally, the pre-optimization and post optimization stats and graphs were compared and conclusions were drawn.

PS-I experience: We learnt various new technologies and had great learning experiences at Electrono. Electrono is an amazing organization with helpful and cooperative employees. They have helped us in every step we were stuck in our project. We got to understand how project is seeded, proceeded and finished in real world industry.

Learning outcome: The basic technical learning outcome was learning of MATLAB and Power systems basics. While there was polishing of soft skills with different activities like seminars, group discussion apart from the report submission.

Name: PRATIK LAXMIKANT PATIL .(2018A8PS0019G)

Student Write-up

Short summary of work done: I learnt the basics of Electric Power Systems, read materials on research topic, take reference from already published research papers, learnt essential softwares like Simulink, LabView for project implementation. Then with the help of learnt skills and knowledge, I drafted IEEE format paper on mathematical modelling of hybrid supercapacitor and Li-ion battery energy storage system for Photovoltaic (PV) array.

PS-I experience: The industrial exposure was first of its kind and helped in building an

experience, team work and presentation skills. I had to do extensive research and then come up with feasible IEEE research paper on supercapacitor test bench.

Learning outcome: Learnt applications of supercapacitor in current world and gained essential software skills required in power system domain. I learnt the professional approach of working, how to optimize, how industries take decisions by group discussions, how to gather and analyse information and prepare a report.

Name: CHAUGULE DHRUV SANJAY .(2018A8PS0641H)

Student Write-up

Short summary of work done: How UVC light could be used in stopping the spread of novel coronavirus.

PS-I experience: It was good experience. Even though, I couldn't get real hands on experience kind of thing, I was happy with the work I did. It taught me about group management and presenting research papers.

Learning outcome: UVC light is really helpful in stopping the Corona virus, there are so many applications we could build using this.

Name: SHRILAXMI PATIL .(2018B5A80889G)

Student Write-up

Short summary of work done: We worked on building a device for real time temperature scanning as people enter and exit a building. We used arrays of thermopiles as sensors and built device around this. This is useful especially in the scenario of COVID-19 pandemic.

PS-I experience: It was very good. We had daily meeting with both the industry mentor and the BITS faculty where they helped us improve upon our ideas and gave us guidance.

Learning outcome: I learnt quite bit about design and simulation. Some electronics and physics too.

PS-I station: Electrono Solutions - Industrial Control & Automation, Bangalore

Student

Name: PRIYANSHI MISHRA .(2018A8PS0120H)

Student Write-up

Short summary of work done: My project was to design and use programmable resistive load bank. I learnt developing project step by step and also about many hardwares. I also learnt to present work in the proper and formal way.

PS-I experience: It was quite good as well as challenging because of working remotely. Also, the mentors were quite supporting and meetings were held regularly. Overall, it was good experience because it gave an idea of working in a company.

Learning outcome: I learnt about my project hardware's alot and experienced working as an intern.

Name: DSOUZA DEON NIGEL ROSHAN DERIL .(2018A8PS0456G)

Student Write-up

Short summary of work done: 1. Designed a remotely operable generator testing facility 2. Conducted knowledge-transfer sessions on the topics specific to my project for my colleagues in the PS-1 station working in my project domain.

PS-I experience: The PS-1 experience was good as I got to learn lot about the various industrial equipment and softwares.

Learning outcome: 1. Learnt about various steps to be followed while designing any setup 2. Learnt to use LabVIEW software 3. Learnt about various sensors and devices used in the setup designed 4. Learnt to choose from various commercially available devices that are appropriate for my setup.

Name: Mehul Kavdia .(2018A8PS0860P)

Student Write-up

Short summary of work done: My PS-1 station was Electrono solutions, Bangalore. The project allotted was "Temperature and humidity test chamber". The objective was to design an environmental test chamber in which the user can control the temperature and relative humidity within set range. Several project milestones were set and work plan was structured, which was followed strictly in order to meet the deadlines. The first part of the work was to understand the customer requirements and design block diagrams for the test chamber. It was followed by designing process flowchart, schematic diagram, wiring diagram and making a bill of materials that contains the specifications and pricing of components that would be used in assembling the test chamber. After the hardware design part, the programming was done. LabVIEW was used for creating control panel for the chamber. Lastly a simulation was designed in LabVIEW to demonstrate the working of the test chamber by implementing mathematical models of heater, refrigerator, humidifier and dehumidifier. Short animation was also added to the front panel for better visualization.

PS-I experience: It was an interesting project and mentors from Electrono solutions and our BITS faculty were very helpful. Due to work from home nature of PS-1, interaction was through MS team and whatsapp. Throughout the PS-1, daily meetings were organized in morning and evening for task allocation and review. Additional knowledge transfer sessions also took place. We also learnt from our batchmates during the meetings as they had different projects. CEO of the company also took few meetings for reviewing the work. The major downside was, we were not able to work with actual hardware and devices. As the project introduced us to new devices such as DAQ,

sensors, relays etc., it was difficult to understand their working and their connections without actually working with them.

Learning outcome: Learnt LabVIEW programming language which is commonly used in industrial applications. Learnt about the working of industrial devices such as relays, sensors, contactors, DAQ etc.

Name: SHEETAL MADIKONDA .(2018A8PS0975H)

Student Write-up

Short summary of work done: I was working on project "Automated test chambers". I had to design temperature test chamber which was capable of achieving temperature range -70C to 180C as a part of this project. So, I worked on learning how these chambers are built, what are all the components that are required to build this.

PS-I experience: My working experience with the company was really great. The PS-1 mentors who belonged to the company interacted with us regularly and made sure that we were making a progress on our particular projects. I also liked the way how the tests, quizzes, project report and seminars were organized. This helped us lot to gain better understanding on our topics.

Learning outcome: I learnt lot through this opportunity. I understood the practical significance of the topics that I had learnt in my courses. I also learnt all the steps in approaching a project. This helped and gave me an idea as to what components are used in the industry, what electric devices are used, what software is used, ratings that should be followed.

Name: SHEETAL MADIKONDA .(2018A8PS0975H)

Student Write-up

Short summary of work done: I was part of the group "Industry control and automation". In this, I was allotted a project "Automated test chambers". I was required to do all the tasks for designing the test chambers. We prepared many documents required for this purpose like voice of customer (VOC) and came up with block diagram, circuit diagram, process flowchart etc. I also made the bill of materials which is important for the designing of these chambers. Finally, I came up with the LabVIEW front panel and this is how I covered all the crucial aspects of designing the test chambers.

PS-I experience: My PS-1 was overall very productive. The company was very particular about the progress each of us made and was very interactive with us. They provided us with all resources and knowledge required for completion of the project. It was very helpful as we learnt how various things are applied in the real world and the common practices in the industry. Since, it's online, our experience was somewhat limited.

Learning outcome: I learnt lot from these 6 weeks during my PS-1. I also learnt about various electrical aspects and components. How to decide those components. How to design control systems in real world based on what we learnt in college. I gained knowledge on LabVIEW software that is very vividly used in the industries. This way, it helped to gain overall knowledge on many aspects related to my project.

PS-I station: Electrono Solutions - Industry 4.0 standard, Bangalore

Student

Name: LAKSHAY KATYAL .(2018A3PS0274G)

Student Write-up

Short summary of work done: Our project focused on building simulation models of various sensors that are used for automation and digitizing factories in the light of Industry 4.0. We aimed at making highly configurable VIs in LabVIEW for the simulation of common sensors and finally logging the iteratively simulated data into Database. The final deliverable was toolkit of these sensor stimulation models integrated with the database used by the organization. The major working areas revolved around sensor simulation and use of LabVIEW.

PS-I experience: PS-1 was my first industry experience and it being completely online in these unprecedented times was quite challenging. Basic work ethics and corporate skills including time management was something that I learnt. Apart from this, the project allotted helped in putting our theoretical knowledge into work.

Learning outcome: Apart from the improvement in my soft skills, I developed an understanding of the LabVIEW software and common database management system MongoDB and it's allied tool Robo3T. I also got familiar with the basics and common terminologies of the emerging Industry 4.0 standard.

Name: SHOURYA SODHANI .(2018A4PS0355P)

Student Write-up

Short summary of work done: The problem statement of the project was to create digital twin of an industrial CNC machining operation. This involved working with several Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM) software to build 3D models, run simulations and generate 3D tool paths by back plotting G-codes to replicate an industrial machining process in a virtual workspace. The project required a thorough research of existing tools in the market to accomplish the tasks mentioned and upon finding that no such software exists, it was decided to build unique and proprietary 3D modelling software tool encapsulating mathematical computation of data to form relevant equations, a vast database for collecting data and life-like visualization of machining operation. The work on the same is still ongoing, as it could not be completed within the limited duration of PS-1

PS-I experience: Despite the apprehensions going into PS-1, the experience of the internship has been nothing but satisfying and rewarding. Working with the team and the industry mentor (Mr. Kalyan Ram B: CEO of Electrono solutions) was an enriching experience. I learnt more about the industry and the shape it will take in the future in 6 weeks than I ever did in a classroom environment. I picked up skills and learnt how to work on new software quickly and efficiently, learnt the value of speed and the importance of sticking to deadlines. Most of all, I learnt the importance of collaboration and working as team rather than individually.

Learning outcome: I learnt about the meaning and relevance of Industry 4.0 and how it will dominate most industries in the coming years. I also learnt several new operations in Computer Aided Design and Computer Aided Manufacturing, as well as reading, writing and editing G-codes to simulate the 3D tool path of machine tool, how to extract and

interpret data from the tool path. Furthermore, I learnt about the steps that go into software development and how to create detailed architecture for the same. Lastly, I learnt about several soft skills required for professional environment, such as how to communicate with peers and mentors, how to give presentations etc.

Name: GUPTAA AARUSHI .(2018A4PS0615H)

Student Write-up

Short summary of work done: Our project was working on building DAVE for Industry 4.0. The goal was to built position repeatability matrix for a CNC machine.

PS-I experience: The PS-1 was great learning experience. I am grateful to PSD for working so hard in these difficult times to help us smoothly work from home without missing out getting good exposure. The instructors have gone out of their way to ensure nothing got between us and the project. I am extremely thankful to our mentor Mr Kalyan Ram for taking out time every day from his busy schedule to guide us in our project. This PS-1 helped build a bridge between the knowledge we received from the college and its application in the industry.

Learning outcome: I have gained the confidence to pursue my business ideas. I am working on start-up and also writing paper with my team under the guidance of the industry mentor.

Name: AADITYA SINGH .(2018A7PS0161G)

Student Write-up

Short summary of work done: Use data analysis and machine learning to create a model to predict the time in which a CNC machine will empty it's lubricant tank (in a Honda factory).

PS-I experience: Very good. Faced lot of difficulties due to lockdown and unavailability of data. Started work very late but were able to finish it on time.
Learning outcome: Since, there wasn't much work in the initial weeks, spent lot of time learning about machine learning and data analysis on Coursera. Learnt about corporate life and how to work with a team.

Name: CHIRAG DOLLY JAIN .(2018B4A30828P)

Student Write-up

Short summary of work done: Established position repeatability in machining center using various tools for data analysis and aggregation such as MongoDB, Python and LabVIEW.

PS-I experience: PS-1 was helpful in establishing basic understanding of the working culture. It helped understand the structure of the organization from the inside and the etiquettes.

Learning outcome: Learnt new tools and working for pitching an idea.

Name: SWAROOP AJIT PALAYAT .(2018B5A41022H)

Student Write-up

Short summary of work done: Learnt how machining centres works, how to interpret machining centre data, how to use LabView in order to work on said data, deriving velocity data from position data using different softwares and validating them.

PS-I experience: Did not have the learning experience of physically working at a company, had similar workloads to that of an offline internship and had lots of interactions with the company and their employees.

Learning outcome: learnt about working of an industry 4.0 and working on raw data.

PS-I station: Electrono Solutions - IoT, Bangalore

Student

Name: NAIK NILAY SANJAY .(2018A3PS0277G)

Student Write-up

Short summary of work done: The project assigned to my group was 'Industry 4.0 - Edge device architecture and design' which comes under the IoT domain. The aim of the project was to create diagnostic application which would track system performance data of device and display it graphically to the user. Along with this, we also had to send this data from the edge device to a server. The group was divided into 2 teams - one working in LabVIEW and the other in Python. Both the teams were assigned the same tasks and were working independently. System performance parameters like CPU usage, RAM usage, Disk usage were monitored using LabVIEW / Python. These data was shared directly from the edge device to the server using MongoDB. For this, we had to interface LabVIEW / Python with MongoDB. We also worked on establishing a TCP client-server connection using LabVIEW / Python and sharing the data collected through it. At the end, we compared the speed of programs. LabVIEW with Python based on execution time the code took to run. We also tried implementing the Python code in LabVIEW.

PS-I experience: PS-1 was great experience for me. Being my first major project, I got to learn many new things which I wouldn't have otherwise through other courses. The faculty instructor as well as the industry mentor helped me through out in understanding the project. Since, it was remote internship, it posed some challenges like internet connectivity issues, communication gap between team members, etc. Overall, it was good learning opportunity.

Learning outcome: I learnt about edge computing and its advantages over cloud computing. Also, I got some experience of using LabVIEW software and some basic understanding of the use of tools like MongoDB and Robo3T. The seminars, group discussions and project reports helped me to improve my soft skills and writing skills.

Name: RONAK SONI .(2018A3PS0450G)

Student Write-up

Short summary of work done: Supercapacitor test benches, MATLAB simulations, writing IEEE papers.

PS-I experience: It was online, so we did not get much hands on experience but the faculty made efforts to make us build our soft skills and make us learn stuff.

Learning outcome: Learnt to write IEEE paper, MATLAB basics and models.

Name: SHREYASI SINHA .(2018A3PS0478G)

Student Write-up

Short summary of work done: Worked on power electronics concepts and microgrid. Made a Simulink model of a DC microgrid with solar power and an energy management system.

PS-I experience: PS-I was great leaning opportunity and the PS-1 faculty helped us in any difficulties we faced.

Learning outcome: Learnt about power electronics and great deal about Microgrids and Smartgrids.

Name: DEVANSH AGARWAL .(2018B2A30608P)

Student Write-up

Short summary of work done: We worked on Simulating a MicroGrid based model on MATLAB and Simulink. My MicroGrid's main focus was to add renewable energy source as backup to the grid in case of main grid failure or reducing the electricity demand from the main grid and make the MicroGrid self sufficient. For renewable energy source, I used solar PV array (two in number) for supplying the power to the Grid loads (5 RLC loads) also an energy storage system which stored the surplus power generated from the PV cells and the main grid was only used as power source when the energy provided by PV and Battery is insufficient, hence keeping it as a last resort. The simulation which ran for 24 hours indeed proved that this was possible for a MicroGrid and can be used for saving electricity bills and being self sufficient in energy demands.

PS-I experience: It was nice experience working with our PS-1 mentor and industry mentor who provided us with their valuable mentoring and helped us in the project, it indeed was fruitful summer which made me learnt lot of things under EEE domain and helped me with the soft skills such as MATLAB and Simulink.

Learning outcome: After my PS-1, I am very clear with what MicroGrids are and its components, I'm clear with modelling a MicroGrid on MATLAB and Simulating it simultaneously. I learnt various topics under EEE domain throughout my project journey. Apart from these major skills, I learnt various communication and presentation skills from seminars and group discussions.

Name: AAYUSH SONI .(2018B2A30665P)

Student Write-up

Short summary of work done: I implement genetic algorithm approach to tune the PID controller in microgrid model so that it regulates it's frequency.

PS-I experience: It was good. The PS-1 faculty was very helpful and available any time for doubt clearing. We had daily meetings which improved my soft skills and also enhanced my presentation ability. It was overall, development in terms of skills and personality.

Learning outcome: I learnt MATLAB, SIMULINK softwares. And also learnt to design models on the same.

PS-I station: Electrono Solutions - VLSI Design, Bangalore

Student

Name: SHAH JAY PANKAJ .(2018A3PS0533H)

Student Write-up

Short summary of work done: The objective behind the project is to design controller for DC-DC buck boost converter and then implement it on FPGA. Buck boost converters are required to step up or step down DC voltage in various industrial applications.The major problem being focused in our project is to lessen the steady state error in the output obtained using PI Controller. This PI controller logic is then converted into digital logic and implemented in FPGA. FPGA implementation provides various advantages in terms of speed, flexibility, low power usage, reduced equipment sizing and massive parallelism. The buck-boost converter needs to be controlled by changing the duty cycle of the switch (Power MOSFET / IJBT) which is why we need PI controller. The simulations for the converters are performed on Multisim and LabVIEW and the simulations for the controller are performed using Simulink. The digital logic thus obtained will be synthesized into FPGA using Vivado. In this project, we aim to design an optimal controller whilst also trying to implement it efficiently on the FPGA.

