Birla Institute of Technology & Science, Pilani
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Practice School Division

CHRONICLES

Electronics

PRACTICE SCHOOL - I

SUMMER - 2021

From the Desk of the Editor

It is my great pleasure to bring forth the 3rd edition of the PS-I Chronicles. This edition features over 1800 articles from PS-I students sharing their experiences during summer 2021.

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

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

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

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

I 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, of BITS Pilani – Pilani Campus for their help in bringing out this edition of PS-I Chronicles.

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

Anil Gaikwad

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Domain: Electronics

PS-I station: Adarsh Control & Automation Pvt. Ltd., - Industrial Automation, Bangalore

Student

Name: ANANYA PANT (2019A8PS0480G)

Student write-up

Short summary of work done: The basics and all the tools required to design a small scale industrial automation system were learned by us. The softwares used to design these automation processes are Unity Pro XL and Citect studio. Unity Pro is an open-source, RAM-based software used to design and configure the entire PLC. Citect Studio is used to design the SCADA software to monitor and control the PLC designed in Unity Pro. The working of Citect studio along with its graphics builder was explained by taking and implementing a few sample screens. These screens implemented are either functional or just static screens implemented to familiarize ourselves with the software.

PS-I experience: It was very good.

Learning outcome: Learnt about the automation pyramid, RTUs, PLCs, SCADA, PLC programming, Unity pro XL, Citect studio (softwares).

Name: TATWESH MISHRA (2019B5AA1300H)

Student write-up

Short summary of work done: During the 8 weeks we used two softwares which were Unity Pro XML and Citect Scada 2018. Along with these two softwares we also used the OFS configuration tool.We learnt about establishing connection between the PLC and Scada through the OFS configuration tool. With the help of Unity Pro software we learnt

how to configure a PLC and develop the functional logic for various components such as motors, valves, etc.The tools and the functions available in Citect Scada helped in the development of functional screens / pages. Concepts such as Genies,Super Genies,etc were used for the development of the screens.

PS-I experience: The experience gained from PS-1 was invaluable.There were regular interactions with PS-1 faculty and the industry mentors which were quite helpful. The constant support and guidance of the PS-1 faculty helped us to settle down initially.

Learning outcome: The learnings I take away from this experience are improvement in soft skills as well as presentation skills.

PS-I station: Agrix Agrotech Pvt. Ltd., - Electronics, New delhi

Student

Name: SINHA UMANG RAMANUJ (2019A3PS0383G)

Student write-up

Short summary of work done: Developing a mobile application for tracking tractors and tractor drivers. The application tracked the coordinates using GPS and saved it on online database hosted by Cloud Firestore. For authentication, Firebase was used. The application was developed using Flutter.

PS-I experience: My experience was truly beyond my expectations. I had expected I would be filling excel sheets during my PS but I actually got to work on the development of a software. I was allotted the project that I told them I would be interested in working on. The mentors were very supportive and I could approach them anytime for help.

Learning outcome: Got to explore online databases and GPS Tracking in detail. Also got to know about something called 'Geocoding' which I had never heard of previously.

Name: ROSHAN AGRAWAL (2019B1A30191P)

Student write-up

Short summary of work done: My work was mainly involved in dashboard development. The dashboard was built on Django framework. I had to connect csv file containing farmer details with json file containing cluster coordinates. I then plotted them on map using folium. Pandas was used to parse the files. I also helped in making statistical graphs, outputting details on dashboard, removing unnecessary elements and frontend improvements. Later I used machine learning to reduce the fuel consumption of the tractors used by farmers. I used greedy algorithm, KNN algorithm and multiple regression.

PS-I experience: It was a nice experience and I was able to learn new technologies. The mentor assigned to me was very helpful and approachable. I was able to learn things even in remote work conditions.

Learning outcome: I learnt many new things during the internship. I got to know how startups use tech to solve problems. I learnt many things in python, pandas, django, ML algorithms.

Name: AYUSH RAJGARIA (2019B1AA0990G)

Student write-up

Short summary of work done: Complete development of a dashboard with front end and backend work and loading the data from database. A bit of machine learning work.

PS-I experience: Decent. Regular help was provided and daily tasks were allotted. Was a good learning experience.

Learning outcome: Learnt a lot. Developed basic understanding of python, front end, backend, machine learning and firebase.

PS-I station: Aurum Smart Tech - DSP (Hyderabad), Pune

Student

Name: RISHABH HULSURKAR (2019A3PS0161P)

Student write-up

Short summary of work done: My worked mainly revolved around writing a code for unix timestamp and do a comparative analysis between Zigbee and Bluetooth Low Energy mesh networks.

PS-I experience: Good learning experience.

Learning outcome: Zigbee and BLE mesh networks.

Name: SOURABH DILRAJ (2019B5AA0820H)

Student write-up

Short summary of work done: Unix time stamp and comparative analysis of ZigBee and BLE.

PS-I experience: worked on two projects that is UNIX time stamp conversion and comparative analysis of ZigBee and BLE.

Learning outcome: Learned about c-programming, UNIX time, solutions of year 2038 problem and different communication protocols, etc

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PS-I station: Bhaskaracharya Institute For Space Applications And Geoinformatics (BISAG) - Embedded Systems/IoT, Gandhinagar

Student

Name: STUTI MALAY SHAH (2019A3PS0217G)

Student write-up

Short summary of work done: We were divided into a group of 3 and were told to read about OCR (Optical Character Reader), its implementation using python and Apache Lucene. After completing that we read articles and research papers on object detection using OpenCV and image processing. After a few days, we were given a project, "Analysis of Sentinel Image Using Python and Image Processing Libraries". For this, we had to download Sentinel-2 data (satellite data), process it and find various vegetation, soil and moisture indices and plot the final image using python. After completing this task, we made a web application that could help find various indices from sentinel data. Flask framework was used for the frontend and backend development, and HTML, CSS and Bootstrap were used for frontend development. This was then deployed using Heroku.

PS-I experience: Overall, my PS-I experience was good. We gained some technical knowledge, got a decent industry experience and it helped develop my social and communication skills.

Learning outcome: I learnt about OCR, Lucene and text search packages, object detection and image processing, OpenCV, satellite image processing, QGIS, using python and some of its image processing libraries, Django and Flask frameworks, HTML, CSS, Bootstrap and Heroku. Apart from these, it developed my professional communication skills.

Name: SHREYAS SAJILAL (2019A3PS0436H)

Student write-up

Short summary of work done: Made a python flask web app.

PS-I experience: Was good. Learnt many new stuff.

Learning outcome: Learnt python and flask web framework.

Name: DEBDEEP NAHA (2019A3PS1289H)

Student write-up

Short summary of work done: This project was about the processing and analysis of sentinel images using python and some of its image processing libraries. Sentinel images are images obtained from the sentinel satellites and have 13 spectral bands. These are medium to high resolution images. To process and analyze these images, these spectral bands need to be separated and combined in different ways to get different indices, like the vegetation index and moisture index. These indices give us specific information about the image, such as regions having dense vegetation, more mineral content, etc. We have used python libraries EarthPy, Rasterio, Matplotlib, Plotly for data visualization and analysis. We have also worked on creating a web environment with simple user interface that shows the various NDVI, RGB, VARI, NDWI plots for calculating various indices and data visualization. We have used Flask Framework for developing the Backend, HTML, CSS and Bootstrap for Frontend, of the website deploying the code to find the indices.

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

Learning Outcome: We gained knowledge on geospatial analysis using various Python libraries. We also gained knowledge of Javascript, Bootstrap framework for developing the frontend, and Django,Flask framework for developing the backend.

Name: HAARIKA MANDA (2019AAPS1226H)

Student write-up

Short summary of work done: I worked on making an Online Voting System using Spring Framework which is a java framework. I worked on object oriented programming by creating classes and objects and inserting them into MySQL tables. I also worked on creating html pages for the client's view of the web application.

PS-I experience: The project work was done in a group of 3. At first it was a bit difficult to get used to communication between the 3 members and our project mentor when choosing the project topic. However once the topic was chosen it was pretty easy to get used to working on the project amongst the members. Our PS mentor gave us some materials to study and we used these resources to implement the project.