PS-I experience: I was hoping for the PS 1 to be offline for a better industry experience but due to the circumstances we had to work remotely. We still had regular meeting with the people from the company and with our PS-1 faculty in charge for our work progress.

Learning outcome: The most important thing, I learnt is interacting with the instructors, giving presentations, having healthy discussions. Other than that we learnt what goes into research paper, how are project reports written. The technical skills, I learnt are getting used to softwares like Multisim, LabVIEW, Simulink.

Name: SUMUKH DATTARAM PINGE .(2018A8PS0064G)

Student Write-up

Short summary of work done: We have learnt and understood the mathematics behind all the topologies of DC-DC converters with an emphasis on Buck – Boost converter. It was the first time I have been exposed to the industry-based software like LabVIEW and Multisim. We have implemented all the basic DC- DC converter design on Multisim and performed Co-simulation with LabVIEW. We learnt how to integrate industry components rather than relying on generic components by matching different ratings with their datasheets. We used MATLAB to design the Integrator controller. Tuning based on control system concepts such as reducing the settling time / reducing overshoots was also performed.

PS-I experience: It was good expirience despite it being a WFH PS-1. We learnt about many power electronics concepts and were exposed to many industry standard softwares. We now have an understanding on how to extract information from research paper. We also had the first-hand experience of writing research paper ourselves.

Learning outcome: 1. Simulating various circuits on LabVIEW and Multisim 2. Performed PID tuning of the controller using MATLAB software 3. Improved my knowledge on the domain of VLSI through various modules and research papers from canvas.

PS-I station: Electrono Solutions –APP / API Development, Bangalore

Student

Name: ADITYA MISHRA .(2018A7PS0117G)

Student Write-up

Short summary of work done: The domain of my project was full stack web application development in the field of Industry 4.0 smart factory. This web application allowed user to continuously monitor real time status of all the machines spread across different floor in different plants spread across the globe using a simple dashboard. We were instructed to follow the waterfall methodology in software development life cycle. In the first stage, planning and requirement we tabulated data from the customers and clients to form voice of customer. This gave us the expectations of this project and allowed us to determine resources and time required for the development of this project. The second stage design stage focused on developing client-end (front end) design for our web application. Five web pages were created login, dashboard-plant, dashboard-shop floor, dashboard machines and machine details page. The third stage software development stage required us to develop backend and integrate client-end with backend. To accomplish remote accessing from one place we used cloud-based database management system named 'MongoDB'. This solution enabled us to collect data from various sensors placed in machine at remote location in an organized document for further analysis. We integrated client-end with backend using C# as our primary programming language and ASP.NET. The next stage, testing stage required us to develop testing scripts and testing databases using Windows service. This program allowed us to find software glitches in deploying MongoDB database onto website that gets updated in real time.

PS-I experience: I was exposed to various new industry grade challenges and their respective solutions. My PS-1 experience helped me in realizing the skill set I need to gain and the computer science field I need to explore, for example, Cloud computing, Cloud based database management system etc. PS-1 also taught me how to work and collaborate with others to and use methodologies to accomplish projects.

Learning outcome: Technical skills-Cloud based database management system, NoSQL, ASP.NET, Windows service and full stack web development.

Name: PARITOSH SHARMA .(2018A7PS0206P)

Student Write-up

Short summary of work done: Our task was to develop web application that would display data received from the machines in a smart factory and report any problems accordingly.

PS-I experience: It was great learning experience. Developed varied technical as well as soft skills.

Learning outcome: Learnt web development using HTML, CSS, JS and ASP .NET as well as windows services development using the .NET framework.

Name: ARPIT ADLAKHA .(2018A7PS0250H)

Student Write-up

Short summary of work done: Web development work. A web app was created to monitor machine status and parameters as part of the smart factory initiative.

PS-I experience: Mentors were nice and cooperative. Tasks were assigned and doubts were cleared daily.

Learning outcome: Basics of web development and windows service (Bootstrap, .NET, C#, MongoDB).

Name: NIMISH GUPTA .(2018A7PS0372H)

Student Write-up

Short summary of work done: Had working with Cloud computing in Microsoft Azure and AWS and learnt about Maven applications.
PS-I experience: Had real time working with Amazon web services and Azure, with Maven application using MongoDB. The fore mentioned faculty Dr. Soumyadeep Bandyopadhyay had helped at every hand.

Learning outcome: Learnt about cloud computing and Microsoft challenges were dealt with outcomes.

PS-I station: Hertztech Solutions Pvt. Ltd., - Digital Signal Processing & Communication / DL / ML, Chennai

Student

Name: SATYA SRUJANA PILLI .(2018A7PS0279H)

Student Write-up

Short summary of work done: Our project is AI based sound quality prediction of vehicle noise.The main objective of our project was to develop software which should be able to predict sound as human predicts it.

PS-I experience: Hertztech solutions is 2 year old private company based in Chennai. This company offers its services in the field of Noise, Vibration and Harshness technologies and testing support for automotive, wind energy and railway applications. It also contributes to fields like data science, digital signal processing and data analysis applied to NVH domain and conduct many vehicle level and system level tests. It has been wonderful experience to do my PS-1 under this company as I got to learn lot about my field of interest i.e, Deep learning. I also understood that industrial requirements are different from academic requirements.

Learning outcome: I learnt about new softwares like MATLAB and also increased my proficiency in Python. I also learnt different concepts related to digital signal processing, Deep learning, Data science, Computer vision. I also improved my soft skills like communication skills, teamwork, presentation skills, group discussion skills. Regular evaluation at the end of the week made me responsible and accountable.

Name: Tanay Gupta .(2018AAPS0343H)

Student Write-up

Short summary of work done: Hertztech solutions provides various vehicle analysis services such as noise, vibration and harshness. My group was assigned to predicting sound quality of vehicle using Machine learning. As the title suggests, we had to create a model that would rate given clip between 1 and 10. At the end, we were successfully able to solve the problem and presented a proof of concept solution.

PS-I experience: I enjoyed my PS-1 project. My mentor as well as industry faculties, were helpful. I learnt lot about Deep learning and we also wrote reports and made presentations. Overall, it was pleasant experience.

Learning outcome: I learnt about Deep learning (DNNs, CNNs, LSTMs, Data augmentation), making reports, making and presenting presentations, team management, group discussions.

Name: POLAVARAPU SRAVANI .(2018AAPS0394H)

Student Write-up

Short summary of work done: Our project deals with the non-contact measurement of engine rotation speed by analyzing vibration and acoustic signals.
1. First, we implemented the coding part in MATLAB and down sampled the given signals and applied cross-correlation to the down sampled signals.
2. An STFT is applied to the final correlated sequence to observe the changes in RPM.
3. The fundamental frequency for each time point was found by identifying frequency for which the power spectrum gave the highest peak.
4. Having extracted the fundamental frequency, the one with the highest peak, the frequency of the neighbouring peaks were also extracted and the energy centrobaric correction was applied to get the more accurate frequency.
5. Since, the final expected RPM graph is different from the one we are obtaining, so we tried out different ways of coding to obtain the expected output.
6. In this regard, separate analysis of vibration and acoustic signals has been carried out.
7. We got an excellent match for our prediction and the expected RPM for the given acoustic signal.
8. The vibration signal, due to poor SNR gave a poor result.

PS-I experience: It was pretty good experience. I got chance to interact with the industry officials. PS-1 faculty and mentor are really very helpful and clarified all my doubts. We worked on the project as a team of 4 members which gave me really new experience.

Learning outcome: 1. Basic knowledge and usage of MATLAB.
2. Learnt some advanced concepts of digital signal processing related to the project.
3. Working on the project as a team.
4. Because of the seminar, I got an opportunity to improve my presentation skills in general and with regard to technical aspects in particular.
5. Because of the group discussion, I got an opportunity to improve my speaking skills.
6. I also improved my report writing skills, communication skills, group coordination skills.
7. Learnt how to extract the ridges from spectrogram in MATLAB.
8. Learnt more about the exact working of signal processing tools such as cross-correlation, energy centrobaric correction from research papers.
9. Learnt how to do trade-offs in time-frequency analysis to get a better spectrogram.
10. Learnt to use the signal processing App on MATLAB for easily reefing the spectrogram.

Name: TAHER YUNUS LILYWALA .(2018B1A70609G)

Student Write-up

Short summary of work done: We designed an Artificial Intelligence based model for predicting the sound quality of a given vehicular noise sample. By taking sound clip and assigning it a subjective score for how acceptable it is, you can train the RNN and later feed it a novel sound clip to get a prediction for its quality.

PS-I experience: It was great learning experience. ML / AI is an up-coming field and this was an opportunity to learn real world application of the same. Besides the project aim, I also got to learn about different things that go into creating vehicular prototypes before they can be sent in for production.

Learning outcome: I learnt many skills. Besides the knowledge of AI that I gained, I also learnt how to work as a team and co-operate with group of people working on the same code.

Name: SAIYAM BHATNAGAR .(2018B3A30883P)

Student Write-up

Short summary of work done: Developed a noise classification model in Keras and Tensorflow. We classified noise clips using time series model. Feature engineering was done using Matlab. Sound pre-processing was done using AudioSegment library.

PS-I experience: Decenty good.

Learning outcome: I knew deploying AI models beforehand. Therefore, there wasn't much learning apart from handling sound data.

Name: ANJALI KADAMBI .(2018AAPS0292G)

Student Write-up

Short summary of work done: We worked on developing a non contact method of rpm determination by analyzing vibration and acoustic signals.

PS-I experience: I got good look into how an industry works and had good time working with company heads on this project because they were very kind and helpful. I also learnt lot about my domain, DSP.

Learning outcome: I learnt how to use Matlab quite well, specifically the signal processing toolbox. I learnt some key new concepts in signal processing and I learnt how to work in closed time frame and also ensure that the quality of the output is high.

PS-I station: Indian Electrical & Electronics Manufacturers - Association, New Delhi

Student

Name: R THAPASVVIN .(2018A3PS0361P)

Student Write-up

Short summary of work done: I worked with the department of public policy and taxation. Analysis of the financial health of various companies in the power sector and projecting how the sector is likely to be in the following years by analysing different reports.

PS-I experience: It was fine. The internal and external mentors were cool. We had to work for the final report we did and I think it is neither too easy nor too frustrating.

Learning outcome: Corporate etiquettes if that counts and time series forecast analysis.

Name: MILIND KUMAR SINHA .(2018A3PS0543P)

Student Write-up

Short summary of work done: Coming up with more accurate report on the growth in industry size of various electrical components employing new parameters and methods of analysis.

PS-I experience: The proactive nature of the industry mentors was big steal of the experience. Regular updates, presentations helped a lot in smooth functioning of the project. The mentors were readily available over phone calls, zoom calls and used to help to the fullest. Prof. Narayan Suresh Manjarekar was also very cooperative and supportive. After attending PS-1, you wouldn't feel that you wasted the total fee but at-least would get enough experience to justify 1/12 of it.

Learning outcome: 1. Professionalism 2. How to make professional reports 3. Data analytics 4. Excel (a lot).

Name: KHUSHEE AGNIHOTRI .(2018AAPS0024G)

Student Write-up

Short summary of work done: I worked with the International Business division of IEEMA to prepare country profiles for potential markets for Indian Electrical Equipment exporters to explore and trade with in post COVID-19 world. Our job was data collection and data analysis to some extent but also to look into domestic power sectors, future targets in power sector, existing diplomatic relations and trade agreements with India, barriers in the indian export Industry and use all of this to prepare powerpoint presentation, excel datasheet and white paper study on the selected countries.

PS-I experience: My experience at PS-1 was good especially considering the unusual cicumstances. The work was quite a lot but my industry mentors were flexible with the deadlines and easily approachable.

Learning outcome: Overall, I didn't learn any technical things related to my branch ECE but learnt a great deal about international trade which was my intention for joining this PS-1 in the first place.

Name: BHUMIKA SRIVASTAVA .(2018B2AA0783H)

Student Write-up

Short summary of work done: Two projects - Tender analysis of power distribution companies and raw materials analysis required for power systems.

PS-I experience: Great knowledge about how things work in industries and country wide associations. Real life application of certain concepts also learnt.

Learning outcome: Knowledge about tenders and raw materials used in power distribution companies and power systems. Analysing these things were major learning outcomes.

PS-I station: Larsen & Toubro Electrical & Automation - Embedded Systems, Mumbai

Student

Name: ANKAM HARI TEJA .(2018AAPS0504H)

Student Write-up

Short summary of work done: In the six weeks, I have worked on project to design Smart Circuit Breaker. I worked in the fields of switchgear systems, wireless sensor networks (WSN) and PCB design. I created the architecture for the model, chosen the communication standard required and did the node analysis in the network. I learnt about the PCB design and manufacturing process. I worked on Autodesk Eagle to create PCB board layout. Also, during the six weeks, I learnt about Embedded systems, what they are, their hardware and software components.

PS-I experience: My PS-1 was great experience and I learnt lot of new things during these six weeks. In addition to all the domain-related topics, I gained lot more soft skills. I had daily meeting with my PS-1 mentor from monday to friday, and almost all the time, I had to present something. Work ethics, time-management, flexibility are fundamental while working on a project. Although the remote model of the PS-1 has some disadvantages, the work done by PSD and all the faculty from our campuses has ensured that the student gained all the elements of Practise School.

Learning outcome: I learnt about Embedded systems, Distributed networks, ZigBee standards, PCB layout and PCB manufacturing process, Switchgear systems,and the Power transmission and Distributed systems.

PS-I station: Larsen & Toubro Electrical & Automation - IoT, Mumbai

Student

Name: ZANWAR LAXMAN GOVIND .(2018B3AA0759G)

Student Write-up

Short summary of work done: My project was based on developing condition monitoring system for circuit breakers like MCCB / ACB used in factories by leveraging Internet of Things. So, starting from studying about the circuit breaker and their mechanism, then using mathematical modelling to develop a model that judged the condition of circuit breaker, then doing simulations, to finally develop a web interface for user is a short summary of my work in those 6 weeks.

PS-I experience: It was good experience overall. Since, it was remote internship, we had daily meetings with our industry mentor wherein we discussed all the progress made & doubts. Initially, we had company orientation sessions as well. I was new to the Internet of Things domain and therefore did a few courses to get introduced as well.

Learning outcome: I feel I developed good communication skills in soft skills. I worked on Arduino IDE, ESP 8266 libraries for the interface part. I also used many new Excel functions during simulation. From knowledge perspective, I learnt new statistical models like Weibull distribution which I used in my model and also detailed understanding of circuit breakers.

PS-I station: Maritime Research Centre - Underwater Acoustic Research, Pune

Student

Name: AYUSH SHARMA .(2018A3PS0326P)

Student Write-up

Short summary of work done: First task was to do thorough literature survey for the project allotted to us. The title of my project was 'Inland Waterways Aids to Navigation using Sediment Prediction'. Then, we were required to come up with our research note that explains the current scenario and establishes the state of the art for that respective field. We were also required to find what India has done in Indian Ocean region and Inland waterways. Then, we were required to come up with our contribution in terms of developing framework or implementing technical solutions as small contributions into development of sophisticated systems. I implemented technology driven solutions for sediment prediction in rivers using machine learning approach. For this, I relied on support vector regressions. Also, to predict the river channel geometry, I used an Artificial neural network. Finally, I developed an algorithm to predict the sediment levels and hence generate warning for vessels using their location and draught from their AIS data.

PS-I experience: My PS-1 experience was great in terms of work experience, though it would have been much better to visit the research center in person.

Learning outcome: I learnt lot of technical skills as well as soft skills throughout the program. I got to know how we can explore new research areas and come up with our own ideas to solve problems.

Name: NIKHIL MAHADEV KAROTI .(2018A3PS0740G)

Student Write-up

Short summary of work done: My project was on the effective detection of target for Passive Sonar Simulator. In the first half of our PS-1, we were required to do an extensive literature survey of the maritime domain and about my project topic involved in it. In the latter half, we focused on the implementation of project by using QGIS software which required a considerable amount of Python programming and use of Matlab software. With use of this, I was able to develop SNR map and was able to calculate detection range of Passive Sonar for specified detection probability values.

PS-I experience: My PS-1 experience was very overwhelming and satisfying. The way the whole PS-1 was organised and managed, helped me lot to develop myself and gave me exposure to the working and functioning of research centre. The group discussion, weekly diary, seminars and the guest lectures were organised, developed both my soft skills as well as increased my technical skills to newer level.

Learning outcome: I learnt the technicalities involved in formulating project report, research note etc. The seminars and the guest lectures by industry experts exposed me to learn new horizons and gave me proper understanding of working world. I was able to develop my programming skills and furnish my soft skills.

Name: DEOTALE RIDDHISH ANANT .(2018A7PS0292H)

Student Write-up

Short summary of work done: GUI design and development of passive sonar simulator. Basically, I had to map the raw data onto the screen with interpolation and heat map.

PS-I experience: Very well structured. But hectic also, not a regular PS-1 station.

Learning outcome: Learnt to make website and how to use plugins.

Name: AYUSH GUPTA .(2018A8PS0250G)

Student Write-up

Short summary of work done: My project was to create GUI to be used in the implementation of a Passive Sonar Simulator. We had to go through various softwares available. After selecting PyQt, we made the custom design for the screen and then coded the front-end in Python language. Also, various functionalities were added to the GUI.

PS-I experience: It was good experience. There was lot to learn. We had frequent lectures from eminent personalities in the marine domain. The director of MRC, Dr (Cdr.) Arnab Das was very motivating and helping. And then our mentor Dr. Shridhar was always like an elder brother to us. Finally, our faculty in-charge of the PS-1, Dr. Anurag Nishad was great person right from the start.

Learning outcome: We learnt several things related to underwater marine topics. As per the project, I learnt how to use PyQt software, code in Python and build an interactive GUI.

Name: SHOBHIT MEHTA .(2018A8PS0417G)

Student Write-up

Short summary of work done: Identifying areas of high anthropogenic pressure on the marine environment is a key element for an effective environmental management. I undertake work aiming at identifying noise hotspots and areas of potential conflicts with vulnerable marine mammals habitat in Indian Ocean region. The global aim of this project is to gather baseline knowledge on noise-producing shipping activities. Areas accumulating noise-producing activities (noise hotspots) are pointed out, with a focus on zones overlapping with important marine mammals habitat. Results revealed several noise hotspots overlapping important marine mammals habitat.

PS-I experience: Experience was good, get to know more about UDA framework and please to meet some important people who worked for the nation security.

Learning outcome: PS-1 helped me to learn different Python modules and GUI.

Name: TANAY KUMAR(2018A8PS0574H)

Student Write-up

Short summary of work done: I worked on my project titled “Underwater Search and Recovery” and it's regulatory framework. I had to study the present level of technology involved in different steps during recovery of distress of aircraft, submarine, submersible. I compared different search patterns deployed in the recent recovery operations from around the world and came up with a model that can be used by recovery organizations

in the Indian Ocean region. My project also involved simulation and modelling. I studied different probability models like the Metron model used during AF 447 recovery to find the probability of finding the distressed object at a certain location in the target zone. Finally, I studied the organizational structure for these operations.

PS-I experience: My experience with MRC has been awesome. I was mentored by Dr Arnab Das who made us aware about the underwater domain awareness framework. I had many interactions with prominent personalities on a wide array of topics that made be aware about the ocean. My perception about this relatively less talked about topic has changed and my PS-1 journey has made me an ambassador for UDA in IOR.

Learning outcome: Literature survey, soft skills, presentation technique and team work.

Name: CHENNAREDDY KRISHNA PRANAY REDDY .(2018AAPS0302G)

Student Write-up

Short summary of work done: I worked in developing a low frequency shipping ambient noise map in the Indian Ocean region, which is the basis for developing a Passive Sonar Simulator. You take the required inputs and put them into some models to get the noise (used Python) and then map it using a software called QGIS.

PS-I experience: Of the 6 weeks of PS-1, first 2 weeks included learning the basics of sound propagation in the ocean, state of the art technology and models and literature survey. By the second week, we finalised the projects (We were given the flexibility to choose the project from set of 31 projects, we were 29 of us). In the following weeks, we have prepared a research note, followed by implementation of our project. Also, we had lectures (about 3 a week) on diverse topics related to underwater domain, maritime industry etc. which honestly broadened my knowledge. It was little out of our regular academics and were interesting as well.

Learning outcome: Learnt lot about geo-politics, maritime industry, intellectual property etc. which were few of the many lectures given by people who, most of them were Navy personnel. There was lot of opportunity to learn new things and explore which you may not get to learn from our typical academics.

Name: SHREYASH GUPTA .(2018AAPS0444H)

Student Write-up

Short summary of work done: The effect of snapping shrimps' noise on passive sonar system and its analysis with varying parameters was the project alloted.

PS-I experience: It was quite enriching although sometimes it was too much to handle because of 6-8 hours of long lectures, else it was great.

Learning outcome: I improved my technical as well as soft skills.

Name: PATNANA VENKATA SAI .(2018AAPS0468G)

Student Write-up

Short summary of work done: I worked on Underwater search and recovery. The project was about building some mathematical models for tracking and tracing of salvage object.

PS-I experience: It was nice experience. Gained knowledge about various domains.

Learning outcome: Gained lot of knowledge about Underwater Domain Awareness (UDA).

Name: KHABALE PRANAV MAHESH .(2018B1A70794H)

Student Write-up

Short summary of work done: MRC, Pune deals with Underwater Domain Awareness, most of us had varying projects. My project dealt with forming a framework for the Indian Ocean region to counter noise pollution in the ocean. I basically had to study various frameworks from either US or EU and come up with basic framework which could be followed locally.

PS-I experience: You will have to put in efforts regardless of which project you choose, there are mostly IT based projects but mine wasn't. Overall, experience was not bad.

Learning outcome: My outcome was to form a marine framework for the Indian Ocean.

Name: HARSH KUMAR SHARMA .(2018B3AA0978H)

Student Write-up

Short summary of work done: Title of the Project: Collision Avoidance In Inland Waterways by using AIS data. In today's world, projects related to inland water transportation are considered as one of the options available for humanity to curb carbon footage. Collision in Inland waterways represent the biggest threat to inland water transportation; its occurrence is very infrequent but has bad consequences that makes its avoidance a very imperative factor. Collision Risk Index (CRI) plays an important role for assessing ship to ship and ships to shore (river bank) collision. The automatic identification system (AIS) has been used to support navigation, abnormal traffic detection, collision prediction and route estimation. The AIS datasets also help to calculate CRI. The aim of this work is to identify all the techniques that have been developed so far, which enable us to derive collision avoidance system that gives collision risk of ship w.r.t other ships moving in that area and w.r.t shore or bank of river in Inland waterways based on Automatic Identification System data. I have chosen Hooghly River for it. Much of the research that has taken place is basically for vessel to vessel collision in the IOR and other oceans. I had developed a risk assessment model for the ship to ship collision as well as ship to shore. This system will raise a warning signal and warn the crew to consider the situation, then the crew have to take actions for collision avoidance. I had developed a Python program for it.

PS-I experience: I would like to thank BITS Pilani for this amazing opportunity to perform this project at one of India's premium research centers, Maritime Research Center (MRC), Pune. The experience of PS-1 was amazing. It created the required setting for experiential, cooperative learning and education for me by providing an opportunity to work on relevant assignments, under the guidance of professional experts and supervision of faculty. PS-1 provided me an exposure to professional workplace and unfamiliar situations.

Learning outcome: Learnt about Underwater Domain Awareness (UDA) framework in the Indian Ocean Region (IOR), MRC's prime vision. In-depth knowledge about cause of collision of ships and ship to offshore. Learnt about various methods used for the collision avoidance system.

Name: Sahil Yadav .(2018B4A30842P)

Student Write-up

Short summary of work done: Using machine learning models to predict vessel paths and anomalous behaviour detection. Also, studying correlation between traffic lanes and endangered marine mammal sightings.

PS-I experience: Amazing experience. Everyone was extremely helpful. Learnt lot from industry experts and fellow students. Enriching 6 weeks in good company.

Learning outcome: Understood more about the UDA framework and geopolitics of Indian Ocean region. Also, technical knowledge about processing AIS data and using machine learning methods.

Name: AAKANKSHA BHARADWAJ .(2018B4AA0406H)

Student Write-up

Short summary of work done: Maritime Research Center (MRC) is a think tank for strategies and framework for the Underwater Domain in the Indian Ocean Region (IOR). We were given a choice of about 30 topics to choose for the project. Two or more people can work on similar topics as well. My project was the mapping / identification of possible snapping shrimp hotpots in the IOR and generating a Spatial-Temporal Ambient Noise Map for the high frequency soundscape, where the Shrimp Noise is dominant.

PS-I experience: Our internship at MRC was beautifully organised. The entire 6-week structure was given before hand and there was lot of freedom in terms of what project we want to do and we had to define the problem statement ourselves (keeping in mind the Underwater Domain Awareness (UDA) framework that MRC follows). I started from scratch for my project, but was able to deliver significant results at the end. The team at MRC is very dedicated and will help you at each and every turn. Arnab Sir (Director, MRC) is quite experienced with PS-1 students and knows what is the right amount of work that we can handle (but at all times we're encouraged to also push our limits). The project domains were very unique and were broadly focused on Underwater Acoustic Communication, Improving Shipping Data, Dark Ship Detection, Improving Inland Waterways, Passive Sonar Simulator & Underwater Channel Model, Shipping Radiated Noise, Underwater Search and Recovery, Acoustic Habitat Degradation and Automated Underwater Vehicles. Projects were available for all skillsets. You could modify the problem statement to suit your skills. We also had some really good sessions on general learning in the field. All kinds of speakers were invited to have webinars with us. From India's Geopolitics to Patents and Climate Change, a multitude of relevant topics were covered in the 6 weeks. These sessions were great learning add on alongside the projects. We had sessions 5 days a week, with an informal project discussion on Saturdays. We are expected to put our best efforts and strictly adhere to the deadlines and deliverables. At the same time, the MRC team was there to make the entire process as smooth and achievable as possible.

Learning outcome: I learnt to conduct a very thorough literature survey and establish the current state of the art in my project topic. This helped my in defining my project statement properly. Learnt lot about Underwater acoustic systems, Underwater communication, Climate change and Environmental degradation, Acoustic habitat degradation. Also about marine defense systems in place, shipping data, trade and geopolitics.

Name: ATHUL B .(2018B4AA1042H)

Student Write-up

Short summary of work done: My topic was mathematical study on underwater channel model for Indian Ocean region. I learnt about mathematical models and different parameters that are specific to a channel model in Indian Ocean region. I made a detail study on why we need separate model for Indian Ocean. It was good project learnt many new things.

PS-I experience: It was wonderful experience. Even though, it was work from home, they had well structured plan for 6 weeks. We got amble opportunities to interact with famous people around the world. I was able to understand many new terms and concepts. It was worth attending for 6 weeks.

Learning outcome: Insights on Underwater Domain awareness (UDA), learnt what is geopolitics and blue economy and its importance.

Name: PRANJAL KAPOOR .(2018B5A30694P)

Student Write-up

Short summary of work done: A passive acoustic method of detecting dark ships such as submarines, in the Indian Ocean region was developed using spatio-temporal map and an underwater hydrophone network. The code was implemented using the PyRAM and Wittekind model in Python.

PS-I experience: The station has main focus on the Underwater Domain and the projects cater to a wide range of stakeholders including national security, blue economy and marine environment all incorporating the technological aspect. It was highly research oriented but also had very practical and operational aspect. There were frequent sessions with Navy Vice-admirals and foreign researchers who were the pioneers in their fields of underwater acoustics and geopolitics.

Learning outcome: There was lot to be learnt ranging from world geopolitics to how to start getting into the research domain. Overall, it was great experience.

Name: AVIRAL TYAGI .(2018B5A30904P)

Student Write-up

Short summary of work done: Used machine learning to estimate shipping radiated noise.

PS-I experience: It was great. Got chance to develop soft and technical skills.

Learning outcome: Learnt about machine learning, oceans, navy, underwater domain awareness framework, marine politics.

Name: VATSAL MAHESHWARI .(2018B4A80855P)

Student Write-up

Short summary of work done: We were asked to work for Underwater Domain Awareness. We had to choose our own projects unlike other PS-1 stations which required thorough literature survey. I choose data profiling to analyse errors in AIS data by using data visualization tools like NumPy, Pandas and matplotlib. Believe me, Dr. Arnab Das (Director) and Shridhar Bhaiya (JRF) provided constant guidance to all 29 of us. Regular interaction used to happen on our progress of the project along with various guest-lectures of eminent personalities. Project required lot of reading and hardwork. If you are looking for a "Lite" PS-1, you better stay away. If you wanna work hard and need guidance, go for it, you won't regret it.

PS-I experience: My experience was more than wonderful, I am a kind of guy who does not care much about the grades unless I am learning something new. I focused totally on learning and I must admit that this station was there to make me learn new things everyday. I had never heard of Underwater Domain Awareness (UDA) before this or I must say that it is a bit unpopular. But, I am ending this PS-1 with great understanding of this domain. All credit goes to Dr. (Cdr) Arnab Das and his team for calling out various eminent personalities. It was an honor to have them even on virtual platforms, their

lectures changed my way of looking at the world map. If you want more insights you can always ping me up.

Learning Outcome: Let me keep this in points for better readability,
1. UDA 2. Geo-politics 3. Maritime domain 4. Signal processing 5. Working of UN
6. China's BRI (Belt and Road Initiative) 7. Data visualization tools like numpy, pandas and matplotlib 8. Web scraping using scrapy and selenium
This is what I remember now, but I can assure you that this was just 30 percent of what we learnt.

PS-I station: Nihon Communication Solutions Pvt. Ltd., - IoT, Bangalore

Student

Name: KALLURI LAKSHMI AISHWARYA .(2018B2AA0808H)

Student Write-up

Short summary of work done: Building a smart pot using sensors, to determine the watering requirement of a plant. Domain-IoT.

PS-I experience: Project and mentor allotment was done within the first week. Mentors were available for doubt clarification. I gained some knowledge of handling electronic sensors and programming them The experience would be even better if we were given the complete 2 months of PS-1.

Learning outcome: Gained my first industrial exposure, improved some of my soft skills, got to know various IoT platforms.

PS-I station: Nihon Communications - Embedded Systems, Bangalore

Student

Name: N HARISHCHANDRA PRASAD .(2018A3PS0422P)

Student Write-up

Short summary of work done: To design hashing logic to create a unique flow id for network traffic analysis. This project involves studying the requirements of network analysis and choosing an efficient algorithm to hash and store the IP 5-tuple extracted from network traffic. The method used should be fast and space-efficient. In this project, flow is being tracked as opposed to packet mirroring. Network analysis relies on gathering some data from the traffic flow. In the past, this usually meant mirroring the packet as a whole and analyzing its contents. However, this involves the processing of large amounts of data which poses an issue when dealing with high speed data streams. Flow analysis involves gathering only header info - the most common combination being the IP 5-tuple of source IP address, destination IP address, source port address, destination port address and IP protocol. This info is much more concise and can be stored and analysed faster, with more efficient memory usage. This sort of analysis looks at parameters like the volume of certain flow and the frequency at which new packets are sent. Comparing these with the average statistics for a particular network can help quickly identify abnormal flows, and is hence an important tool in cybersecurity.

PS-I experience: Apart from not being able to meet with the industry mentor because they were really busy, it was a great experience.

Learning outcome: Basics of IOT, Embedded systems.

Name: NANDI SHUDDHABHO SOMBUDDHA .(2018A3PS0563H)

Student Write-up

Short summary of work done: Network simulation in Contiki OS using Cooja simulator to analyse performance of RPL protocol.

PS-I experience: PS-1 experience was great despite it being WFH. The mentors and instructors were very helpful and it was fun coordinating with students of other campuses.

Learning outcome: Learnt about the functioning of RPL protocol. Learnt how to use Cooja simulator.

Name: AMAN SHARMA .(2018A3PS0639H)

Student Write-up

Short summary of work done: Our project was to design a efficient hashing logic to create unique flow ID for network traffic in the domain of cybersecurity. We were required to design, implement and time a hashing logic to create a unique flow ID for each network traffic flow using network parameters (source destination ip address, port etc.) that uniquely identify a network traffic. We were able to design the logic but not implement it because of complete online mode of working due to COVID-19. By doing this project I was able to develop understanding of network traffic in computer networks and explore the domain of cybersecurity for first time. We read lot of research papers and analysed existing solutions given in them related to our project. We developed an analytical ability to understand which algorithm works best for practical implementation of hash value using network protocol fields and on basis of our literature review, we designed logic and suggested it to company via group presentation.

PS-I experience: As this time PS-1 was conducted completely in online mode, we were not able to get a hands on industry experience. But despite of online mode of working, we were able to be part of professional environment. We were allotted faculty mentors by BITS which helped us in every way possible. Overall, the experience was good.

Learning outcome: I was able to gain some technical skills as well as soft skills during the PS-1. I learnt to do proper literature review. I was able to improve my group discussion as well as presentation skills.