Learning outcome: I learned how to use Spring Framework to make basic web applications and my skill at coding in Java improved immensely. I also learned how to use MySQL database as well as improved by grasp of the SQL language by inserting and modifying database tables. I also learned how to design web pages using html and css which were modern and looked professional.

Name: SUNAND S WARRIER (2019AAPS1328H)

Student write-up

Short summary of work done: My work involved creating a web application for Online Voting using Spring framework. The first phase consisted of learning advance java and spring using the resources shared by our mentor. We were able to finish a very basic structure before midsem evaluation. We focussed on adding additional features such as Login and Authorization to the developed project in the second half of the internship.

PS-I experience: I had a good overall experience in my PS-1. Mentor provided us with resources for learning the basics required for implementation. I had a pretty decent learning and practical experience.

Learning outcome: The development experience was insightful and rewarding. I got to learn about web application development using Java and Spring framework. Also learned about HTML, CSS and a bit of database handling.

Name: ADITYA ARYAN (2019B5AA0899H)

Student write-up

Short summary of work done: Our project was viewshed analysis using cesium server where we made a web application with which on a 3D model of globe we could draw lines b/w any 2 point draw any type of polygon and even circles. We could measure the distance b/w any 2 points and get a area of a selected region. We then implemented terrain profiling which is a graph of altitude vs distance b/w 2 point. And we finally implemented the a layering feature with which we could get different types of layer like river, river basins, road and railways etc. of a given region.

PS-I experience: It was nice experience. Got to dip our feet in the vast world of IT. Got a hands on experience of the industrial level working of companies.

Learning outcome: Learnt a lot about web development using mainly JavaScript.

PS-I station: Bhaskaracharya Institute For Space Applications And Geoinformatics (BISAG) - Software Development, Gandhinagar

Student

Name: PATHAK YASH YOGESH (2019A7PS0023G)

Student write-up

Short summary of work done: Worked with a team to build a web application to implement change detection on sentinel-2 satellite data. The work was mainly of web development. We had to use some open-source software such as QGIS and SAGA for analysis of geospatial data.

PS-I experience: PS1 experience was decent. Our mentor was quite helpful. He was an expert in the field and he helped us at a number of occasions and cleared all our doubts.. At the end of PS1 we had to submit a report to BISAG in addition to the standard PS1 report which is to be submitted to BITS.

Learning outcome: I learned about frameworks used for building web applications. Learned django, a bit of javascript and some software specific to this particular project like QGIS, GeoServer, OpenLayers. Also learned the stages of software development and how should one proceed when creating new software.

Name: PAVAN KUMAR REDDY YANNAM (2019A7PS0038H)

Student write-up

Short summary of work done: My PS1 team consists of 2 members from Hyderabad and 1 from Goa campuses, all CSE branch. Our PS1 work at BISAG-N Gandinagar, was to develop a Web application to perform AI based Change Detection and Clustering on multi-spectral Sentinel data. It is mainly divided into two parts, namely GIS Analysis using QGIS Python API, and Django Web Development (GeoDjango). Change Detection is a method of understanding how a given geographic area has changed between two or more different time periods. It involves comparing changes between geographic data (Raster Data). As per our BISAG-N Mentor guidance, first we familiarized ourselves with GIS concepts and GIS-analysis softwares like QGIS, and SAGA. Then, we used modules offered by QGIS Python API and SAGA API to do the analysis. Further, we explored AI based change detection techniques, and performed a comparision study between traditional and AI based techniques. We developed a web application using GeoDjango Framework, along with postgresSQL as our database. We used Openlayers package to render maps on the web browser. Geoserver was used to publish and share geospatial

data (Raster Data). Further, Geoserver's support for OGC's Web Map Services (WMS) was used to send HTTP requests, for requesting georeferenced map images from the server to the client (fronetend). We also included extra features like User login, triggering emails to users when change is detected, In-app notifications and Search functionality.

PS-I experience: Though PS1 is in virtual mode, I had a good experience working with my PS1 station BISAG-N. I got the opportunity to experience the working methodology of a government research organisation. I gained knowledge on GIS and web development through the guidance of highly qualified experienced mentors. The project provided me an opportunity to explore a completely new domain, based on GIS and improve my software development skills.

Learning outcome: I have learnt the usage of key technologies in software development (like Git, Django, HTML, JavaScript, REST API, etc.) and in GIS (like QGIS, SAGA, etc.). I got an exposure to frameworks like Bootstrap, Openlayers, Geoserver, Geonode, and Geodjango. Also, I improved my report writing and presentation skills. Team work and communicating effectively with our mentors, in a virtual environment, are part of the learning outcomes for me. Overall, it was good learning experience with my PS1 station BISAG-N.

Name: ARYAN SARAF (2019A7PS0138H)

Student write-up

Short summary of work done: We have developed a web application which can help perform clustering and change detection of raster data. Also, the output raster layers can be visualized and downloaded. We have used data from the Sentinel-2 Program for our analysis tasks. We have used Django for creating the web app and geoserver, openlayers, postgresql, postgis were used as well. Our project can be used to organize development activities in urban areas and for improving agricultural yield in rural areas.
This web application can be used to perform change detection on sentinel-2 geospatial data. The web application can display raster layers. A user can upload raster images to the websites. To download the output of processing, a user has to create an account on the website and log-in. The web application also has the feature to search for a layer in the uploaded layers.

PS-I experience: I had a pretty good experience. My allocated industry mentor was quite responsive and would reply soon. I worked in a team of three and had a good experience.

Learning outcome: I learnt a lot of technical things regarding which I had no clue earlier. This includes things like geoserver, openlayers, celery and many others. Also, I learnt about software like QGIS which can be used for viewing and analyzing geospatial data. Also, I think my communication skills have improved due to the multiple meets we had with our mentors and the team.

Name: AMAN HARPAVAT (2019A8PS0269P)

Student write-up

Short summary of work done: Developed a model for detection of moving objects in a video.

PS-I experience: Good overall. However, the mentor from the company was not really interested.

Learning outcome: Learnt about ML, python and its various libraries and models. Got experience in preparing reports, giving presentations and engaging in group discussions.

Name: SARVESHWAR MAHAPATRO (2019AAPS0257G)

Student write-up

Short summary of work done: The main aim of this project is to build a machine learning model that will be used to forecast the weather data and deploy a good model which will act as a microservice for a website. The website should serve the functionality of forecasting the weather at a given time. Since, the data being used is a time series data,

Forecasting of Weather Data has to be done using Recurrent Neural Network and Long Term Short Memory (LSTM).

PS-I experience: It was a nice experience, Industry mentor was always connected with us, the deadlines were set right and we could finish our assigned tasks on time. The professor was very encouraging and helped us well.

Learning outcome: In this project, I learnt the key technologies in Software Development and Machine Learning like Recurrent Neural Network, LSTM, GRU, Convolutional Neural Network, Tensorflow, Streamlit and some useful Python packages like NumPy and pandas. We have gained experience in various machine learning models for a given problem statement and analyzing which one is a perfect fit for the project.

Name: BATTULA VENKATA SAI ANKIT (2019AAPS0331H)

Student write-up

Short summary of work done: Our objective was to develop a deep learning model of analysis of Time Series Data of weather data. Further, the technique was to be rendered to the end-user within an easy-to-operate web application.

PS-I experience: Two tasks were to be done by the end of the project.
The first one was to develop and train a deep learning model that forecasts a given city's minimum and maximum temperature. The dataset we used was the Daily minimum and maximum temperatures in Melbourne, Australia, 1981-1990. It was time-series data that we were asked to analyse and forecast the future weather.
The second task was to build a user-friendly website that takes dataset from the client and runs the model we have built, in the backend, and shows the forecast result to the client.

Learning outcome: The learning experience from the PS was precious. Not just working on the deep learning model on a research basis, we were asked to build a website that is nothing but an actual real-world application of machine learning. It serves its purpose, and the institute also played its role well.

Name: VINAYAK SINGH (2019B4A70606P)

Student write-up

Short summary of work done: Our group worked on implementing image processing algorithms using OpenCV. We started with implementing an industry relevant research paper on the same. We primarily dealt with edge detection and the various algorithms that have been developed to improve the results. Finally we compiled all our implementation in a web app using the streamlit framework in python to demonstrate the results in a user friendly manner.