Name: VENKATESH RAJAGOPALAN .(2018A8PS1041H)

Student Write-up

Short summary of work done: We were told to stimulate a RPL (Routing protocol for low power and lossy networks) network on Cooja simulator which is based on Contiki OS. We measured the performance characteristics of the network and analysed it briefly during our PS-1.

PS-I experience: Overall, It was good experience. I got good support from the mentors and the Instructor in charge. The evaluation components were easy to follow through and was keeping me busy all the day.

Learning outcome: Got pretty good experience on Wireless Network and IoT applications in daily lives. Insight on microcontrollers and microprocessors. The team was very supportive. Overall, the online PS-1 went quite smooth.

Name: ADITI UMASHANKAR .(2018AAPS0329G)

Student Write-up

Short summary of work done: Our project was mostly literature review of flow capture methods. We first learnt the basics of networks, enough to understand the papers, we needed to read. We learnt about hashing and flow analysis. We then narrowed down couple of methods and picked out flow organisation method.

PS-I experience: It was good experience. The professor in charge, Dr. Meetha V. Shenoy, was involved throughout and she helped us get started, taking into consideration the field was entirely new to us. She asked for updates and was the reason we progressed as we did.

Learning outcome: Knowledge about networks, hashing, flow analysis. Soft skills like presentation skills and report writing.

Name: AAYUSH CHANDAK .(2018B2A80433G)

Student Write-up

Short summary of work done: My project was about understanding the mechanism and implementation of phishing and spear phishing attacks and how to detect and prevent them.

PS-I experience: I had pretty good experience. The work plan wasn't very exhausting and manageable. The PS-1 instructor and the industry mentor were very helpful as well.

Learning outcome: I learnt how the phishing and spear phishing attacks are implemented and various algorithms for detecting and preventing them.

Name: AYUSH KUMAR SINGH .(2018B4A30924H)

Student Write-up

Short summary of work done: To design hashing logic to create unique flow ID for network traffic analysis. This project involves studying the requirements of network analysis and choosing an efficient algorithm to hash and store the IP 5-tuple extracted from network traffic. The method used should be fast and space-efficient. In this project, flow is being tracked as opposed to packet mirroring. Network analysis relies on gathering some data from the traffic flow. In the past, this usually meant mirroring the packet as a whole and analyzing its contents. However, this involves the processing of large amounts of data which poses an issue when dealing with high speed data streams. Flow analysis involves gathering only header info - the most common combination being the IP 5-tuple of source IP address, destination IP address, source port address, destination port address and IP protocol. This info is much more concise and can be stored and analysed faster, with more efficient memory usage. This sort of analysis looks at parameters like the volume of certain flow and the frequency at which new packets are sent. Comparing these with the average statistics for a particular network can help quickly identify abnormal flows and is hence an important tool in cybersecurity.

PS-I experience: This was the first time I was doing an internship and the experience was overall good. Our mentor was like someone who an intern dreams of. We got all the help needed from our instructor Dr.Meetha V Shenoy.

Learning outcome: Introduction to cyber security and networking.

Name: GARIMA PATEL .(2018B4AA0931H)

Student Write-up

Short summary of work done: Our project was analysis of performance parameters of RPL (Routing Protocol for Low Power and Lossy Networks) protocol. Since, we were completely new to the field of networking, so we had to start from basics. We studied some basics of Networking and basics of RPL. Then, we analysed some parametes based on performance of RPL using Cooja simulator.

PS-I experience: It was good experience as I got to learn something new.

Learning outcome: I learnt about RPL (Routing Protocol for Low Power and Lossy Networks) and its working in network formation.

PS-I station: Power Grid Corporation, Nagpur

Student

Name: AMBEDPELLIWAR SANKALP .(2018A3PS0383P)

Student Write-up

Short summary of work done: The project was on "Role of Smart Grid in Solving Power Woes of our country". Firstly, the need of Smart Grid was learnt. Then, the technologies and infrastructure to implement smart grids were discussed. Later, challenges faced in implementing smart grids were discussed. Then, the role of renewable energy was

discussed. Then, the green energy integration infrastructure was learnt. At last, role of REMCs was discussed.

PS-I experience: It was good experience in terms of industry exposure. Had it been normal PS-1 like other years, it would have been of even greater help.

Learning outcome: The smart grids are very important in shaping the future of energy sector, not only in India but throughout the globe. Also, the urge to depend on renewable energy has been increasing unprecedentedly. So, the use of smart grids is inevitable.

Name: PRADHAN HRISHIKESH SURESH .(2018B4A80667G)

Student Write-up

Short summary of work done: Project was mainly focused on study of fixed series compensation (FSC) at Wardha sub-station. It started with the history and need of series compensation in power transmission lines, followed by the current usage and advantages. Understanding the different components of FSC and studying their functions and working. Like capacitor bank, MOV, OCT, bypass switch, spark gap and more. After studying the components and their working, we moved on to their rating scheme. Further, we learnt about the behaviour of FSC during different line fault conditions. Last part of the project was focused on the control and protection of FSC. This is done by MACH control and protection system.

PS-I experience: It was quite good with consistent grading structure and timely evaluation. The knowledge gained will be helpful for me in future.

Learning outcome: Complete knowledge of all aspects of FSC.

PS-I station: Power Grid Corporation of India, Gurgaon

Student

Name: ANSHUL SOMVANSHI .(2018A3PS0405G)

Student Write-up

Short summary of work done: My project topic was "Layout and Schemes of Power Transmission Station and its various components". I studied about sub-stations, its types, need for substation and functions of different types of substations. Further, I studied about the various components used in a substation in detail. Then, I focused on various switching schemes used in sub-station and did an exhaustive study of different switching schemes, their advantages, disadvantages, cost, efficiency and many other features. Lastly, I studied about sub-station design and insulation techniques / schemes namely- Air Insulated Substation (AIS), Gas Insulated Substation (GIS) and Hybrid Switchgear in a comprehensive manner, comparing them based on various features, cost and many other parameters.

PS-I experience: It was an exiting experience, I got to learn about many things. I was also able to up-skill my soft skills and was able to learn how to present a seminar, participate in group discussion and how to write report. It was new experience for me which helped me learning many new things.

Learning outcome: The study focused on different sub-station types, sub-station function and sub-station requirements for a particular location. The study also focuses on different components in sub-station, function performed by each sub-station and roles they play in proper and efficient functioning of the power system. Further, various insulation schemes like AIS, GIS and hybrid switchgear are discussed with their reliability at a particular location and then various switching schemes are discussed which function for effective electrical and physical arrangement of a power system sub-station.

Name: AKSHAT GUPTA .(2018A3PS0447P)

Student Write-up

Short summary of work done: Study about various sub-stations, their workings, their types and components of a sub-station. Study about various switching and insulation schemes. Also to prepare layouts and design of sub-stations.

PS-I experience: My PS-1 experience was well and nicely conducted and it helped me to gain a lot of practical knowledge about substations.

Learning outcome: Selection of sub-station, insulation and switching schemes for a sub-station at a particular site based on conditions favourable.

Name: VISHAD SHALIN SHAH .(2018A8PS0419P)

Student Write-up

Short summary of work done: Had to study on NOFN (National Optical Fibre Network). Read different reports provided by the mentor. Learner about different technologies, topologies and procedures in such a big government project. Also, saw how is data actually transmitted in fibre optic network. Understood functioning and role of different levels of government in this project.

PS-I experience: Good experience overall. Topic was excellent, interesting and futuristic. Expected more materials or help from the mentor.

Learning outcome: Can precisely explain how data is transmitted around the world. Learnt about topologies, active and passive technologies, their capacities, dark fibre, etc.

Name: HARSHDEEP SINGH CHHABRA .(2018A8PS0775P)

Student Write-up

Short summary of work done: Study analysis of Thyristors. It's design, working and protection. Protection from electrical glitch and thermal causes.

PS-I experience: The PS-1 was little different than usual. The online made it a little difficult at first but slowly we got used to it. The study was good and learnt lot about the domain of power electronics.

Learning outcome: 1. Power Electronics 2. Presentation skills 3. Official report writing 4. Working online.

Name: VINAYAK BUDHIRAJA .(2018B2A30522H)

Student Write-up

Short summary of work done: My project area was on erection testing and commissioning of extra high voltage power transformer. Then, I also studied about failure in transformers and their maintenance.

PS-I experience: My experience was good. I learnt many new things and also applied that knowledge in day to day life. There were some problems also because this was virtual PS-1 and it would be better if we could go to the sub-station and actually work near the transformer.

Learning outcome: I learnt many things. I got complete knowledge of installation process of power transformer. What are the failures in power transformer and how those failures can be prevented. I learnt how to interact with professionals in corporate world and also how to present in a seminar.

PS-I station: Power Grid Corporation of India, Jammu

Student

Name: DIPIN .(2018A3PS0371P)

Student Write-up

Short summary of work done: Research based project on Iot in which it's applications in electric, power sectors transmission and distribution were to be discussed. Internet Of Things as word says things that are connected to virtual cloud which connects almost whole the globe.

PS-I experience: As it was work from home kind of internship, we all missed real experience of industry but on the other side it was good experience towards learning new things, virtual meets to our industry experts, having insight knowledge though company mentors and most important having opportunity to create, build, lead on our own as the way we like.

Learning outcome: Learnt various technical skills, soft, vocatinal, presentational skills. Learnt really new, important, necessary concepts of our discipline, basic principles of life, time management etc.

Name: SYAMITHA SREE RAVU .(2018AAPS1036G)

Student Write-up

Short summary of work done: Research project on the maintenance and pre-commissioning of EHV power transformers in a power distribution system. Project was purely study oriented.

PS-I experience: Industry mentors were helpful and provided us with plenty of resources to help us research and understand the topics. The experience was very smooth.

Learning outcome: Deeper understanding of the functioning and importance of power transmission and distribution systems.

PS-I station: Power Grid Corporation of India, Lucknow

Student

Name: TESHYANSH VATSYAYAN .(2018AAPS0398G)

Student Write-up

Short summary of work done: Researching on control switching devices applications on transformers, transmission lines and reactors.

PS-I experience: It was an amazing learning environment in which we gained the relevant industry experience despite it being work from home.

Learning outcome: I was able to understand the working of a power grid, smart grids and its applications in present day Indian scenario.

PS-I station: Power Grid Corporation of India, Patna

Student

Name: ADITYA VERMA .(2018A8PS0008P)

Student Write-up

Short summary of work done: Study the use of SCADA and SAS used in a power sub-station. Initially, the basics are made perfect like what a substation is, its uses and functions, the equipment used in a substation, schemes that are applied in transmission, function of control room etc. After the study of these basic topics, the main project is looked into and worked upon.

PS-I experience: It was very enriching experience altogether. How to deal with the problem of work from home, and many other problems were easily overcome because of the guidance the faculty in-charge. It was fun and enlightening experience.

Learning outcome: Knowledge about power sub-station, their equipment, schemes and auxiliary systems. SCADA and SAS, their function and uses.

Name: ANANYA VIKRAM SINGH .(2018B2A80878G)

Student Write-up

Short summary of work done: It was great experience.

PS-I experience: I learnt lot.

Learning outcome: I got to learn about scada and sas systems.

Name: ANANYA VIKRAM SINGH .(2018B2A80878G)

Student Write-up

Short summary of work done: It was great experience.

PS-I experience: I learnt lot.

Learning outcome: I got to learn about scada and sas systems.

Name: VINAYAK AGARWAL .(2018B3A80761G)

Student Write-up

Short summary of work done: Fibre optics, MPLS, etc.

PS-I experience: Good.

Learning outcome: Technologies and Instruments used in Telecom networks.

Name: VINEET KUMAR .(2018B4A80014G)

Student Write-up

Short summary of work done: My work was study oriented project about telecommunication technologies. I learnt some concepts related to Computer Networks and Optical Fiber communication. It was fun learning how a simple phone call or web browsing includes some complex technologies to make it a better user experience.

PS-I experience: It was good learning experience but it would be have been better if we were physically present. But my mentor and instructor were very helpful.

Learning outcome: I learnt some concepts related to Computer Networks and Data / Phone communication. Learnt MATLAB too.

PS-I station: Power Grid Corporation of India, Secunderabad

Student

Name: KASYAP SRIRAMAGIRI .(2018A8PS1228H)

Student Write-up

Short summary of work done: The project given is Smart Charging of Electric Vehicles. I had to research on the infrastructure required to sustain the ever-growing demand for electric vehicles. Learnt about different ways to charge an electric vehicle. I had to research the different charging methodologies and approaches to integrate electric vehicles into the smart grid. I also had to study how electric vehicles can give back to the grid and how AI and BigData are influencing the smart charging field.

PS-I experience: It has been an amazing experience. Both the mentor and PS-1 faculty were very friendly and very supportive. I learnt lot in this PS-1 and I hope to use this experience in the future.

Learning outcome: I learnt lot about this ever-growing domain. We have to start implementing renewable energy in our day-to-day activities and electric vehicles are the stepping stone to renewable energy lifestyle. To sustain the ever-growing demand for electric vehicles, we need to implement sustainable and flexible infrastructure. If used properly, electric vehicles can provide back to society and give back to the grid when necessary. Integrating electric vehicles into smart grids is crucial. It needs to be done to sustain the growing number of electric vehicles. The field of smart charging is a relatively new field and many advancements are being done to make the use of electric vehicles user friendly and sustainable.

Name: RITIK CHINMAY PATI .(2018AAPS0413H)

Student Write-up

Short summary of work done: Any disruption in power sector due to crisis / disaster creates hardship to the human beings, as every aspect of human life is directly or indirectly associated with the electricity. It has also experienced many manmade crises such as terrorist attacks, bomb explosions, strikes, fires etc. The natural disasters / man-made disasters always involve losses / damage of infrastructure of the country. Therefore, the very purpose of preparation of this project is to evolve more proactive, holistic and integrated approach of strengthening disaster preparedness, mitigation and emergency response in the event of disaster taking place. The ‘crisis and disaster management plan for power sector’ provides framework and direction to the utilities in power sector for all

phases of disaster management cycle. This document is in accordance with the provisions of Disaster Management Act 2005 and the guidelines issued by NDMA from time to time and the established practices.To make Indian power sector disaster resilient, achieve substantial disaster risk reduction and significantly decrease the loss by maximizing the ability to cope with disasters at all levels of administration as well as at the field level India, is one of the most disaster prone areas of the world. India has been vulnerable, in varying degrees, to a large number of natural, as well as human-made disasters on account of its unique geo-climatic topographic features, environmental degradation, population growth, urbanisation, industrialization, non-scientific development practices and socio-economic conditions. Hazard risk & vulnerability analysis involves vulnerability mapping, zoning for wind, cyclones, earthquakes, Tsunami, floods etc and building power structures in accordance with the Zone in which it falls and safety factor as per relevant Indian standard. In today's scenario, disaster management is a continuous and integrated process of planning, organizing, coordinating, and implementing measures, which are necessary for prevention of danger or threat of any disaster. This covers building resilience at planning, design and operation stage. Preparedness & response consists different aspects, which are to be covered as an organisational practice for effective mitigation of any disaster in future. Preparedness & response also gives direction for effective and well organised coordination among different organisations like RPC, RLDC, SLDC, STU, CTU for better preparedness in the situation of disaster / crisis.

PS-I experience: It was really nice. My PS-1 Instructor Dr. Swapna Kulkarni Ma'am, is very kind and helpful. Even at Power Grid Shri. I Poornachandra Rao, is also very helpful. There was proper communication throughout the PS-1.

Learning outcome: Got to know about Mobile-Centric Operational Model and Situational Intelligence across the digital utility for outage response. Also, about outage management during disasters and disaster management plan for power sector. I got to know how to prepare group discussion and presentation. Skills for writing report, diary and sysnopsis.

Name: PAKALA BHUMIKA .(2018B4A30882H)

Student Write-up

Short summary of work done: Viewed few previous reports to have general idea, given two quizzes, submitted a diary every week writing all the work done and major challenges faced in that week, project allotment, read all the documents shared by the mentor, given

two seminars on my project, we also had group discussion on Industry 4.0 pros and cons, have submitted two project reports on canvas platform.

PS-I experience: PS-1 is a platform where we can learn many skills. Learnt how to work with MATLAB, a basic understading on Simulink, I was able to get good understanding on electronics, overcame the stage fear through the midsem presentation, got to communicate with many people regarding the project and discussing the issues, gained communication skills, made myself familiar with the presentations and ppts, I learnt how to make report by guidelines and sample documents shared by our PS-1 instructor Dr. Swapna. I learnt how actually group discussion should be through the guidelines of my PS-1 instructor. I also gained confidence of proving myself better in the next GD wherever it might be there because of this first attempt. We got free subscription of MATLAB R2020b for all the students from our institute. I have downloaded the software and got to know it better. With the help of the videos available in the canvas (LMS) platform, I am able to understand the concept of Simulink in much clearer way. With the quiz held, I have also gained much knowledge of conductors. Learnt much about grounding and their protection techniques. Once again through the seminar 2, I was able to overcome my stage fear to the fullest and was able to give my best in the presentation.

Learning outcome: We had quiz on the company through which I got to know much about my station. Learnt about the protection techniques followed in PowerGrid as part of my project report. Our instructor gave us the guidelines for the presentation and shared few important template documents of the project report and seminar. I learnt more about protection techniques in an electric station. Which includes isolation, insulation and grounding through the documents shared by my mentor and also through internet. I started working on grounding systems. Started working on my second presentation which mainly focuses on grounding systems. Gone through all the materials shared by my PS-1 mentor and also through the internet on grounding systems. The importance of the de-energized conductor. Its properties and working principle. Methods to detect the presence of the induced voltage. Protection techniques used to prevent workers from entering the dangerous places. The grounding systems and its objectives at the worksite. The importance of the protective grounds in the installation of the grounding system. The features of the grounding system and its various methods being followed.

PS-I station: Power Grid Corporation of India, Vadodara

Student

Name: JAIDEEP KHARE .(2018A3PS0384P)

Student Write-up

Short summary of work done: There are lot of different components available in a sub-station, therefore the functioning of each component is very crucial to understand for proper operations management. The protection schemes should have very rigorous approach to clearing faults while leaving the rest of the system still under operation. Common faults in transformer setups such as: Oil & winding insulation faults, core faults, winding faults, overloading and overheating faults are discussed. Following faults, the schemes that can be used for protection were studied about. These include: differential protection, restricted earth fault protection, distance protection, lightning protection, overflux protection, buchholz relay protection & transformer fire protection. We also learnt to Interpret single line diagram of transformer sub-station.

PS-I experience: It was really awesome experience to learn how electricity distribution works in the first place, and how industry electrical engineers keep a check on heavy types of equipment to ensure power supply all the time. Our mentor was very enthusiastic, supportive and was always just a call away in case on any issues. I am really grateful for BITS to provide me with this opportunity! Thanks.

Learning outcome: Developed an understanding of big picture of Power Grid and electrical power supply operations in India. Got to understand the actual working process of big industrial plant such as Power Grid. We also got to understand real-life issues that might arise while working with transformers and electricity transmission. Also, learnt what protection schemes are used to prevent disasters. And last but not least, there was great enhancement in my soft skills while contacting our mentors and participating in group discussions, presenting our reports.

Name: PRAKHAR TIWARI .(2018A3PS0565H)

Student Write-up

Short summary of work done: My project was "Sub-station operations and maintenance". I learnt about electrical sub-station working principle, maintenance and saw how these components are maintenened using suitable maintenance techniques. At the end of project, I learnt single line diagram.

PS-I experience: It was nice experience. I always wanted to know working of electrical sub-station and see how different components work together. The best thing I learnt is

preventive maintenance and it's maintenance. I also learnt about latest technologies which can be used to maintain sub-station more efficiently.

Learning outcome: I learnt working of sub-station, maintenance of sub-station, different faults of each component of sub-station and single line diagrams.

Name: APOORV SINGH .(2018A3PS0640G)

Student Write-up

Short summary of work done: Firstly, we had to contact our assigned PS-1 mentor and ask us to give topic on which we can work. We had a choice to work individually or in a group of 2. My topic for project was PLCC (Powerline Carrier Communication). Some reading materials were also provided to us, which helped us in making the midsem and final report. Apart from that, weekly google meets were also organized by our PS-1 mentor. Some of them were asked us the updates and some were for evaluative components. We had to present our work in the form of midsem seminar and endsem seminar.

PS-I experience: It was a moderate kind of experience for me, as we were working from home, industry type experience was not provided but PSD tried to organise some webinars which were good. Apart from that, my project topic was good and it was nice experience learning about it in detail.

Learning outcome: I learnt lot of new things from my project topic which may help in my next year subject.

Name: PREETISH JAIN .(2018A8PS0604G)

Student Write-up

Short summary of work done: I learnt about Power Line Carrier Communication (PLCC). What is PLCC and how it is used for communication by not only in power grid

but even by homes and offices to establish connection between various appliances. I also learnt about teleprotecton methods used by power grid to safegiard their equipments.

PS-I experience: PS-1 was great experience in getting a first insight in industry sector and how it operates.

Learning outcome: Among the technical skills, I learnt about Power Line Carrier Communication. I was fascinated reading about it initially that we can use the existing power transmission infrastructure for various more aspects of communication. Among the soft skills, I learnt how to make and present a report and how to analyse an existing report. I also participated in group discussion which also expanded my knowledge. Overall, it was great learning journey for me.

PS-I station: Power Grid Corporation of India Limited, Bangalore

Student

Name: THAKKAR KARAN ARVINDKUMAR .(2018A3PS0245G)

Student Write-up

Short summary of work done: My project was study oriented project. The project was about how to detect faulty cell in VRLA battery in Power Grid. To detect faulty cell it required microchip, debugger etc. In this project, PIC16F15214 microprocessor is used. Microchip cost is very low and a program is also available with microchip. I studied the master-slave setup used in the schematic diagram. Study about various PIN modes in chip. Since, transferring data is very important role of this project so, I also learnt about data communication. Analog data transmission is not possible due to delay distortion and signal amplification. I also get familiar with various terms like baud rate, clock rate etc. Since data correction cannot be 100% accurate. So, filters are used in this project. In MODBUS certain filters are defined in C language libraries in which the instruction set to be executed is written. I learnt about parity bit filter and modulo 2 filter. There are more advanced filters like CRC filter which can't be done by parity bit filter and modulo 2 filter. To study the entire project can take few months. The project is also in developing stage.

PS-I experience: My PS-1 experience was good. I was in this project with 2 more students from Hyderabad. Our mentor is from Bangalore station. The project was about

how to detect faulty cell in VRLA battery in Power Grid. The experience studied under him was good opportunity. But due to COVID-19 situation, the platform was online between us. That's why I feel like I literally miss beautiful opportunity working in Power Grid because we can get knowledge through online platform. But to see different programs, machine setups and various sectors in Power Grid is different. Also after mid semester, we can't in contact with our mentor for big period of time because he has lot of work in Power Grid. Communication during PS-1 was very less between our group and mentor. Due to his busy schedule, we can only talk with him in the evening for one hour. But the good part is that our mentor still teach us about this project in short interval of time. I really enjoyed this project during PS-1 under him. If the platform is the real power grid center then working experience can be amazing.

Learning outcome: Our project was about detecting faulty cell in VRLA battery in Power Grid center. I understand some new things like data communication / transmission, data correction, MODBUS protocol and devices like microcontroller, debugger etc. I also learnt some new skills like group discussion, presenting a report through online platform etc.

Name: UTKARSH GUPTA .(2018A8PS0046H)

Student Write-up

Short summary of work done: The study project was on the automation of the process of detecting a faulty cell in the VRLA battery which is done manually currently. We studied how we will try to make an electronic circuit which can detect a faulty cell in the VRLA battery after a significant interval of time that will prove very helpful for the power grid center. The project will be cost efficient as the Microchip PIC16F15214, RA pin, debugger etc. are not expensive products, easily available and we got detailed information about them. We also learnt about the master-slave setup in the form of modbus protocol. In this project, data communication plays a key role and we studied how the digital data is transmitted because during the analog data transmission there can be some delay distortion or signal amplification problems. There is about 8-bit information which is transmitted throughout data communication. Data transmission can never be 100% accurate so to make sure that there is no error in information various filters are used in software coding. Parity bit filter, modulo 2 filter and CRC filter are few of them. Finally, the code was studied and tried to be implemented by studying about few of the modbus libraries. The material provided to us by the mentor was thoroughly studied and tried to be implemented.

PS-I experience: The PS-1 experience was really good. Despite working remotely from home and this being a virtual PS-1, I learnt lot of things from our mentor as I was in constant touch through video conferencing. He helped us lot in the project and was mostly available to resolve our doubts. Our PS-1 faculty also supported us throughout the PS-1 as she regularly conducted meetings and responded to our queries as soon as possible. I also want to thank my teammates as I learnt many things from them. Overall, it was wonderful experience working in the Power Grid Corporation for the last 40 days.

Learning outcome: This PS-1 helped to learn lot of things. Along with the theoretical concepts, we developed other skills like communication skills, presentation skills etc as this was first time for us working from remote place far from the actual place where all the machines and equipment were present and also submitting the reports for the online evaluation.

Name: SINHA SAURABH KUMAR SANJAY KUMAR .(2018B4A80845G)

Student Write-up

Short summary of work done: My PS-1 was on research based project, we had to research about the three major components in sub-station, which are transformers, transmission lines and bus bars in power systems and how they operate. We also studied the different types of fault occur in the power systems and how to clear these faults using protective equipment. We also got to know about different types of protection schemes, such as differential protection, distance protection, backup protection, frame leakage protection, etc. Throughout the PS-1 many webinars were conducted, which is quite interesting and helpful. At the end, we concluded that with time changes, it is necessary to improve the efficiency of the system.

PS-I experience: My PS-1 experience was good, being work from home meant that we won't be able to get hands-on experience but my instructor put in lot of effort so that we can get hands-on experience. Also, the company mentor allotted to us was quite helpful and cooperative, he also tried his level best to help us got proper internship experience. His very long experience in the industry proved to be quite helpful and thus improved our overall PS-1 experience.

Learning outcome: I improved my speaking skills, communication skills, presentation skills and writing skills. Also, learnt about MATLAB and simulink.

PS-I station: Power Grid Corporation of India Limited, Kolkata

Student

Name: RAUNAK SHARMA .(2018A3PS0377P)

Student Write-up

Short summary of work done: My project is "HVDC sytem operations and multi terminal philosophy in India". It's a study oriented project, so we (me along with two other people) have to deal with material present on the web (mainly research papers). Our mentor is very helpful and always there to clear all our doubts. Instead, he teaches us during the phone call. I got to learn many new things about the working of PGCI, Kolkata and got an opportunity to improve my communication skills. The PS-1 faculty assigned to us is also very helpful.

PS-I experience: It was good experience being part of an industry for around 40 days. I got to learn many new skills that will be very helpful in my near future.

Learning outcome: I got to know the working of PGCI, Kolkata and the difficulties they are facing to supply electricity. It also improved my communication skills up to some extent.

Name: JAGMOHAN JENA .(2018A3PS0387P)

Student Write-up

Short summary of work done: My project was basically study project having the title "HVDC SYSTEM OPERATION IN INDIA & MULTI-TERMINAL PHILOSOPHY IN HVDC OPERATION". Initially, I was explained the basics of HVDC transmission, its importance, merits and demerits. I learnt about various existing HVDC projects working in India. I also learnt various components of converter stations used for AC-DC conversion and its transmission. Post-mid semester, I concentrated on Multi-terminal philosophy and its

recent use in power sector in large scale. I went through an important multi-terminal project present in India, connecting NE region with Agra and its power distribution throughout India. I also learnt about organisation profile of POWER GRID coporation and its involvements in vast domains like power system management, telecom, smart grid etc.

PS-I experience: Electrical sector definitely requires practical involvement in PS-1 but COVID-19 restricted us to have PS-1 in virtual mode. With the available resources virtually, it was indeed good and new experience. Our instructor and mentor were very much helpful and supportive which helped us towards the fulfillment of PS-1.

Learning outcome: 1) HVDC transmission 2) Existing HVDC projects 3) Multi-terminal philosophy 4) NE-Agra link 5) Soft skills.

Name: SHALU SINHA .(2018A3PS0432P)

Student Write-up

Short summary of work done: My project during PS-1 was based on 'High Voltage Direct Current (HVDC) transmission systems and Multi terminal Philosophy in HVDC transmission' . The work included analysis of power transmission system in India, study of various sub-stations based on HVDC technology, study of multi terminal technology and its feasibility and the economics behind power transmission.

PS-I experience: PS-1 was good opportunity to learn about power sector and was also a platform to leverage the benefits of corporate exposure. My project also provided me with an insight of the course 'Power Systems' and how industrial mechanisms function.

Learning outcome: After completing PS-1, I now have an idea of how theoretical concepts are applied in the industry and on day to day basis. The program has also helped me develop soft skills like leadership, communication etc.

Name: SOURABH GUPTA .(2018A3PS0531P)

Student Write-up

Short summary of work done: The topic of our project was design of HVAC sub-station which mainly focus on various equipment's used in sub-station, viz., transformers,circuit breakers and bus-bars. Firstly, we studied in depth about the transformers, transmission lines and bus-bars, what faults can occur, what are the causes behind the faults and how to design them.Then, we learnt about the switchyard equipments used in sub-station like current transformers, capacitive voltage transformers, wave traps, isolators, circuit breakers, shunt reactors and many more.

PS-I experience: PS-1 is short term experience about what the professional life is going to be. It has group discussions, seminars, presentations etc which can improve your speaking skills, helps to know how to interact with new people and develop your overall personality.

Learning outcome: We learnt about different components in detail that comprise a Sub-station. Basically, we learnt about how to design an electrical sub-station and its working.

Name: DIVYANSHU SINGH .(2018AAPS0673G)

Student Write-up

Short summary of work done: Design project on HVAC 400/220 KVa transmission sub-station.
PS-I experience: Good experience. Got to learn about various sub-station components.

Learning outcome: Learnt about the design aspect of HVAC transmission sub-station.

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

Student

Name: RAMINENI PHANINDRA .(2018A4PS0131H)

Student Write-up

Short summary of work done: Me and my team were working on Flat pack design for a control desk. The project involves designing, simulating and evaluating a 3-D design using CAD software. We were required to come up innovative assembly ideas to make the product more compact while also ensuring ease of manufacture. The goal of the project is to re-design a control desk to enable flat packing and easy assembly upon shipping.

PS-I experience: I had good learning experience from my PS-1 station. Although, worked form home the regular meets and all the project reviews made the experience really engaging. It was great getting to work with industry experts on such project, it really helped me acquire the kind of skills required by the industry.

Learning outcome: I've learnt lot about product design. Using CAD for the whole project i've learnt how to design modular products, test the design using computational fluid dynamics (CFD) and finite element analysis (FEA), compare with benchmark and come up with improvements and also how to document the designed product.

Name: ADITYA VASIREDDI .(2018B5A41129P)

Student Write-up

Short summary of work done: The project alloted to us involves the usage of flat-packing a product to reduce transportation costs. The CAD software used to achieve this was SolidEdge by Siemens. We were given drawings of a welded desk design, our task was to convert it into an assembly type design so flat packing would be possible.

PS-I experience: The PS-1 experience was interesting on whole and better than I thought it would be given the remote experience. The overall communication and work flow was very professional.

Learning outcome: I learnt how to use certain components in Solid Edge that gave me a foundation in CAD technologies.

PS-I station: Pyrotech Electronics Pvt. Ltd., - Industrial Control & Automation, Udaipur

Student

Name: RAHUL AJMERIA .(2018A3PS0329H)

Student Write-up

Short summary of work done: Product development, designing VideoWalls using pre-existing Led modules, the project required knowledge from various domains such as mechanical design, electrical circuits like charlie / multiplexing, electronics microcontrollers, computer algorithms to control the overall unit.

PS-I experience: A great learning experience, got to hone my communication and technical skills gained industry knowledge.

Learning outcome: Vast learning outcomes in various fields mentioned before.

Name: PILLAI ADITHYA AJOY KUMAR .(2018A8PS0072G)

Student Write-up

Short summary of work done: Manufacturing LED modules.

PS-I experience: Nice learning experience.

Learning outcome: Assembly of LED modules.

Name: PILLAI ADITHYA AJOY KUMAR .(2018A8PS0072G)

Student Write-up

Short summary of work done: Led video wall manufacturing.

PS-I experience: It was good.

Learning outcome: Nothing as such.

Name: SAKTHIVELAN KARTHIKEYAN .(2018AAPS0318G)

Student Write-up

Short summary of work done: Our work was review on flue gas sensing and environmental modelling techniques used in the industry and understanding them from controls perspective.

PS-I experience: Given that, we were constrained to work remotely, PS-1 felt more like a course than a project. The faculty was very keen to help us during this difficult time and so were the industry mentors. If not for the pandemic, a lot more could have been done.

Learning outcome: We learnt about industry standards in manufacturing, safety alongside theory pertaining to gas sensing.

Name: VISHNU R NAMBIAR .(2018B5AA0865G)

Student Write-up

Short summary of work done: I had to make a video wall using LED modules. The project mainly involved assembly and not actual manufacturing of the modules. Both the software and hardware components had to be taken care of.

PS-I experience: It was enjoyable overall as I was able to explore new topics and interact with industry experts.