PS-I experience: Got good learning.

Learning outcome: We gained extensive knowledge of the open source OpenCV library, and the streamlit framework useful for deploying machine learning applications.

Name: RUCHIR PARMANAND KUMBHARE (2019B5A70650P)

Student write-up

Short summary of work done: Worked with QGIS mapping system and its mobile application-Qfield to develop a real-time geodatabase synchronization mechanism for Qfield. Django and Python was used extensively in the project.

PS-I experience: Would have been much better if offline.

Learning outcome: Learnt to work as software developer in a group.

PS-I station: Caliber Interconnect Solutions Pvt. Ltd., - Industrial Automation & Control, Coimbatore

Student

Name: SHRUTI AGRAWAL (2019A8PS0477G)

Student write-up

Short summary of work done: Automated excel sheets using pandas and created GUI using pyqt4.

PS-I experience: My ps experience was okayish.

Learning outcome: Learnt about Pyqt4, Python and Pandas.

Name: AASHMAN CHALISHAZAR (2019A8PS0519G)

Student write-up

Short summary of work done: Creation of a GUI based program for IC testing through Shmoo Plot. Involves creating GUI by working with python and PyQt4, creation of graphs via matplotlib libraries in python and implementation of validations in the GUI.

PS-I experience: PS-1 experience was pretty decent for an online semester, though the project allotted was different from the one mentioned in the PS website. Instructors were knowledgable but strict and particular and followed up with our progress many times a day. Workload was high and sometimes company people would reprimanded us for missing deadlines. BITS prof managing our PS was understanding, and gave proper feedback for all submissions. Overall a good learning experience and exposure.

Learning outcome: Python, basic OOP, PyQt4, handling graphs in Python thru Matplotlib and numpy libraries, Email etiquette and Professional conduct for delivering ppt presentations, speeches and reports.

Name: JASKARAN SINGH CHHABRA (2019A8PS0653G)

Student write-up

Short summary of work done: I was assigned industrial control and automation as the domain under which my project was "Vector Conversion". I had to create a Graphical User Interface. The task was to take an input file from the user and extract particular patterns from it using Python programming language and its libraries and then write those extracted patterns in the output files in a specified format using file handling concept in Python.

PS-I experience: It was an amazing experience. Both PS-1 mentor and the allotted BITS faculty were extremely helpful during the entire project. Meets were conducted online frequently for guidance and the progress of our work was looked upon regularly. The evaluation components helped me in learning the skills required in an industry.

Learning outcome: I learnt the concepts of Python, its libraries, object oriented programming concepts and Graphical User Interface development. Work life balance and taking help when stuck were a some of the key aspects which I learnt during the PS1.I also got a chance to improve my soft skills and develop a good email-etiquette.

Name: MEHAK SAREEN (2019B2A80169G)

Student write-up

Short summary of work done: The work done during my PS revolved around report automation using Python.

PS-I experience: During my PS-1 tenure I was able to experience how the industry works in real-time and how each day is alloted to generate a final outcome keeping in mind the requirements of the industry project.At the same time I had a steep learning graph during my PS and was constantly able to solve my doubts regarding every new task that was alloted to me.

Learning outcome: I was able to learn how to automate various inputs given by the user in the form of a useful output which is required by the user and also integrate it with the GUI at the same time in order to obtain the end product.

Name: VIRESH KUMAR (2019B5A80772P)

Student write-up

Short summary of work done: The project focused on development of a program for automation of report generation. I had to work on the creation of a Graphical User Interface of a program whose planned functionality was to take the required input of data and provide output in the form of Excel files and PowerPoint presentations which would contain Pivot tables and charts. I got to work with modules like PyQt 4, Pandas, Python-pptx and PyWin32.

PS-I experience: My overall experience with the internship was quite fair. I was working on a live project so the workload was somewhat heavy. It was a great experience interacting and working under my PS-1 Faculty. I also got to improve my teamwork skills while working on this project.

Learning outcome: I got practical knowledge of implementing object oriented programming in a real world project. I also learned some deep concepts of Python Programming Language. Most importantly, I got to know about the industrial scenario and its many challenges and subtleties.

PS-I station: Central Electronics Engineering Research Institute (CEERI) - App/AR/VR, Pilani

Student

Name: PRANAV KUMAR DARGAN (2019A7PS0111G)

Student write-up

Short summary of work done: Creating an application that can convert text in a captured image to speech, and also creating informational media such as a simulation to demonstrate concepts related to a specific topic. In our case, we focused on Electrons and electricity.

PS-I experience: While the station was remote, we were able to schedule meets regularly with our mentors who were available to be contacted frequently. They were able to provide us with general guidelines and help with what to proceed with next. The timeline was also flexible to accommodate whenever we needed extra time to complete a goal.

Learning outcome: We ended up getting familiar with a lot of software development tools, such as Unity's AR Foundation package, Blender, Adobe Illustrator, Adobe Premiere Pro etc. While all of them were not used in the final project, the introduction and practice on each of them is helpful. Working in a formal/Semi-formal environment was definitely a bonus, as the mentors were easy to communicate with.

Name: CHAKKA V. SAI KRISHNA CHAITANYA (2019A7PS0171H)

Student write-up

Short summary of work done: Developed an Android application for secondary school students to aid them in learning electrical science concepts.

PS-I experience: Although we haven't got any expert lectures to aid our learning, we have got a lot of space for taking time and studying a lot of new concepts and tools that prove to be very useful in the near future.

Learning outcome: Time managment, team work, android application development using flutter.

Name: NIMISH SHREERAM WADEKAR (2019A7PS1004G)

Student write-up

Short summary of work done: My PS-1 involved multuple sub-projects as part of a larger project. The main goal was to aid younger students in understanding the fundamentals of electrical science. The target platform was Android. I was part of the Unity Engine team. As part of the first sub-project, I had to create an application in the Unity Engine, that allowed the user to take a photo of some text using the phone's camera. The image is then sent to the backend, where the other teams converted the image to text and speech and returned that to the Unity application. I had to create a GUI to display the text and allow the user to listen to the audio in multiple languages.
The second sub-project involved creating a simulation on the behaviour of free electrons in a conductor under the influence of an electric field. This was achieved using linear interpolation. An interactive GUI allowed the user to control the potential difference across the ends of the conductor and influence the motion of the flowing electrons.

PS-I experience: It was a decent experience, where I learned to be a part of a larger group in a software project. I also polished my Unity and C# skills during the project.

Learning outcome: Learnt the ARFoundation Unity package and its ARCore plugin and the Android API in Unity.

Name: RAJAVARDHAN REDDY SIRIGANAGARI (2019A7PS1337H)

Student write-up

Short summary of work done: The objective of the project was to show as a proof of concept that the integration of technology in education is a viable method of introducing new concepts and accessibility for students.
To increase accessibility, an application that can convert any printed text to speech was developed using Optical Character Recognition and Text to Speech libraries. The user is thus able to convert printed material to an audio book style format, providing an alternative method to access information. Various other concepts involving image processing were also used, to allow for clearer recognition of the images taken by the user.
To demonstrate technology being used for content distribution, a video and simulation related to electrons and electricity was made to explain concepts regarding the same. This was done using Unity and Premiere Pro, with the simulation demonstrating the flow of electrons, while the video was used to explain the discovery of the electron and its journey to the present use of semiconductors in electronics.

PS-I experience: It was a good experience. The industry and faculty mentors were always available if our team had any doubts. The deadlines were set properly. Despite being a work from home PS, it didn't hinder the learning experience nor the software development process.

Learning outcome: I got to learn a new programming language called Dart and libraries like Flutter and Tesseract OCR. Although I was familiar with android development, using a cross platform tool like Flutter helped me understand it's strengths and limitations.

Name: ARYAN GAUTAM NADKARNI (2019B3A70406P)

Student write-up

Short summary of work done: Created an Educational VR app for Electrical Sciences for students of grade 10. We worked on converting image to speech via two subparts - image to text using OCR and text to speech using TTS. We then carried out image processing. We also integrated an Avatar making software within the app along with a one pager on how to use it.

PS-I experience: My experience was good as I got to learn a lot of new things. The faculty mentor and industry mentors were helpful. It was a good environment to learn.

Learning outcome: I did not have a lot of idea about App Development and CS in general coming into PS and this project has helped me build my knowledge up to a good level. I would be confident while working on similar projects in the future.

PS-I station: Central Electronics Engineering Research Institute (CEERI) - Embedded Systems/IoT, Pilani

Student

Name: PRIYANSH BHAVESH PARIKH (2019A3PS0288G)

Student write-up

Short summary of work done: In today's world, natural resources like water have become more and more limited. However, with the advent of the internet, everything is connected. Hence my work was based on creating a Smart Water Grid, which can provide the water network data via IoT cloud and use ML techniques for leak detection. My work is based on the IoT part. We started by performing a feasibility analysis of various cloud platforms available to us and found out Kaa Cloud was best suited. Then we went on to learning about Kaa, Creating endpoints, sending sensor data to the cloud via Raspberry Pi using Python, creating a custom dashboard for the sensor outline at the CEERI water plant, creating a failsafe system for the water pumps, and even a notification and alert system for the user, using Slack API. We even learned how to send data in real-time to and fro from Raspberry Pi to Arduino.

PS-I experience: My PS experience was great. I had previously done work on IoT and was looking forward to getting this opportunity, and I am really glad I got it. It was fantastic working with a team, hearing people's opinions, having weekly meetings, discussing progress, and debugging code. I also thank my industry mentor for introducing us to various people working at CEERI, and without their constant technical help, our progress would not have been possible. Also, I was lucky to have a great teammate who was enthusiastic about our work and helped keep my focus—also, listening to industry experts providing great insights about the future of IoT. Perhaps the most valuable lesson I

learned is taking ownership of work is the most essential factor constituting progress, and displaying leadership is not only about giving good ideas. It can be as simple as scheduling a meet.

Learning outcome: On the technical side, my learning outcome was getting to know about a whole new platform Kaa, polished my Python skills, learned to use Raspberry Pi entirely from scratch, learned about APIs, and communicated protocols like HTTP and MQTT.
On the interpersonal side, I learned how to create and put up a good presentation, how to create an excellent technical document, organize work and time, and most importantly, how to talk to people to get things done.

Name: YASH BAGRECHA (2019A3PS0387G)

Student write-up

Short summary of work done: My project in PS-1 was regarding the smart agriculture i.e. using technology to make farming more efficient and simpler. So, I made mobile application that computes the amount of water required for crops on daily basis. Along with it the application also computes the time required to irrigate the field.

PS-I experience: My PS-1 experience was quite decent one. I worked under the guidance of Dr. Shashikant . Though the ps-1 was completely online, still I got to learned a lot of things. My industry mentor always guided me and helped me whenever I faced a problem. My project mates were also very helpful. During my ps-1 I got to learn many things related to smart farming. I got to know about different methods for making farming more better.

Learning outcome: I learned to use Android studio, which is used for building android apps. For making this app, I learned basics of Xml and Java. I also used a weather API in my application. Writing the code for API part was main part of my application. Having a knowledge of using API in apps can prove to be beneficial in future. Because every application today uses API's. Other than that I developed my soft skills.

Name: ARCHIT RUNGTA (2019A3PS0450G)

Student write-up

Short summary of work done: Our project was based on burst and leak detection techniques using IoT and ML in smart water grids. Due to the remote nature of the PS we worked extensively on simulations, the software we used is EPANET, which is a water network simulation tool. Our work involved learning the software, using it to simulate water networks, generating leak data from the water network by changing various parameters in EPANET and applying ML algorithms on the generated data to detect bursts and leaks. We performed extensive literature review to choose the ML techniques suitable for the task.

PS-I experience: The experience was good for an online PS, but it could have been far better in an offline scenario.

Learning Outcome: EPANET, some ML algorithms like Random Forest and Gradient boosting, data processing.

Name: SWASTIK BARPANDA (2019A3PS0482H)

Student write-up

Short summary of work done: The project alloted by our faculty was "Spatial Soundscape Recreation Using Binaural Audio Synthesis". The project required us to develop an app on MATLAB which simulated the surround sound experience of a listener inside a room with a sound source inside it. We had to make the listener location dynamic and the sound source location to be fed by the user.

PS-I experience: Nice

Learning outcome: Team Work, Time Management, Dedication.

Name: SHUBHAM GELERA (2019A8PS0328P)

Student write-up

Short summary of work done: Created an end to end solution for collection of data from a smart water grid network via Raspberry pi and sent it to the Kaa IoT cloud platform for visualisation, dashboard creation, alerting, analytics, command execution ,etc.

PS-I experience: It was very good. Learnt lot of new things so overall very fruitful experience.

Learning outcome: Learnt about different development boards and IoT cloud platforms. Learnt about using communication protocols like HTTPS and MQTT. Learnt creation of .svg icons. Learnt basic connection using serial library for Arduino via Python.

Name: ARYAN DEVRANI (2019A8PS0408P)

Student write-up

Short summary of work done: Re-created a spatial soundscape environment in a closed cuboidal room, by converting a mono (single channel) audio input into a 3D, binaural sound with the help of Room Impulse Response (RIR) and Head Related Impulse Response (HRIR) libraries. MATLAB as used as the programming environment. Also developed an interactive GUI to make the model user-friendly in terms of entering source coordinates and listener trajectories.
We presented a set of algorithms for creating a virtual auditory space rendering system. These algorithms were used to create a prototype system that runs in real-time on a typical office PC. The model could reconstruct sound localization cues quite accurately with unnoticeable latency, creating a highly convincing experience for the users.

PS-I experience: It was a great experience to work under the supervision of a senior Principal scientist from CEERI Pilani. We were well-equipped with resources to develop

a firm understanding of the underlying concepts and were guided at every step of the project. We followed a very definitive deadline which allowed us to roll out multiple versions of the working model, upgrading its features step-by-step. This allowed us ample time to do a thorough literature review on the project, and to experiment with the features that could be implemented.

Learning outcome: I am now extremely confident on working and programming in MATLAB. I know how to use multiple toolboxes, functions and commands which will help me in completing projects in the future. I also learnt a great deal about the field of Signal Processing and the application of 3D audio in AR/VR industries, Gaming and Music. The project also refreshed my concepts on Signals and Systems and I could finally relate the theoretical knowledge to a real-world application.

Name: SHAMBHAVI VISHNU SABHAHIT (2019A8PS0486H)

Student write-up

Short summary of work done: I was part of a team of 3 students and our project was based on implementation of IoT in agriculture. Our project's aim was to determine soil properties, calculate the net crop water requirement & irrigation time, and design a smart water dispenser system. My work revolved around determining soil properties like the soil type, pH range of the sample and the moisture content. I implemented the above tasks using MATLAB, Arduino UNO and an FC-28 sensor. My final task involved development of an android application to display the results obtained for various samples collected. I implemented the same using Android studio.

PS-I experience: The two months I spent working at CEERI Pilani was a good learning experience for me. The project allotted to our team was interesting and it gave me a chance to explore new technical skills. The PS-1 experience also helped me enrich my soft skills through the various seminars and group discussions held throughout the internship. Both my mentor and faculty gave me enough freedom to learn new skills and implement the same in the tasks assigned to me. PS-1, as a whole, gave me a much needed exposure into real world industrial projects.

Learning outcome: On the technical side, I learnt to perform image classification with a satisfactory accuracy rate on MATLAB, use Arduino to determine moisture levels and also got a brief overview of android app development in Android studio. I also got a chance to

review various scientific papers and learn about contemporary technologies used in agriculture.
From a soft skills point of view, I got a chance to improve my communication and presentation skills during the group discussions and seminars and also work well as part of a team.