Learning outcome: Learnt material that is not taught in college and more application based learning in general.

PS-I station: RMJ Automation & Training - Industrial Control & Automation, Mysore

Student

Name: MEHUL JINDAL .(2017AAPS0415H)

Student Write-up

Short summary of work done: Developed ladder logic and SCADA screen for automation of conveyor for mines.

PS-I experience: The program was educational without being overexerting.

Learning outcome: Several software used to facilitate automation in industrial processes.

Name: ANSHUMAN SINGH .(2018A8PS0039P)

Student Write-up

Short summary of work done: During the first week, we got to learn about automation and control through the lectures uploaded on Canvas and online lectures scheduled by the mentors and projects were alloted. Therafter, the consecutive week we were introduced with PLCs programs on softwares like WplSoft and Control expert and then SCADA. During the last week of PS-1 we worked on the project.

PS-I experience: Faculty at my PS-1 station was very helpful in clearing any doubts about operating various softwares and automation processes. PS-1 would have been more fruitful, if we were actually training at the centre.

Learning outcome: I got to learn about automation, software and hardware components used in control methods employed in industries.

Name: SIDHARTH SINGHAL .(2018A8PS0049G)

Student Write-up

Short summary of work done: Automation of renewable energy alternative / solar energy by using various softwares.

PS-I experience: Automation of renewable energy alternative / solar energy by using various softwares like WPL Soft, Unity Pro, SCADA software.

Learning outcome: Learnt about the automation of renewable energy / solar energy using various softwares.

Name: AYUSH AGRAWAL(2018A8PS0568G)

Student Write-up

Short summary of work done: Learnt about PLCs and their programming.

PS-I experience: The mentors were very helpful. Our PS-1 instructor was also very helpful.

Learning outcome: Gained some industrial experience.

Name: S Karthik .(2018A8PS0589H)

Student Write-up

Short summary of work done: Our PS-1 station deals with providing afffordable automation solutions and automating the control systems in wide variety of industries. The project assigned to us was to construct an automation system for the downhill conveyers used in mines. We used simulation software called Control expert, by Schneider electric and a graphical screen builder called Citect studio, also by Schneider. We started out by learning to simulate simple systems on a realtively easier simulator called WPLSoft, by DELTA. As we got more familiar with the logic applied in control systems, we switched to Control expert. In the final week of the course, we began working on the project. First we programmed the logic for cascading conveyer system in Control expert and then applied the variables to create an animated GUI in Citect studio.

PS-I experience: Out PS-1 instructor was very amicable and regularly organised sessions with the PS-1 station mentor to clear our doubts and to help famililarize us with the insdustry's workflow and responsibilities. It was overall an ideal station for an Electronics and Instrumentation major like me.

Learning outcome: I learnt to construct, simulate and present moderately complex control system on a PLC (Programmable Logic Controller). I also learnt one of the mode of application of the logic in PLCs, Ladder logic.

Name: SAKETH SAI MALLEPADDI .(2018A8PS1027G)

Student Write-up

Short summary of work done: For the first half of the PS-1, we had to develop an automation system for shifting channels of the bars which come out of the hot rolling mill. We need to develop an automated system using SCADA and WPLSoft and program the PLC and sensors using ladder logic programming as part of the project.
For the second half of the PS-1, we developed an automation system for Bottle filling and capping production line, this involved developing the ladder logic program for the production line where the output of the liquid should be triggered only when the sensor senses the bottle and the liquid should be released for 10 seconds and then the bottles should be capped where again the release of the caps is sensor based. All this had to be programmed on control expert software and then SCADA screen was created and the program was simulated on Citect studio.

PS-I experience: It was my first hands-on experience in the industry. We were asked to develop automation systems for something industries use every day. It was great experience to do project which was very relevant to what the industries need. Overall, it was satisfactory experience.

Learning outcome: Learnt many new softwares like WPLSoft, Control expert, Citect studio, SCADA which are industry standards in the automation sector and also learnt ladder logic programming which is used for developing automation programs.

Name: ARYAN BHARDWAJ .(2018AAPS0313G)

Student Write-up

Short summary of work done: Automation of ladle heat furnace using softwares. For PLC control expert was used. For the SCADA part Citect studio was used.

PS-I experience: Experience was okay.

Learning outcome: Learnt PLC, SCADA and their implementation in automation of systems.

Name: ISHAN DIXIT .(2018AAPS0333H)

Student Write-up

Short summary of work done: It was acceptable.

PS-I experience: It was good.

Learning outcome: PLC, SCADA.

Name: PETLOZU SUJITH .(2018AAPS0365H)

Student Write-up

Short summary of work done: Firstly, we have started our preparation for the project by learning about PLC and SCADA introduction. Then, we learnt the communication in PLC, wiring and PLC programming. We have used ladder programming for PLC in "WPLsoft" software. We did some real life automation ladder programs in "Control Expert" software. In the last two weeks, we have installed "Citect studio" for SCADA animation and used various tools to build an example to operate tank and valves. Finally, in the last week, we have started our project "AUTOMATION OF WATER TREATMENT PLANT", we analysed the given scada diagram and built the ladder circuit for it in control expert and

animated tank, reservoirs, pumps, valves and master start and stop push buttons and linked it with our program to design the final automation plant for water treatment to send water to various stages of purification into the reservoirs built.

PS-I experience: Our PS-1 faculty has arranged two webinars on the first day. In the first webinar, the grading scheme was explained and regularity in doing the work was taught. In the second webinar, we had interaction with Dr. Kiran, CEO of "RMJ Automation" and mentor Mr. Murali. They gave brief introduction about the project domain and work plan for 6 weeks. In the next day, the project was alloted to the group of three students. The power point slides for the PLC and SCADA were provided and the W.Bolton PLC text book was mailed in the first week. "WPLsoft" software link was sent in the second week with a guiding manual. We had regular interaction with the mentors on Thursday of every week to clear the doubts in ladder programming. The basic example programs were implemented in the Thursday gmeet by the mentor in Control expert so that, we get an idea to build real life automation examples. We had regular assessment of our learning through all the midsem evaluation components. We made YouTube demo video on an example made in Control expert. We got the citect studio software link in the fifth week and had a meet for working with basic animation tools. In the final meet, we had the description of our projects and what all to design in it. We ended our PS-1 by successfully desiging "Automation of water treatment plant" and doing all the endsem evaluation components by the 27th of June.

Learning outcome: I learnt working with three new softwares "WPLsoft", "Control expert" and "Citect studio" which are useful in automation industries. Automation is very much necessary for effective production of goods with less time consumption. I learnt programming through ladder logic which is flexible and intuitive for designing automation circuits. I also learnt operation of PLC and wiring it to input and output devices. Dealing with problems like redundancy in PLC. I learnt animation through SCADA and designed our project. It was my first and great experience to Industrial exposure.

Name: VAIBHAV BHUSHAN .(2018AAPS0411G)

Student Write-up

Short summary of work done: Learnt about the basics of PLC, SCADA and applied softwares related to them to build a model for transformer protection.

PS-I experience: Industry oriented projects and helpful mentors.

Learning outcome: Can easily make PLC models.

Name: TUMMALA KUSHAAL .(2018AAPS0422H)

Student Write-up

Short summary of work done: We have implemented a part of bigger project- Automation of Ladle Heating Furnace in a steel industry. The first 4 weeks were spent on learning the basics of PLCs, PLC programming and SCADA. We have worked on our project in the last weeks.

PS-I experience: Although, I had my doubts about the online PS-1 experience, I was wrong. Meticulous planning by PSD and our PS-1 instructor, Dr. Vinay Belde, made sure that the experience was almost as good as an onine mode. We did have some problems due to network issues but we worked around them. The mentors from our PS-1 station were kind and answered all of our questions, even trivial ones, with patience.

Learning outcome: Working of PLCs, PLC programming, SCADA and SCADA implementation. Along with this technical knowledge, I have honed my soft skills. The PS-1 program was effective for overall development.

Name: JONATHAN SAMUEL J .(2018AAPS0460H)

Student Write-up

Short summary of work done: We were given a project on automation of conveyor systems for steel industries. The goal of the project was to build user friendly SCADA screen with all operations needed by the operator. To perform the programming behind these operations, we learnt ladder logic which is implemented in PLCs using softwares like WPLSoft and Control expert softwares.

PS-I experience: Experience was good but we got to do everything in Simulation mode only.

Learning outcome: Learnt about PLCs, SCADA and Ladder logic. Softwares learnt: WPLSoft, Control expert and Citect studio.

Name: AGNIGUNDALA RAMYA .(2018AAPS0475G)

Student Write-up

Short summary of work done: I worked on how to reduce manual work through automation for RAW MATERIAL HANDLING SYSTEM FOR SAIL.

PS-I experience: It was good project and I got to learn new things.

Learning outcome: I learnt how to use automation in any industry to reduce manual work and produce finished products.

Name: SHASHWAT SINHA .(2018AAPS0616G)

Student Write-up

Short summary of work done: Learnt basics of PLC and SCADA, with an emphasis on PLC programming. Designed simple PLC systems on Delta WPLSoft and more complex systems on Schneider control expert. The final project was to build a transformer protection system using Control expert and its SCADA visualization using Citect studio.

PS-I experience: It was great. The PS-1 station has been working in the field of automation for over two decades, and I gained lot from their guidance and study materials. The final project was fun and helped me apply the concept of PLC programming and ladder logic to a real-world project.

Learning outcome: I think this was pretty useful introduction to industrial automation. We learnt about automation tools such as PLC and SCADA, and how to program and simulate PLC systems using software such as WPLSoft and Control expert. We also learnt the use of Citect studio to create and simulate a SCADA system. These tools have enabled me to build a wide variety of automation systems.

Name: DESHPANDE SOHAM SUDHARM .(2018AAPS0723G)

Student Write-up

Short summary of work done: Learnt WPLSoft, Control expert, Citect.
PS-I experience: Got to work with multiple softwares, learnt PLC and SCADA.

Learning outcome: Knowledge about working of SCADA.

Name: SHIVANI PAWAR .(2018B5A80521G)

Student Write-up

Short summary of work done: The project I was allotted was "Intelligent elevator control system" in which we had to write a PLC program simulating a working elevator which was later changed to "Transformer Protection" in which we had to make a PLC program to switch the transformer to off condition whenever the current temperature exceeds the set point temperature or when the number of loads in operation exceed the maximum number of loads that can be tolerated. In the first three weeks, we learnt to solve different problems using PLC programming in various softwares like WPLSoft and Control expert v14.1 and then learnt to simulate SCADA for the same programs in Citect studio software. In the last three weeks, we worked on our allotted projects.

PS-I experience: My PS-1 experience was good. I learnt about various electronics concepts and how to put them to practical use which got me interested in electronics

before any of my EnI courses start next semester as I'm a dualite. Despite it being a remote internship, my experience was definitely better than expected.

Learning outcome: I learnt how to solve different automation problems using PLC programming and simulate them in SCADA. I learnt how to work in a team too.

PS-I station: RMJ Automation Solution and Training - Embedded Systems, Mysore

Student

Name: AYUSHI AGRAWAL .(2018A3PS0443P)

Student Write-up

Short summary of work done: There were two parts of our project:
1. To make a digital display meter for measuring the temperature sensed by temperature sensors (we used K-type thermocouple) using LPC2138 microcontroller to interface the device.
2. To display the 0-10V input voltage signal on a display meter using the LPC2138 microcontroller.
Hence, in this project for amplification and cold Junction compensation of K-type thermocouple, we used the AD595 instrumentation amplifier and for voltage signal conversion, we used voltage divider, which is required because of the signal range for the microcontroller is 0-3.3V, hence can't transfer signal more than 3.3V values. For simulation and implementation purposes, we used the Proteus 7 software and Keil uvision.
3. To display the signal, we used 16*2 LCD display which can display the output of the microcontroller. For analog to digital signal conversion, we used inbuilt ADC (of 10-bit resolution) of LPC2138. Here, an alarm system is also used to detect when temperature and input voltage go beyond a set point LED will blow and indicate the danger. While in industries for voltage conversion in place of the voltage divider, optocoupler can also be used and additionally, EMI / EMC filters, switching regulators also required for noise elimination and to avoid heat.

PS-I experience: I had great experience at my PS-I station at RMJ automation solution and training, Mysore. The mentors and PS-I faculty were so cooperative and we did good

teamwork and come out with a final project which impressed our mentors. Even in work from home system and remote learning, I was able to experience the industry culture, and working in a tight-packed deadline schedule helps me to keep regular and focused during PS-I. RMJ has good working environment, I was in constant contact with my faculty and had several meets with mentors for work discussion and doubt clearance. The team was also very cooperative. Coordinately with each other's contributions, we successfully completed our project.

Learning outcome: I learnt about new field which is embedded systems and it added values in my skills, which helped me to explore my core fields and understand whether I am interested in pursuing it further or not. I learnt new technical skills about the proteus software, Keil uvision 4, and LPC2138 microcontroller. Not only just technical skills, but my soft skills were also enhanced and I learnt business ethics, teamwork, discipline and many more skills which will surely help me further in my life.

PS-I station: Samsung, Noida

Student

Name: NEELAKSH SINGH .(2018A3PS0337P)

Student Write-up

Short summary of work done: My work in this Internship season was to develop a sentiment analysis API. A sentiment analysis API is a framework to analyze reviews and detect the sentiments being reflected by classifying the reviews into the following categories: Negative, Neutral, and Positive reviews and also to identify the critical components related to service or product mentioned in the review by deploying relevant NLP algorithms. This project had great importance for the organization because if completed successfully it enables the organization to get an idea about the situation of a product in the consumer market. They can easily detect which features of any device / service are subject to customer dissatisfaction and which aspects of the feature need improvement.

PS-I experience: I never imagined that I would get the opportunity to work with an R&D team as an intern and that too in a prestigious firm. It was great experience. Although, regular interactions were limited to my mentor I had a few interactive sessions with other members of the team as well. I got a good deal of knowledge from many employees working in the domain and got to pitch my own ideas as well. On overall, it was an

experience to cherish and I believe it would have been even better if the internship hadn't been virtual, still, I loved it.

Learning outcome: I got an introduction to key areas of ML & DL and got to learn some key concepts while working on a project and gain valuable hands on experience. I also got to learn AngularJS and MongoDB for making a single page web application.

Name: ADARSH NANDANWAR .(2018A7PS0396G)

Student Write-up

Short summary of work done: We worked alongside second and third-year students from other tier-I colleges. The work depends upon the team assigned to the intern. I was assigned to the Applications R&D team. We worked on a research-based project involving digital signal processing, machine learning, android application development, and web API development. In the initial weeks, we conducted extensive research on digital signal processing, audio file handling, the problem statement, and the previously used methods to solve the problem. Our goal was to identify various patterns in the audio file and find ways to classify them. After gaining knowledge about the domain, we started implementation. The majority of our work was done in python and java.

PS-I experience: Industry mentors were experienced and friendly. It is up to the student how much effort he/she wants to put in the project. It certainly helps if you have previous knowledge about machine learning and development since a lot of time is spent on research work and thus little time is left for project implementation.

Learning outcome: 1. Data collection, audio data analysis, digital signal processing 2. Machine learning 3. Java, OOP, android app development, android studio 4. Web API development.

Name: TAPAS MAZUMDAR .(2018A8B40427P)

Student Write-up

Short summary of work done: Developed a functional MIDI to RIFF (WAV) library which would parse all MIDI files in a directory and convert them to respective WAV files (which can be heard as audio). This project required signal sampling and analysis techniques, knowledge of various acoustic parameters, knowledge of MIDI and WAV file formats and programming efficiency in C/C++/Java (used C++).

PS-I experience: This PS-1 was an overall great experience for me. Had this been possible on-site, I would've enjoyed this much more but the WFH experience was pleasant as well. There was lot to learn from scratch since the project domain wasn't completely in the domain of my academics but this made me work even harder to meet the goals which was a thrilling challenge to say the least.

Learning Outcome: Got accustomed to parsing files of non-text and binary formats and how to write them as well. Learnt about audio processing and got the answer to my childhood curiosity about "How sounds are digitally propagated and played on a single synthesizer?" The mentor and our PS-1 instructor gave enourmous amount of help in contributing to the project, both by providing valuable resources as well as giving us guidelines.