Name: MANSI DOSHI (2019A8PS0493G)

Student write-up

Short summary of work done: The title of my project was "Development of Read-Out circuit using Arduino for Portable RF Radiation Intensity Meter". Initially, we started by taking in voltage input via a potentiometer and displaying it on a 16*2 LCD. After that we displayed the power as well as the corresponding voltage on a 16*2 LCD screen by storing the data in the flash memory of the Arduino Uno Chip. After that we provided a provision in our circuit for attenuation as well as multiple frequency input. We did this work on Arduino Uno as well as ATmega 16 microcontroller chips for performance comparison. We used Arduino IDE for writing the code and Proteus software for circuit stimulation.

PS-I experience: My PS-I experience was a useful learning experience. I gained new knowledge and skills during the project course. To be able to work at such a renowned research institute was overwhelming for me. I enjoyed the constant support from my industry mentor as well as professor who always pushed out our team and encouraged us to work beyond our capabilities.

Learning outcome: I gained knowledge about the domain of IoT and Embedded systems and also got a deeper insight at integrating various components of a circuit together to get the desired outcome. I learnt how to write the code on Arduino IDE and stimulate a circuit on Proteus. The course of my project taught me to continuously optimize our circuit through various ways, which improved my understanding of circuit making. Overall I was able to improve my time management skills, team-working skills and soft skills.

Name: SVADHI JAIN (2019A8PS0573G)

Student write-up

Short summary of work done: My project was "Development of Read-Out circuit using Arduino for Portable RF Radiation Intensity Meter." We used Arduino IDE and Proteus software for making the circuit. The basic idea of the circuit was to take in voltage input and display this on a 16x2 LCD screen along with corresponding power in mW and dBm. We made the circuit using 2 different microcontrollers Arduino Uno board and ATmega16 to compare the performances. We expanded the circuit to cover more frequencies as well as added provision for power attenuation.

PS-I experience: It was a good experience. I learnt various new skills and gained a lot of knowledge. Working at such a renowned research institute, I have a lot to take back from the experience. We had constant help and support from our industry mentor as well as faculty.

Learning outcome: I was introduced to the vast domain of IoT and Embedded Systems. During the project I got to work on softwares like Proteus along with Arduino IDE. I also learnt about various different microcontrollers. Apart from the technical knowledge, I also got to work on my presentation and group discussion skills and also on soft skills.

Name: DEVVRAT JAYDEEP DESAI (2019A8PS0622G)

Student write-up

Short summary of work done: The title of my project was Development of read out circuit using Arduino for portable RF radiation intensity meter. I worked in a group of 3 and we had to make a Proteus simulation for the RF meter. Initially we researched on different ICs which we would use in our circuit. We then started with the implementation in Proteus and used Arduino IDE for coding. On making the circuit with the Arduino Uno, our industry mentor asked us to make the same circuit using ATmega16. With few modifications in the cicuit and code we were able to make it compatible. Then we added attenuator compensation in both the circuits.

PS-I experience: I gained a lot of knowledge about work culture in the real world and about how to balance work and life through PS-I. I learnt a lot from my mentor, both in terms of theory and practical application.

Learning outcome: I learnt a lot about Arduino and AVR programming. Also learnt about different microcontrollers and what are the key aspects that makes one better than others. I also learnt about circuit simulation using CAD softwares.

Name: JEEVAN N V (2019AAPS0239G)

Student write-up

Short summary of work done: Plastic waste is recognized to have pertinent disposal or reprocessing problems. It is a threat to sustainable environmental and economic conditions. Microwave-based Pyrolysis represents a modern, effective alternative to treat waste. Although conventional Pyrolysis has long been known and has been put into practice, enhancements in the heat transfer rate to maximize the generation of wealth out of plastic waste treatment remain a challenge. This work prominents the use of microwave irradiation as one of the most gifted heating technologies for pyrolysis, due to its ability to provide a high heat transfer rate.This project presents an overview of the advantages of microwave-assisted pyrolysis of waste plastics together with its limitations. The work carried out under this project also discusses the set-up of the system and the preliminary design requirements of the microwave-based pyrolysis system.

PS-I experience: As we know online mode has its limitations, in the inital week we had difficulties with installing some simulation softwares as student version were not available.

Learning outcome: I mainly got a deeper understaing of RF modeling, Microwave, Waste treatment, Pyrolysis, Cavity design, Reactors, Electromagnetics. I also learnt how to simulate and design models in physics engine sotware called COMSOL.

Name: AKHILESH GOWRISHETTY (2019AAPS0241H)

Student write-up

Short summary of work done: The title of the project was Smart Controller for Agri Applications and Smart Water Dispenser System. The project involved using Internet of Things (IoT) and Automation of irrigation system. The project involved literature review and working the project. Each team member was given topics to work on. These topics involved tasks such as hardware development, application development, API requests and image classification. A hardware system was developed using open source hardware and software. This hardware system controls the irrigation devices such as motors and pumps. The system can be controlled manually and automatically also. The application development involved designing Apps for calculation of parameters for the irrigation needs. Image classification was utilized for estimation the pH and determining the suitable crops for the given soil type.

PS-I experience: The PS-1 experience was informative and engaging. The PS faculty ensured smooth onboarding with the industry mentor and gave feedback for our work done. The industry mentor has helped us in understanding the concepts and has provided with pointers regarding the project. Overall, the PS-1 experience was good and helped me improve my communication and interpersonal skills.

Learning outcome: The project involved various domains. Being able to work at least on the surface of them, has given me confidence. I have learnt various topics about hardware by working on the project.

Name: M. PRATYUSHA REDDY (2019B1AA1480H)

Student write-up

Short summary of work done: Development of green technology for plastic waste treatment.

PS-I experience: A positive and enriching learning experience.

Learning outcome: Literature study, applications of microwaves, application of COMSOL software.

Name: ADHYAN AHUJA (2019B4A30548P)

Student write-up

Short summary of work done: The main aim of our project was to design a generic model that is specifically optimized for leak detection in the water distribution system. The EPANET platform has been used to model and simulate the water distribution system. The data from the EPANET simulations was used to train the Random Forest and Gradient Boosting Machine Learning algorithms, which are known for their excellent accuracy and ability to forecast water grid leaks. A pipe dynamics study was conducted to find the best parameter to simulate a leak like situation and generate the data. We also conducted a study on the mathematical aspects behind the two shortlisted ML algorithms to see how it works in the backend.

PS-I experience: The PS-1 helped us in getting outside exposure. The faculty and mentors assisted us in accomplishing our project's goal. The entire evaluation scheme for the online PS-1 aided me in gradually completing the project at a regular pace. Quizzes, diaries, seminars, and project reports encouraged me to keep learning new things about my project and get experience producing diaries and reports for planning and tracking thoughts and progress in the project. My entire PS-I was an enjoyable learning experience.

Learning outcome: I've learned about the field of machine learning and various methods that can be used to solve a variety of problems. I learned how to operate the EPANET software and simulate a leak in the water network. I also got familiar with various platforms such as google colaboratory. While preparing for multiple assessments, I improved my soft skills such as communication and oration in addition to my technical talents. My work ethic, time management and teamwork skills were also enhanced.

Name: VEDANT TRIPATHI (2019B5A30582P)

Student write-up

Short summary of work done: It was a good experience. Got to know about Deep learning and computer vision.

PS-I experience: Quite a learning exprience.

Learning outcome : Experience in ML and deep learning.

PS-I station: Central Electronics Engineering Research Institute (CEERI) - Industrial Automation and Control, Pilani

Student

Name: KAMATH SAKSHAM SHIVSHANKAR (2019A3PS0373G)

Student write-up

Short summary of work done: The project titled "Advanced closed-loop control system to improve battery performance and longevity for electric tri-cycle" aimed at making an efficient BMS for the electric tricycle. We as a part of the Battery Performance and Analysis team worked on monitoring the battery parameters using the DC1812A demo board. We started off with doing literature survey of various algorithms for calculating state of charge of the battery and monitoring various other parameters. We then moved on to study about various boards which are appropriate in monitoring a battery. We then interfaced the Arduino to the DC1812A board via I2C communication and read all the required data from the registers and printed them onto the LCD. We studied about various MATLAB toolboxes which are used for modelling a battery. We also used MATLAB for filtering outliers, given the thresholds and the STOP points in the on-field trial data of the electric tricycle and later plotted the graphs of the parameters using MATLAB. MATLAB was later replaced with python for ease of the PS mentors. We made python scripts for real-time monitoring of the parameters over time and established the communication between the COM port and the python script for this. The read data was saved onto the excel file along with the time stamp of the reading. We also made another python script for plotting the data from the excel sheet and saving the plots in a jpg file for future use. All these interfacings were done in the CEERI-labs and were tested out successfully. I also interfaced the SD card module and the RTC DS3231 module with the Arduino to save the real-time read data in a micro SD-card file and later transferred the file into excel

for further manipulations. This will help in recording the real-time on-field data of the electric tricycle tests conducted in Pilani.

PS-I experience: I had an enriching PS1 experience working with my mentor, the PS faculty and team members. Our CEERI mentor and PS1 faculty were highly supportive in all our endeavours throughout the 8 weeks of the PS. They provided their valuable feedbacks and gave inputs for betterment of our work and guided us to accomplish our goals in stipulated time. Despite working remotely we made the best out of platforms like Google meet to communicate and resources at our disposal. To sum up , I got a good exposure of industrial and research world.

Learning outcome: I learnt about various Python libraries like MATPLOTLIB, PySerial etc. I was exposed to various MATLAB toolboxes and learnt about data management, processing in MATLAB. I learnt about various IC's, modules used. I explored more about I2C communication which helped in the communication between Arduino and various slave modules. Most importantly, I learnt about how to present one's self and communicate with industry professionals, managing time and being punctual with respect to deadlines given.

Name: SHUBHANG JHA (2019A3PS0460G)

Student write-up

Short summary of work done: I had to work on the Closed Loop Control System of a Brushless DC motor.This motor was used in an Electric Tricycle being developed by CEERI Pilani.The project primarily required application of some advanced concepts of Control System so it was a great exposure to the broad area of automation and control.The relevant simulations were performed on Simulink which also helped in improving my MATLAB skills.

PS-I experience: I had a great experience in PS. Even though the interactions were virtual it didn't feel like that.My station mentor and PS faculty both were very supportive and approachable throughout the PS-1 term. Also, it was a great collaborative experience with my project partner.

Learning outcome: Got to apply the concepts learned in Control Systems in 2-2. Got an introduction to Automation and Control domain and an understanding about how research work is carried out.Improved MATLAB skills and got a chance to use multiple MATLAB toolboxes.So many interactions throughout the PS helped me better my presentation and communication skills.

Name: UDAY DHAL (2019A8PS0406G)

Student write-up

Short summary of work done: This project dealt with the application of Finite Control Set Model Predictive Control (FCS-MPC) on brushless DC motors and the conventional DC motor aimed to be used in the motor design of an electric trike. Through both speed and current, MPC is applied. Both simulation and experimental results prove the validity of the design procedure and the potentials of the MPC on a commercial scale. The PID controller is also brought under light for a direct mode of control while using MPC. This method proposes a unified approach for suppressing commutation torque ripple over the entire speed range without distinguishing high speed and low speed and overcomes the difficulties of commutated-phase-current control, avoiding complex current controllers or modulation models.

PS-I experience: Overall it was a good experience.

Learning outcome: Learnt some new concepts beyond from courses studied in second year. I got familiar with a lot of in-depth concepts related to my project and provided time and resources to implement it.

Name: VASANWALA ABDULTAIYEB SAIFUDDIN (2019AAPS0279G)

Student write-up

Short summary of work done: We were given the task of developing a Control Algorithm to control the speed of a Brushless DC motor. This Motor is essential of CEERI's E-Trike Project for Specially abled people. Initial weeks were spent researching different control algorithms best suited for the project, reading research papers, and learning simulation software. And final weeks were spent on modeling our system in MATLAB - Simulink and testing its performance. The two control algorithms that we implemented were PID and Fuzzy PID. These algorithms were tested under different conditions.

PS-I experience: I had a great experience in PS. Even though it was conducted online, it didn't feel like it. Our mentor had bi-weekly meetings and was always available for help, and our PS - faculty had the same helping nature and held weekly meetings. Although through a screen, I was properly able to collaborate with my team and get the work done.

Learning outcome: I got to apply the concepts learned in Control Systems in 2-2. I got introduced to the Automation and Control domain and a glimpse of how research work goes about—and heavily improved by presentation and talking skills.

Name: ADITYA CHOUDHARI (2019AAPS0309H)

Student write-up

Short summary of work done: My project aimed to create a battery management system for an electric trike. The vehicle was mainly developed for the differently-abled. We were a team of two students working together along with our mentor, who was extremely responsive and helpful. We started with a literature survey to familiarize ourselves with the project. Then we moved on to learning the required software, which included MATLAB for battery modelling, Arduino for data collection and Python for data visualisation and analysis. We also made connection schematics for our experiment and remotely helped the research scholars at CEERI to set it up. The virtual nature of PS1 made it a little difficult. Still, we managed to successfully conduct our experiment and gather important data, which will surely act as a headway for the advancement of this E-trike in the future. It was a great learning experience for me.

PS-I experience: It was challenging in online mode because we had to set up a physical experiment to gather data and analyse it. Our mentor was very helpful and helped us in planning the flow of the project. He conducted meetings twice a week and these shorter deadlines helped to get more work done. I learned a lot through this PS-1.

Learning outcome: Learnt to use of MATLAB, Arduino and Python. Also learnt about the functioning of the battery in an electric vehicle. Improved my presentation and interpersonal skills by working in a team.

Name: DIYA SUSAN THOMAS (2019B1A31096H)

Student write-up

Short summary of work done: Domain: Industrial Automation and Control
Project title: Control and Motor design for an electric trike
Our team reviewed different control techniques to control a BLDC motor for an electric trike. It includes PID control, Genetic algorithm based control, NN-Fuzzy logic based control and finally Model predictive control (MPC). We implemented MPC using MATLAB/Simulink for simulations and tried optimizing the model using different cost functions and mathematical transformations. Courses like Control Systems and ED basics are useful. MPC is a relatively new technique with applications in the R&D phase so the learning was challenging but at the same time rewarding.

PS-I experience: I expected a lot more interaction and guidance from my industry mentor, but our BITS mentor guided us through the process. Patience is required while reviewing dozens of research papers and it is very possible that in the first two weeks you don't have work and suddenly you find yourself with multiple deadlines. Overall, it was a peek into the working of a government research lab.

Learning outcome: Learnt how to use MATLAB/Simulink for complex simulations. Pretty much one and a half month of self-study.

Name: MOHIT AGRAWAL (2019B4AA0918H)

Student write-up

Short summary of work done: We worked on the project "Control of a BLDC motor for an e-trike and it's design". For this in first three weeks we reviewed 3 research papers through which we learnt basics and different control techniques. For next 4 weeks we used MPC model to work on, we created MATLAB simulation and obtained the results.

PS-I experience: Wonderful experience.

Learning outcome: Gained intellectual skills, technical knowledge related to the project field. Learnt how to use Matlab.

PS-I station: Central Electronics Engineering Research Institute (CEERI) - Machine Learning/DSP/AI, Pilani

Student

Name: ARSALAN MALIK (2019A3PS0499P)

Student write-up

Short summary of work done: Our team worked on Face Recognition in Low-Resolution images. The performance of traditional face recognition systems which are developed for high quality images degrades considerably for the low resolution images obtained in real world settings. In this project, our aim was to develop a system that works well with very low resolution images in real world settings and can be used for detection of employee presence at CEERI for entry into the premises. This was done using Deep Learning techniques with the help of a 'Two-Branch' architecture of VGGface. It used a stored database of high-resolution images, extracted its features through the Convolutional Neural Network and compared them with the features of corresponding low-resolution images to identify the person. Apart from the task of recognizing a person, we also identified whether a given person was in our stored database or not. The achieved classification accuracy for this was 92.85%.

PS-I experience: PS1 was my first internship experience. It gave me an exposure to working on a research project. I got good 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.

Learning outcome: PS1 helped me learn about Image Processing techniques and explore the field of Deep Learning using open-source libraries: TensorFlow, Keras and OpenCV. Learnt how to efficiently train models locally with GPU acceleration and GitHub to store our work. I developed the habit of keeping track of my progress by maintaining the weekly diary. The Group Discussion and Seminar sessions were helpful towards developing my communication skills.