Name: PATEL DARSH RAJESH .(2018B4A70532P)

Student Write-up

Short summary of work done: I worked on implementing deep learning based Real Time Voice Cloning model in an Android App. This app will require a 10-sec audio sample from a random speaker and the text for which the user wants to generate the speech output, as input and will synthesize speech for that text in the voice of that random speaker. There were two parts for my project:
1) To build a working pipeline of the voice cloning model using speaker encoder (which was pretrained on speaker identification task), synthesizer (encoder-decoder model with attention layers and a concatenation layer for speaker embeddings) and vocoder (converts mel-spectrogram to time domain) in Python.
2) To build an audio recorder app in android studio and implement speaker encoder and vocoder using pretrained model and PyTorch dependency provided in android. Next, to deploy Synthesizer on Heroku using RESTful-API of Flask and to use this API for processing the text and audio embeddings and receiving the output mel-spectrogram in android app.

PS-I experience: I am very happy the way in which my time at this PS-1 station went. It was really nice experience to get a feel of the corporate world. Our project mentor was very helpful and guided us through the various parts of our project.

Learning outcome: I am grateful to got a hands-on working experience in the field of machine learning, deep learning and excellent exposure to industry-grade tools and protocols that are used in the corporate workplace. While working on this project, I learnt many things like App development, Flask, how API works, the theory behind NLP, the architecture of Tactotron model which is used in text-to-speech synthesis, PyTorch, to name a few.

Name: KUSHANK MAHESHWARI .(2018B4A70679P)

Student Write-up

Short summary of work done: I was alloted two projects:
1) To develop an algorithm for solving the problem of image deblurring and overexposure in images.
2) To develop keystroke dynamics mechanism for geature phone biometric.

PS-I experience: The PS-1 experience was great as I worked in a team where the other 2 people were from IIT which lead to a great bonding with those guys and development of a sense of team work.

Learning outcome: I learnt Opencv library of Python which is basically used for image processing and computer vision.

Name: KUSHANK MAHESHWARI .(2018B4A70679P)

Student Write-up

Short summary of work done: There were two projects to be completed during my PS-1. The first one was to solve the problem of Image deblurring and overexposure in images. The second one was to solve the problem of biometrics in FeaturePhones.

PS-I experience: The PS-1 experience was pretty good which enriched me with a sense of team work and enhanced my knowledge in Industry domain.

Learning outcome: I worked on OpenCV library of Python and developed the algorithm for the above mentioned problems. Above all, I got the experience of writing a research paper during my internship.

Name: ARSH TYAGI .(2018B4A70719P)

Student Write-up

Short summary of work done: I was given project related to the topic of "Augmented Reality" in which I had to model 3D skeleton and project it in real-world using smartphone. Android studio was the platform used to build the app and basic concepts of ARCore were kept in mind while developing the project. This project aims to develop an AR app in which human skeleton model can be manipulated. Many topics like character modelling, human body tracking were researched and their concepts were used. To make the model perform simple tasks like walking, running and more, blender was used as the platform. I was able to learn concepts of AR and modelling and also able to build my understanding of using android development platform.

PS-I experience: It was new experience for me working under professional mentors and I got to know the requirements and expectations of a project in multinational corporation and their officials were quite interactive and indulging. Overall, my experience at PS-I station was pretty amazing and diverse.

Learning outcome: I received exposure to many new concepts / topics like AR, modelling, animation which were quite interesting. I was also able to improve my soft skills and writing skills due to interactive seminars and other components. I got to use software like android studio and Blender which were challenging but built my concepts of coding and designing (modelling).

Name: APOORV GARG .(2018B4A70818G)

Student Write-up

Short summary of work done: Our work was based on digital signal processing on audio data and using machine learning algorithms to make a multi class classifier. Also, we had to build an API, an mobile application and link them.

PS-I experience: It was good experience provided the circumstances it was conducted in. People were polite and welcoming in nature. Really wished to have on site experience.The project made me get out of my comfort zone and explore new fields.
Learning outcome: How to communicate, give presentations and writing report. Some more machine learning insight with little knowledge of app development and DSP.

Name: PURUSHARTH AMRUT .(2018B5A70897P)

Student Write-up

Short summary of work done: Building an AI engine for sentiment analysis and component classification (the phone part the the review talks about) of customer reviews from the Samsung members app. Storing thousands of reviews tagged by the engine in a database and building a web-based GUI to access that database.

PS-I experience: Our mentor entrusted me and my partner with building a whole project completely from scratch and gave us full liberty over the decisions. This gave us humongous learning opportunities, but at the same time, there was big time crunch, so I didn't have time in the day to do anything else (and I didn't need it, because the project was exciting enough). This really taught me professionalism, and the fact that skills can be learnt, it is the will to learn that's required. At the end, I am surprised when I look at the things I am doing, about which I did not have clue when I started. I can't say anything about other centers, but I wouldn't miss this PS-1 for any other internship.

Learning outcome: Got assigned the job of designing and implementing multi-level complex algorithm for the component classifier, as this wasn't being done by the neural networks. The algorithm turned out to work with very good accuracy. Learnt web-scraping

to gather raw data, natural language processing using Python's NLTK library, using regular expressions heavily and at every level and data cleaning and filtering for training the ML model.

PS-I station: Shalaka Connected Devices – API / App Development, Pune

Student

Name: ROHITAAS BERI .(2018A7PS0147G)

Student Write-up

Short summary of work done: We learnt basic Web development and API development.

PS-I experience: It was good. We learnt a lot.

Learning outcome: Basic web development.

PS-I station: Shalaka Connected Devices - Control systems (EV), Pune

Student

Name: MEHTA PARTH DEEPAK .(2018AAPS0314G)

Student Write-up

Short summary of work done: Our project titled 'Battery Management System Frontend Dashboard' involved making web application to monitor the battery charge and other parameters of an electric car battery. It required the knowledge of IoT and control

systems.The tools used to implement this project were Node.js JavaScript framework, MQTT.fx and Google Firebase.

PS-I experience: The PS-I was great experience. The project belongs to completely different domain than my major but with the help of our industry mentor Mr.Hemant Kamat, we were able to successfully implement the project. The PS-1 instructor and my teammates were really cooperative and helpful. To sum it up, Shalaka connected devices is great PS-1 station to gain some practical knowledge.

Learning outcome: As a result of my work during the 6 weeks of PS-1, I got decent industry exposure. I learnt how projects are implemented in an organisation from the initial stage to the final stage and its documentation. On the technical side, I learnt intermediate web development- JavaScript and Node.js. I got insights about IoT as well. I got chance to polish my soft skills such as public speaking and realised the importance of teamwork.

Name: CHETLAPALLI VENKATA SATYA SAI CHAITANYA .(2018AAPS0393H)

Student Write-up

Short summary of work done: My project is Frontend dashboard development.
Work done:
1. Acquiring working knowledge of JavaScript programming, Node.js and Google cloud database, as well as the product development process, to start with the implementation of the project.
2. Starting with the programming of the Web application.
3. Designed design document based on the requirements of the problem statement.
4. Testing completion of the Web application on completion of programming.
5. Deployment of the application, completion of the project documentation.

PS-I experience: 1.We worked in development of frontend dashboard for cloud in battery management system and completed our project.
2. Frontend dashboard project will be passed to company R&D department. They will use the project in development of their product.
My Experience
1. Learnt technical skills, team work, project in-time submission.
2. Contributed and collaborated for project.
3. Gained new intern experience in my life.

Learning outcome: 1. Development of web application that helps in monitoring and tracking the amount of charge stored in the battery of an electric car.
2. Getting in depth knowledge of how a project is implemented in a company.
3. Development of a sense of teamwork and persistence.

Skills gained
1. JavaScript programming (Node.js) 2. Google cloud database, Firebase 3. GUI for web applications.

PS-I station: Shalaka Connected Devices - IoT, Pune

Student

Name: PRAJWAL M .(2018A3PS0299G)

Student Write-up

Short summary of work done: During PS-1, our project was to make an android based app for facility monitoring system. Our group consisted of four members. On the initial weeks, they explained the process and techniques used in the company for their projects and also asked us to try variety of sample projects on our domain. After that, we were given the design document for the main project. We asked to follow the design document for the project. An industry mentor was allotted to guide us with meeting everyday to check our progress and to helped us to carry forward the project.

PS-I experience: My project domain was based on IoT. The PS-1 components were uploaded on the canvas platform. On the initial weeks, we followed that, later we were connected to the industry mentor explaining more about our project. We were given instructions for moving forward with the project. So, it was very nice experience to work as a team and learn more about IoT and its application through the android based project.

Learning outcome: PS-1 helped me to learn the procedures used by the companies for their projects. We were made into work as group which also helped me for learning how to plan and organize the project as work for the group.

Name: AKANKSHA VINOD HUBLIKAR .(2018AAPS0317H)

Student Write-up

Short summary of work done: Shalaka connected devices allotted us an IoT project on Ambient Light sensor simulation. The first four weeks of our six-week long internship centered on making us comfortable with the technologies required to execute this project. We had 1.5 hours long meets every day with the CTO of the company, who was personally involved in each of our projects. The internship commenced with him teaching us Python from scratch. We covered all the basics that would be needed to execute a Python program extensively. In the following two weeks, we started working on our projects. They gave us precise instructions about the deliverables at the beginning of our project. We would have deadlines for each part, such as completing the source module, completing the simulation used for testing, completing our application and finally completing the UI. At the end of this internship, we made fully functional Python application that would allow sensors to send the required data to the cloud server and a UI that extracts this needed information from the cloud. The application and the UI together enable communication between the device and user and hence form an essential part of any IoT system. Therefore, this project will serve as basis for all sensor communications and can be modified accordingly to suit different scenarios.

PS-I experience: I had pleasant experience working for Shalaka, the industry in-charge, Mr. Hemant Kamat, and our faculty in-charge Dr. Ankur Bhattacharjee was always available to clarify our queries. Concepts instead of execution were the point of focus. Although, the experience gained by working in an offline PS-1 would have been entirely different, online PS-1 tried to do justice by organizing talks with an industry experts. Overall, decent experience was gained.

Learning outcome: When I started PS-1, I just knew basic C and now I know Python, paho-MQTT and about MQTT.fx. I also have a fair knowledge of what goes into making an IoT system. I have also learned about communication protocols and now have better appreciation for them.

Name: PUNYA PARAG MODI .(2018AAPS0336G)

Student Write-up

Short summary of work done: We made simulator system that emulates what a sensor would do in an IOT system and this simulator software communicates with the Shalaka server.

PS-I experience: It was very enlightening and helped me know how to handle a project. Also, it was enlightening to make entire code file and made the simulator.

Learning outcome: Working with a team, making an entire simulator module, preparing a report.

Name: IYPE ELDHO .(2018AAPS0339H)

Student Write-up

Short summary of work done: The project aims to create a simulator that involves seeing system responses to various scenarios by emulating data given by sensors (specifically light ambient sensors). The objective of the same is to implement this as the first step in the company's standard approach to handling new projects. This is being done by using simulator without implementation of any physical hardware, the company can see the scope and back-end technical requirements required for the project as well as its overall feasibility.

PS-I experience: We learnt various design and coding related practices followed by the company related to virtual aspect of sensor creation. The industry expert was approachable and helpful. However, we could not learn more about the hardware aspect of the project due to COVID-19 situation.

Learning outcome: Python programming and communication protocols like mqtt.

Name: HRISHIK SAGAR .(2018AAPS0340G)

Student Write-up

Short summary of work done: We worked on an Ambient Light Sensor simulator. It's an IOT device that calculates the amount of ambient light intensity in the surroundings and sends the value to the user via cloud server and takes actions according to the user's input. It required us to create three different Python programs. The first was the module program which had the internal registers of the sensor and its API functions. The second was the application which calculated the ambient light intensities and published the required messages to the cloud server. The third was the user interface which subscribed to the topics in the cloud server and took necessary actions according to the user's input. The application program updates values to the server at frequent intervals. To connect to the company's server, we used a tool called MQTT.fx. The deliverables of the project included these three programs, a design document and an user guide.

PS-I experience: The first few week was very slow. Our mentor would teach us basics of Python in one hour sessions everyday. Once that was done, however, the pace picked up. We learnt about communication protocols, started coding and completing the design document. The workload increased quite a bit in the last two weeks, where we wrote the application and user interface programs. Despite a pretty slow start, we did end up learning quite a bit especially in the form of MQTT communication protocols and how to write Python codes regarding the same.

Learning outcome: Basic Python programming, mostly datasets. MQTT communication protocols - using the MQTT.fx tool and communicating with the cloud server using Python. Different components of an IOT system - the sensor and its registers, the communication with the server and back, the application that runs constantly in the background.

Name: AADHAR SHARMA .(2018AAPS0384G)

Student Write-up

Short summary of work done: Our project was to make a climate sensor simulator using JavaScript language. We had to create a functional model of climate sensor that can be used in virtual embedded system to create virtual sensor node. We also made a frontend application for displaying the sensor data.

PS-I experience: The project allotted to us was in the domain of Internet of Things. The company's CTO was our mentor and had great expertise IoT and embedded system. We

had sessions for explaining about the different IoT protocols used in Industry. The experience in working in SHALAKA CONNECTED DEVICES was really good and the work done was substantial in learning Industrial Internet of Things.

Learning outcome: I gained knowledge about Industry 4.0 and learnt to create web app using javascript and MQTT protocol and learnt deploying the application on firebase.

Name: MANISH KUMAR P (2018AAPS0656H)

Student Write-up

Short summary of work done: We need to create an ambient light sensor simulator. It is a photo detector which is used to measure the amount of ambient light present in the surroundings. Its main application is to calibrate the working of devices depending upon the amount of ambient light present in the surroundings. Its used in smart watches, mobile phones, lightning control system and cameras etc. This simulator is completed by using JavaScript and Node.js modules and is based on an OPT3007 ultra thin light sensor. The model of the sensor has an API which will set and get values from the internal registers of the sensor. There are three types of registers used: Control registers, Data registers, Status registers. We also tried to create an application that uses the above ambient light sensor module to read data from the data registers of the sensor and publish the same data using MQTT protocol in JSON format. The application also takes commands from the front end and configures the sensor to behave in a specific way.

PS-I experience: I had great experience. We had chance for industry exposure and had chance to listen to few great minds of our country. Being in the time of a pandemic had it's own problems, but overall outcome is good. Our PS-1 Instructor, Prof. Ankur Bhattacharjee along with our Industry Mentor, Mr. Hemant Kamat were as enthusiastic as us which eased our problem of communicating with them.

Learning outcome: I learnt lot from PS-1 even though we didn't have the chance to work on-site. I am now equipped with new tools like JavaScript, Node.js, MQTT protocols etc. This being my first internship has resulted in quite good industry exposure.

PS-I station: Smarti Electronics - App/API Development, Pune

Student

Name: GAURANSH SAWHNEY .(2018A3PS0325P)

Student Write-up

Short summary of work done: I was responsible for building an Object Detection system to detect objects from images using YOLO v3. I also built a Flask server to host the model. The server receives the base64 encoded image in request and runs the detection on the image after decoding it and returns details if objects detected as response and an image highlighting the objects detected.

PS-I experience: The project was interesting. Although, it was more backend development than Deep learning as I had expected. The mentors were helpful and the instructor was happy as long as I met the deadlines which I did. In my case, the GD was pointless as I was the only student under my instructor for the PS-1 station. The seminars were good experience in public speaking.

Learning outcome: Using pre-built Python libraries for the detection. Deploying a Deep learning model. Using Flask for Backend development. Getting a hang of building application / solution for production. Also learnt about Docker.

PS-I station: Smarti Electronics - Digital Signal Processing & Communication /ML/DL, Pune

Student

Name: RANKA SHARANYA MILIND .(2018A7PS0215G)

Student Write-up

Short summary of work done: Main aim was to find if a given image was similar to (given) reference images. I explored several techniques, but finally settled on using Convolutional Neural Networks. A good accuracy of about 95% was achieved.

PS-I experience: My PS-1 experience was good. We got to interact with the Technical Director of the company. Work was not boring and the mentors are helpful. On the other hand, I did not have mentors who were specifically knowledgeable in this field (Image Analytics / ML / DL) and therefore, most of my work was exploratory. I got advice on possible topics to explore from my mentor.

Learning outcome: Got to learn more about image analytics. I explored several non ML algorithms that do similar tasks (before settling for CNNs) and I got knowledge of basic Image analytics. I also learnt about Keras library for making Neural Networks. More practical knowledge about using Neural Nets rather than theoretical knowledge.

PS-I station: Smartii electronics - IoT, Pune

Student

Name: BINAY GOYAL .(2018B5A30903P)

Student Write-up

Short summary of work done: The domain was IoT. So, my work was to explore ThingsBoard, which is an open source IoT platform and deploy on my Linux machine to know how it works and how it can be beneficial for the company.

PS-I experience: It was very fruitful and a great leaning experience to work for this project. Really learnt a lot. I learnt about the technical work there but not much about its market and sales.

Learning outcome: Hardware and software IoT integrated platform.