Name: RUTURAJ GODSE (2019A7PS0002G)

Student write-up

Short summary of work done: The objective of our project was to classify the state of a person into different categories like alert, awake, fatigued, sedentary using data from physiological signals (PPG). Data was collected from wearable devices like smart watches and signal processing is carried out for noise filtering so that machine learning algorithms can be applied to the collected data. Modern classification algorithms are used to form the hypothesis to classify a person's state. There are tremendous applications and potential for this kind of study in healthcare and occupational safety.

PS-I experience: I had a great experience. Both my industry mentor and BITS faculty were very helpful and enthusiastic about the project. I learnt many new things and also managed to produce good results.

Learning outcome: I learnt various Machine Learning and Deep Learning algorithms and frameworks - Scikit, Tensorflow - to implement them.

Name: HARDIK SHAH (2019A7PS0076G)

Student write-up

Short summary of work done: The purpose of the project was to classify the state of a person into different categories like alert, awake, fatigued, sedentary using data from physiological signals (PPG). Data was collected from wearable devices like smart watches and signal processing was carried out for noise filtering so that machine learning algorithms can be applied to the collected data. Modern classification algorithms like artificial neural networks, SVM, logistic regression etc. were used to form the hypothesis to classify a person's state. There are tremendous applications and potential for this kind of study in healthcare and occupational safety.

PS-I experience: It was a great experience to be a research intern at one of the top research labs in India. I learnt a lot of things throughout the 2 months of PS-1. My industry mentor was kind enough to guide me and mentor me at every stage of the project. My faculty mentor was also vey supportive and helpful. He made sure to arrange all the meetings and gave us valuable insights and suggestions on our work. He made sure that all evaluative components would increase our knowledge on our respective project areas.

Learning outcome: Among technical skills I learnt Machine Learning and Deep Learning. I learnt about classification algorithms like neural networks, support vector machines, logistic regression etc. I learnt the deep learning framework tensorflow for implementing neural networks. I also learnt the pandas python package for preprocessing of data. I learnt to collaborate on machine learning project with my partner using jupyter notebooks and google colab. The group discussions, seminars and meetings with my industry mentor definitely impproved my soft skills. All in all, a lot of learning took place for me at CEERI and I am thankful to BITS for giving me this opportunity.

Name: SHIVSUNDAR R (2019A7PS0081G)

Student write-up

Short summary of work done: I was allotted a project related to cardiac arrhythmia detection. We had to build ML/DL models to analyse biomedical signals(eg. PPG) and predict the presence or absence of arrhythmia. This was a ternary classification problem where the the 3 classes were 1.Normal, 2.Tachycardia, 3.Bradycardia. Our PS mentor had already worked on the project and had written the basic code. Our job was to modularise the entire code, make it efficient and test out various ML/DL models. The code was written in Python and I was in a group of 2, my partner was from Hyderabad campus.

First 3 weeks, we analysed 3-4 papers on the topic and went through the existing methods adopted to solve the problem. Then we implemented various models and tested their accuracies. We achieved a decent accuracy for predicting arrhythmia and our industry mentor was also satisfied with our work. Overall, we developed new models over the existing code and achieved decent results.

PS-I experience: The experience was amazing, to be in touch with experts from the industry was a great learning experience. Our discussions with the PS-mentor and the faculty mentor were awesome and we really learnt a lot from these. I also enjoyed working in a team. The fun part was when we got stuck, and our mentor would give us a hint or explain the concepts and then we would proceed and solve the task. Overall I really enjoyed PS-1 and I would like to thank BITS-Pilani for giving me this opportunity.

Learning outcome: I learnt a lot from this experience. I learnt a lot about Machine learning and how it is used in today's world. I learnt how to code in python and how to apply ML in it. The discussions with my PS mentor were great and I learnt a lot from him both technically and otherwise. Our faculty mentor was also very supportive of our learning and all the evaluations were conducted in such a way that we learnt something out of it. I learnt a lot from my group-mate as well, we shared our ideas and worked on the project together. Overall, PS-1 was a great experience.

Name: CHIRAG WADHWA (2019A7PS0103P)

Student write-up

Short summary of work done: My project was titled "ANOMALY DETECTION IN X-RAY BAGGAGE SECURITY IMAGES USING NORMAL CLASS DATA". This project was based on deep learning and required knowledge of deep models including CNN's, GAN's, autoencoders and ML algorithms including SVM classifier. We picked up a paper recently published and tried to implement it in order replicate the results. The model consisted of 3 different phases which were trained separately. The first phase had a backbone CNN architecture with a Feature Pyramid Network on top of it. This was a multi-label classification task. In order to reduce class imbalance, the number of positive images(having anomalous objects) and negative images(not having anomalous objects) were same. The second phase had a Bi-GAN.Only the data of negative images, processed in phase 1 is fed to this model for training purpose. Finially, the phase 3 was an SVM classifier to classify the input image. We worked on 2 datasets, NUS-WIDE and SIXRay. I learnt a lot about new ML models such as FPN and how it enhances the feature maps from any base CNN architecture. Also, learning about the real power of GAN's was very exciting for me.

PS-I experience: Despite the PS being online it was a pretty good learning experience. Certainly there was a lacking feel of working in person at the institute itself. But the overall experience was amazing. The insights from my industry mentor and BITS faculty mentor really helped me learn a lot and make this experience a success.

Learning outcome: The concept of FPN and how it enhances the feature maps from any CNN architecture was something new for me. That was really interesting. The experience of working hands on under the guidance of a reputed research institute was very helpful.

Name: R. RAMANATHAN (2019A7PS0115G)

Student write-up

Short summary of work done: Our goal has been to explore 3D image processing and using available datasets for object detected and 3D image segmentation tasks. 3D object detection has been approached in 2 ways. The Medical Detection Toolkit referenced and used in this project works on true 3D convolution or 2D slices with context . Our approach is to test this algorithm and the associated toolkit on public medical data in order to gauge its usability in security applications. The goal is to implement and test state of the art image segmentation models from the mmdetection library. Initially we shall focus on the Cascade R-CNN model. Finally the collection of models will be tested on the Security Scan dataset and inferences will be presented. Once implemented, the framework will allow easy model testing on the popular LIDC-IDRI dataset for existing and future models in the mmdetection library. The results obtained from our work may be published and help further research in this domain.

PS-I experience: The experience was challenging at times but helped me grow and improve myself.

Learning outcome: Acquired insight into the research process and usage of state of the art computer vision tools.

Name: NANDAN H R (2019A7PS0164H)

Student write-up

Short summary of work done: Our research project was titled "AI-based techniques for Cardiac Health monitoring using analysis of biomedical signals (PPG/ECG)." We were a team of two and were expected to analyze PPG Signals to detect two types of Cardiac Arrhythmia, namely Tachycardia and Bradycardia. The first half of the PS mainly involved Literature Review where we read a few papers regarding previous works. The second half of PS involved coding, where we fit various Machine Learning models onto the data and analyzed the results.

PS-I experience: The overall experience was good. It involved a lot of self-learning and experimentation but both our industry mentor and faculty advisor were extremely supportive of our work. However it had its limitations in being online. Gaps in communication with mentors and team members was the biggest challenge.

Learning outcome: I was able to get an idea of how academic research works. I also learned the general process of solving a Data Science problem and experienced it first hand.

Name: RITA JAINAM PARAG (2019A7PS0177G)

Student write-up

Short summary of work done: I worked in a team of 3 where we explored a new type of deep learning architecture called Capsule networks and its improved variation called Dual Attention CapsNet and compared their performance on different datasets. We tried this architecture with different hyperparameters and optimization techniques and tried to improve its performance.

PS-I experience: I had very smooth experience of PS-I even though it was conducted in online mode. The faculty mentor assigned to us was very supportive and helpful throughout the PS-I. We had regular meetings to discuss any difficulties or doubts regarding the project.

Learning outcome: I got to learn about deep learning, different machine learning frameworks and the new architecture, CapsNet. I also got to know how a machine learning research usually progresses. Also I learnt collaboration and how to work in a team by effective communication with your team members.