PS-I station: Tech Mahindra - Secondary Research, Pune

Student

Name: NIHARIKA RASTOGI .(2018A8PS0752P)

Student Write-up

Short summary of work done: The objective behind the project was to study how digital transformation, with a major focus on Artificial Intelligence, is changing the way businesses operate and how Artificial Intelligence functions, to aid in production and services. We further focus on Industry 4.0 and its applications and study their role in the Aviation, Smart city and Automotive sectors through analysis of tech and vendor landscape. Further insights on consumer response to these changes were achieved through a primary survey.

PS-I experience: Being completely online for the first time, it was unique experience. Though hands-on learning could not be provided, the main objectives of the project were achieved through regular online meets and training webinars. Having geographical boundaries posed problems in achieving diverse population sample for the survey leading to slightly skewed results and disturbances in communication due to internet issues, at the end, it was truly enriching experience.

Learning outcome: Through this PS-1, we gained skills like Machine learning, Data analytics using Excel and an understanding of Industry 4.0 and consumer behavior. Apart from these technical aspects, the project helped us in developing crucial team skills like leadership, flexibility and mindfulness, teamwork and cooperation. It also helped cultivate skills like report writing, data analysis and representation, making us Industry-ready.

Name: THAKARE SIDDHANT SANJAY .(2018AAPS0505H)

Student Write-up

Short summary of work done: Study of impact of AI in different sectors of economy like IT, aviation, communication, smart-city, etc. and various projects in these sectors which implemented AI.

PS-I experience: It is quite informative, but the fact that it is completely online makes information harder to absorb.

Learning outcome: Learnt about AI and it's use in various projects in different sectors of economy. Learnt about data analytics, market strategies and various things about a job's ambient environment.

Name: SIDDHARTH BANZAL .(2018B3PS0747P)

Student Write-up

Short summary of work done: We did study on AI, digital transformation, Industry 4.0 and applications of the same by focussing on 3 different sectors.

PS-I experience: My experience was good. I got to learn about new and upcoming technologies through the study. It could have been better if we got more hands-on experience, but given the circumstances, this was probably the best that could have been done.

Learning outcome: I learnt about upcoming technologies like IoT, AI and Industry 4.0 applications. I also learnt how different sectors are becoming digitized and about the further scope of digitization in them.

PS-I station: Tech Mahindra - Sectoral study, Pune

Student

Name: GAJRAJ SINGH RAJAWAT .(2018A2PS0107H)

Student Write-up

Short summary of work done: We did the analysis of impact of digitalization on telecom industry.

PS-I experience: It was very good got to learn lot about telecom sector. How digitalization is effecting the economic condition of the sector.

Learning outcome: Learnt about the impact of digitalization on telecom sector.

Name: RIMJHIM SHUKLA .(2018B2A40742P)

Student Write-up

Short summary of work done: Study based; to study the impact of AI on different sectors.

PS-I experience: Amazing!

Learning outcome: Soft skills, technical skills.

Name: DRUMIL KOLWADKAR .(2018B4AA0690G)

Student Write-up

Short summary of work done: My PS-1 project was mostly secondary research project, we had to research about digitalization and the technologies that are causing it, such as AI, IoT, cloud etc. We even got insights about the vendor landscape particularly in the telecom, aviation, automobile industry and learnt about the strategies adopted by the top players. We also conducted a survey to learn the impact of digitalization in the digital

banking sector so as to understand the perception of people towards it. We then used data analysis tools such as ANOVA and t-test to analyse the data. Overall, it was great experience.

PS-I experience: My PS-1 experience was good, being work from home meant that we won't be able to get hands-on experience but my instructor put in a lot of effort so that we can get hands-on experience. Also, the company mentor allotted to us was quite helpful and cooperative, he also tried his level best to help us get proper internship experience. His very long experience in the industry proved to be quite helpful and thus improved our overall PS-1 experience.

Learning outcome: I improved my speaking skills, learnt about data analysis as well as learnt to work in a group thus improving my coordination skills.

Name: RUTVIK KECHE .(2018B5A30077G)

Student Write-up

Short summary of work done: Learnt about the impact of digitalisation across various sectors like education and insurance. Prepared a detailed report regarding the challenges, strategy, advantages and disadvantages as well as vendor landscape and roadmap for the future, regarding the digital transformation in the global telecom sector.

PS-I experience: It was efficient. The online webinars would've been even more effective if they had been filtered out on the basis of specific project requirements but overall it was good experience.

Learning outcome: Learnt about various survey analysis techniques, data collection mechanisms and also realised how to interpret the collected findings. We were also familiarised with industrial report writing.

PS-I station: Texas Instruments, Bangalore

Student

Name: CHOUDHARY CHIRAYU YASH .(2018A3PS0471G)

Student Write-up

Short summary of work done: Predictive analysis of IOT enabled smart meters.

PS-I experience: Due to work from home, accessing hardwares was not possible. Hence, work on data analytics was given. I had no prior knowledge about this subject. So, I studied about the models on the Internet and applied them. Regular components such as seminar and group discussions were held to present our work and enhance the communication skills. At the end, detailed report was made.

Learning outcome: Learnt about Deep learning and data pre-processing. Enhanced communication skills and teamwork.

Name: VEDANSH DAYAL .(2018A3PS0576G)

Student Write-up

Short summary of work done: Our project was to design an outline of Remote Health Monitoring system to be accessed by patients in remote areas. We worked on the cloud domain where we had to use Machine learning algorithms like Random Forest, Neural Networks to work on the data sent using sensors through secured channel. A comparative analysis of some of the algorithms was also performed to determine the best out of the bunch. We also learnt Exploratory data analysis, cloud computing and FMEA.

PS-I experience: The first hand experience to work in an industry with experts is one of a kind. Regular insights and helps were provided by our mentor and PS-1 instructor. Even though, we worked from home the experience was very rewarding and informative.

Learning outcome: I gained knowledge about the basics of Python, ML algorithms, cloud computing and exploratory data analysis. Seminar, reports and group discussions were helpful in improving my soft and technical communication skills.

Name: VORA MIHIR KETAN .(2018A3PS0755G)

Student Write-up

Short summary of work done: Implementing Ml algorithms on diabetes dataset that will predict if a person has diabetes or not. This is done as a part of cloud computing for a remote health monitoring system.

PS-I experience: Learnt lot like basic ML that I had no knowledge about before. The mentor and the PS-1 faculty too were really helpful. Only wish I would have been able to do something more related to electronics like working on hardware but as it was WFH that didn't happen.

Learning outcome: Learnt about few ML algorithms, working with datasets, basic of how cloud operates.

Name: VEDANT MOHANTY .(2018AAPS0192G)

Student Write-up

Short summary of work done: My PS-I project was titled ‘Remote health monitoring system and telemedicine’. The work was focused on designing the outline of health monitoring system which can be accessed by patients residing in remote areas. The entire project was divided into various levels. My team worked on the cloud server level, where based on the vital parameters collected and sent through the sensors, we used machine learning algorithms to predict particular disease in a patient. We did a comparative study of various machine learning algorithms employed in the healthcare industry to predict if a patient has diabetes or not. Various other aspects like cloud computing, failure mode and effects analysis were also learnt in the design process.

PS-I experience: PS – I provided me a platform to work with industry experts. Our PS-I instructor and industry mentor was very supportive and helped us through all the stages. Though due to the remote nature of PS-1 this time, we could not work on the hardware aspects of the project, but overall, my experience was very rewarding and informative.

Learning outcome: I gained knowledge about programming in Python, exploratory data analysis and various machine learning algorithms. The seminars, reports and group discussions helped to improve my technical communication skills.

Name: DEVANSH GUPTA .(2018AAPS0275G)

Student Write-up

Short summary of work done: The project on which I worked was to design Indoor asset tracking systems for hospitals. Initially, I researched upon the existing wireless technologies used for communication and thereafter prepared a blueprint of my own system design. In the later part of PS-1, I worked on computational part of the system where I did a comparative analysis of the algorithms used for the purpose of object tracking.

PS-I experience: The experience was very productive and rewarding. The mentor was good and monitored our progress and gave his valuable suggestions which helped us in completing our projects.

Learning outcome: Learnt about the concepts related to wireless communication and object tracking. Got to know about algorithms like kalman filter, trilateration, etc. Gained hands-on experience in working in Python language.

Name: SRIMIT SRITIK DAS .(2018B1A30527P)

Student Write-up

Short summary of work done: IoT based smart meter data analytics for domestic market. In recent years, uncontrolled usage of electricity among households has raised a concern to many nations with an immediate increase in the demand of electricity supply. Hence, there arises a need for humans to track down and control their energy usage. A smart meter provides such an opportunity. Our project focused on the analytics part of smart meter data which not only tracks the energy usage but also predicts the future usage based on previous data and weather conditions. We used two popular existing time-series forecasting models, SARIMA (classical model) and LSTM (ML based model) to predict the future energy consumption of a household. The project compared the accuracy of both the models, implemented on collected energy consumption data set of 5567 London households and local weather conditions. A correlation graph between various weather parameters (wind speed, max. and min. temperature, UV index, precipitation, etc.) and average energy usage per household was used to select the weather parameters affecting the energy consumption followed by implementation of time-series forecasting models.

PS-I experience: It was a fascinating experience of work from home. It gave an industrial exposure and helped in learning about the working environment of an OEM giant like Texas Instruments. It helped us to learn about the on going research and development in the Kilby labs of TI at Bangalore. The regular diary submission helped in keeping track of the progress. The industry mentor helped in structuring the project just like real life company project and the PS-1 faculty was always ready to help us, giving us constructive comments to improve our project and ensured that we were able to meet the deadlines. Most importantly, it helped us to utilize our free hours during the country wide lock-down.

Learning outcome: * Functioning of the R&D department of TI located at Bangalore.
* Some of the on-going research of TI.
* Smart Meter: Hardware, Networking and software.
* Various existing Time-series forecasting models.
* Detailed study and modifications in ARIMA and LSTM models.
* Analysis and drawing correlation between two different datasets.

PS-I station: Vodafone Intelligent Solutions (VOIS) - Secondary Research, Pune

Student

Name: DEEPAK MOONDRA .(2018A1PS0053P)

Student Write-up

Short summary of work done: I was assigned project on the topic "Future of shared services". Here, I gathered data for shared services and provided futuristic solutions to improve the current shared services model.

PS-I experience: PS-1 provided an opportunity to understand and learn the operations of industry. It helped me in gaining proficiency to solve industry problems applying theoretical concepts and contemporary tools. I was provided with an opportunity to enhance technical, interpersonal and communication skills through practice. It helped me to enhance my communication, data analysis, teamwork and problem solving skills.

Learning outcome: Understand the technological processes and identify various problems at the industry / organization. Work on possible solution (s) to an identified problem / project, with professional standards. Seek, visualize, analyse and record data / information through appropriate documentation. Improved problem solving and critical thinking skills. Developed appropriate organizational attitudes and values. Acquired soft skills and social skills, particularly to communicate with industry professionals.

Name: JAI SHARMA .(2018A4PS0378H)

Student Write-up

Short summary of work done: The project assigned to me was “Digital Transformation of Telecom Industry”. We had to analyze the various telecom industry and suggest how they can benefit from adopting new digital services to improve their efficiency, service quality, customer base, revenue sources. We gathered both theoretical and statistical data, read several case studies related to the subject concerned. Webinar's held were helpful in getting more ideas and knowing the industry better. Gave 2 presentations of the report prepared explaining the content.

PS-I experience: Though the PS-1 was work from home for this year, it was a wonderful experience working with students from the other 2 campuses. Our mentor and PS-1 instructor both held meetings regularly to make sure the groups are performing smoothly and also helped in interacting with other groups. Maintaining diary helped to be on track with the deadlines.

Learning outcome: Being a group project, it helped me learn how to coordinate, how to handle people. It helped lot in improving communication and presentation skills. Learnt how to make a professional report.

Name: SYED HAMZA ZAIDI .(2018A8PS0402P)

Student Write-up

Short summary of work done: Our project was under secondary research. The title of our research project was 'Impact of AI in Telecom Sector". After discussion with our faculty in-charge and the industry mentor, we decided to start with a wide sector-wise analysis of the impact of AI on various industries such as telecom, healthcare, aviation, and customer service. Then, we narrowed down our research to the various implementations of AI within the telecom sector. Lastly, we looked at the latest developments in AI and made future predictions of the impact of AI will have on the telecom sector.

PS-I experience: This was very different experience from the one I was expecting. Instead of hard deadlines and concrete guides, we were encouraged to explore the field on our own and pave our own way through the project. Since the project was open ended, we were free to take it in any direction we wanted and most of us took up topics we were interested in.

Learning outcome: Since this was a research project, I did not pick up any development skills (which I would have preferred). However, I did improve my soft skills a lot as we had to work in teams and communicate regularly, presented seminars and prepared reports. We also got constant feedback on our work which let us work on our shortcomings.

Name: PATIL GURUDATTA VIJAY .(2018AAPS0359G)

Student Write-up

Short summary of work done: We have had many discussions during creation of report, which greatly increases our skills to work in a team. The quarantine has really made us used to the collective work online, which has greatly increased our skills in this area. Also we have various seminars, discussions and many components helping us to be better learners as well as giving us a good experience of working in an institution. We have created our report on the basis of future expansion of company can induce for its growth, this includes analysis of the areas, both theoretical as well as analytical. We have found various growth rate in sectors as well as their contribution in our current PS-1 station. We also learnt about the challenges faced by Vodafone in the telecom sector. We have found some innovative solutions to their problems. We also learnt Python and R for our analysis. We used advanced excel to record our data. I have found our PS-1 as a good learning opportunity for technical and professional career. I feel PS-1 was a great opportunity for me to learn and aquire new skills. This year PS-1 also gave me good grip on how to conduct online meetings, seminars and create reports.

PS-I experience: I have had great experience in PS-1 so far, we had digital transformation as our topic, which is really interesting. We analysed real state of the art technologies like IoT, Zero touch network, big data, cloud computing and many more.

Learning outcome: I learnt Python, R and advanced Excel during the course of PS-1. I also learnt economic analysis of a company and professional standards used by companies for solution.

Name: SOHAM SANDIP AWATE .(2018AAPS0365G)

Student Write-up

Short summary of work done: I was in secondary research program. My project topic was “Digital transformation in telecom firms”. My objective was to understand which factors are leading towards the journey of digital transformation, how telcos are chalking the strategy, roadmap, finalize partner’s landscape, impact on financials / customer experience / operational efficiency / generating new revenue streams by digital transformations of the traditional technology & business setup.

PS-I experience: I had good experience. I bonded very well with other campus students. Our PS-1 faculty also guided us along the way. We even had meetings with our PS-1 mentor. He was very helpful & guided us when we were stuck in our work plan. I also explored many domains in digital transformation, learnt about various shared services & their strategies.

Learning outcome: I learnt how to research effectively, go through research papers & case studies. I learnt basics of R, Python & advanced Excel.

Name: SOHAM SANDIP AWATE .(2018AAPS0365G)

Student Write-up

Short summary of work done: We had to research about digital transformation in telecom firms. How digitalization, which factors are leading towards the journey of digital transformation,
1) How telcos are chalking the strategy, roadmap, finalize partner's landscape.
2) Impact on financials, customer experience, operational efficiency.
3) Generating new revenue streams by digital transformations of the traditional technology & business setup.

PS-I experience: I got to work with other students from different campuses. I was project coordinator so i had to manage between all the students. It was fun to do. I learnt to go through research papers, case studies and articles.

Learning outcome: I learnt how digital transformation is leading in all industries and how majorly it affects telecom firms. I also learnt basics of Python, R & advanced excel. I improved my communication skills as well.

Name: DYAVADI SAI KIRAN REDDY .(2018B2AA0809H)

Student Write-up

Short summary of work done: My Project is about future of shared services. We examined the "Shared Services" model and its capacity to recover and returns in current and future Industry sector and also the challenges it constitute. Analysed "Shared Services" and planned how to operate and also the effects of bringing all resources of

telecom industry together. Also analysed risks of using this model to improve customer satisfaction and services.

PS-I experience: PS-1 was really good as an experience.The officials were really helpful and despite their busy schedule they had time to spare with us.There were some technical difficulties but all was managed well without any hiccups.

Learning outcome: Learnt Python, R and data analytics.

PS-I station: Vodafone Intelligent Solutions (VOIS) - Sectoral study, Pune

Student

Name: PRANJAL SINGH MANDLOI .(2018B3AA0739G)

Student Write-up

Short summary of work done: Researched worldwide telecom industry and different companies in it including SOFTBANK, AT&T and other major players. Analysed their decision making skills and how their decisions impacted their growth.

PS-I experience: It was decent. Enjoyed it. Had to present as per what we feel right and the mentors were always ready to help.

Learning outcome: Learnt to use bloomberg properly.