Name: KUSNENIWAR HRISHIKESH GOVINDRAO (2019A7PS0179G)

Student write-up

Short summary of work done: The project title for our team was Face Recognition in Low-Resolution images. The aim was to develop a system that works well with very low resolution images in real world settings. We started with a literature review of recognition challenges encountered for low resolution images and various image quality metrics necessary for assessing an image's quality. In one of the papers, we found that a Two-Branch architecture was shown to perform very well on low resolution images. We implemented this architecture using the Keras framework. This architecture was trained and tested on datasets of face images that were readily available online. We achieved a classification accuracy of 92.85% using this network and are still working on ways to improve this model.

PS-I experience: The work-from-home PS-1 had its own limitations (computational resource constraints), 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.

Learning outcome: PS1 helped me learn about Image Processing techniques and explore the field of Deep Learning using open-source libraries: TensorFlow, Keras and OpenCV. I learnt how to efficiently train models locally with GPU acceleration and GitHub to store our work. I developed the habit of keeping track of my progress by maintaining the weekly diary. The Group Discussion and Seminar sessions were helpful towards developing my communication skills.

Name: SUSHANT SREERAM SWAMY (2019A7PS1031G)

Student write-up

Short summary of work done: My project was fruit disease detection using object detection and segmentation techniques. Initially we were asked to do literature review and try and understand the research which has already been done in this field. Due to the dataset being small for rotten apples, we had to look into data generating techniques as well. We implemented lightweight gans and were able to produce images for the dataset. On the other hand, we also implemented object detection algorithms such as Faster RCNN on Rice Leaf Dataset while our dataset was being generated.

PS-I experience: I had a great experience working. We were mentored nicely and were guided whenever we faced any issues. Even though the PS 1 course was online, we got to work a lot and learn many new things.

Learning outcome: I learnt about various types of GANs, and other GAN based architectures which deal with small dataset. I also learnt about object detection algorithms such as faster rcnn, mask RCNN etc. Through the evaluation components, I also believe to have enhanced my soft skills.

Name: SUKRIT KUMAR (2019AAPS0231H)

Student write-up

Short summary of work done: Worked on application of Capsule based neural network architectures and its application in computer vision tasks. Implemented regular, DA-CapsNet architecture in tensorflow. Developed the intuition behind, need for Capsules and where their performance differential compared to regular CNN networks.

PS-I experience: Worked in a team of 3. First few weeks were spent in literature review,completing Andrew Ng course, read 3 different papers on capsules which helped develop an intuition of capsules. Created 3 different models to compare using Keras,Tensorflow. Discussed various improvements with PS mentor, implemented said changes, reported the results.

Learning outcome: Learnt about capsule based networks, Attention mechanism. Developed deeper understanding of the Tensorflow framework and creating custom layers and activation functions. Learnt about optimizing a model by tweaking various hyper-parameters.

Name: SAILESH DUDDUPUDI (2019B3A70632H)

Student write-up

Short summary of work done: My project was CapsNet for computer vision applications. I had to learn a new type of neural network that could potentially replace conventional CNNs. Our project involved reading up on various papers on CapsNets and its variation (Dual-Attention CapsNet) and implementing them ourselves to compare with one another. We started off by implementing the basic CapsNet and then moved on to implementing DA-CapsNet (DA and only ConvAttention implementations) on various datasets such as MNIST, Fashion MNIST, CIFAR-10. We then ran these models and compared their results, that is their accuracies and reconstructions.

PS-I experience: It was definitely harder to do my PS-1 online but overall, I have learned a lot. The evaluatives were organised in a timely manner. It was great interacting with experts in the field of Deep learning and AI and helped me learn a lot about this field.

Learning outcome: Each evaluative improved not only my technical skills but also my soft skills and presentation skills. Working in a team also taught me how to be a team player.

PS-I station: Central Electronics Engineering Research Institute (CEERI) - VLSI Design/Circuit Design, Pilani

Student

Name: ADITYA AGARWAL (2019A3PS0202P)

Student write-up

Short summary of work done: Researched and learned a lot about designing/modelling a resistive humidity sensor and its intricacies. Electronics aspects as well as chemistry aspects of the sensors was highlighted and understood over the course of whole PS-1. Designed a circuit to convert the analogue signals of the sensor into digital(designing an ADC) and displaying the results on a TFT screen. Modeled a circuit for the sensor itself. Understood the materials used for sensing humidity and modeled a 2-d sheet for the purposes of this using some +2 knowledge and further research.

PS-I experience: It was a new experience and essential to learn dealing with professionals in an environment for research professionals. I also wanted to discover whether I could pursue this as a full time work for my future which was a great opportunity to get just after the 2nd year of my bachelors degree.

Learning outcome: I learned quantum properties of materials and designed circuits using my prior knowledge gained from my core course subjects for use in modelling an efficient humidity sensor. I also gained knowledge of some softwares which were used for the purpose of research at CEERI, Pilani.

Name: VATSAL AGARWAL (2019A3PS0254P)

Student write-up

Short summary of work done: The project assigned to me was titled "Design and Simulation of Silicon Photodetector". We had to start by reading research articles related to photodiodes and their applications. We learnt as much as we could about the physics behind working of photodiodes, their types and their specific applications ; such as LiDAR, oxymeter, among others. After that I was assigned to focus my attention on Avalanche photodetectors(APD). After gaining sufficient knowledge about it, I started to learn using Silvaco TCAD software. The software is a programming based device designer and simulator. After learning and practicing few example devices on the software, I began designing my APD sensor following a particular specification sheet. The simulation result for spectral response, dark current and breakdown voltages was obtained successfully

and was quite agreeable with the specification I desired to produce for my sensor. The simulation was successful.

PS-I experience: The PS-1 experience was certainly unique, as we did everything in online mode. I think the overall experience was satisfactory considering the same. I learnt many new things about the project domain. The experience also helped improve my interpersonal skills and presentation skills among other soft skills.

Learning outcome: I learnt the physics behind working of Photodiode sensors, specifically Avalanche Photodiodes (APD). The design process of such a sensor requires many considerations like nature of radiation you want to detect, its application, knowledge of material properties and many levels of optimizations. I learnt Simulation softwares like Visual TCAD and Silvaco TCAD. Using these softwares, I learnt how to design basic APD sensor and simulate it to get various device characterstics and optinized it to get desired specifications.

Name: TUSHAR SARDANA (2019A3PS0260P)

Student write-up

Short summary of work done: The project involved the development of conversion and amplifier circuits to detect and measure RF Radiation Intensity present in the ambiance followed by the development of a read-out circuit using ATmega microcontroller for portable a RF Radiation Intensity meter. However, due to the lack of availability of simulation models the project was reduced to development of the read-out circuit only.

PS-I experience: It was a good experience working at CEERI. I got first hand experience in microcontroller programming and interfacing. It helped in building team work, presentation skills and communication skills.

Learning outcome: Gained advanced knowledge about microcontroller and RF power detectors. Learnt embedded C programming and how to use softwares such as Keysight ADS, MATLAB and SPICE. I also got insights on the working of research institutes like CEERI.

Name: REVA TEOTIA (2019A3PS0268P)

Student write-up

Short summary of work done: My project was the design and investigation of photoacoustic detector. First, I learnt about the basic theory of photoacoustic spectroscopy, MEMS microphone as a photoacoustic detector, and working of capacitive MEMS microphone, along with COMSOL Multiphysics. Then, I simulated a capacitive MEMS microphone on COMSOL and studied the effect of the various parameters on the sensitivity response of the microphone.

PS-I experience: The PS-1 provided first-hand experience in the research field and helped me to improve my presentation skills. Due to online mode, I missed the interaction with my fellow batchmates who were working on different projects. My mentor was very helpful and guided me whenever I required his help. My PS-1 Instructor was very supportive and I could ask for her help any time of the day and she would always respond.

Learning outcome: I learnt about COMSOL Multiphysics software and the working of MEMS microphones and photoacoustic detectors. I improved my soft skills such as email writing conduct, slides preparation skills, group-discussion skills and much more. I also got an idea about working in research institutes. This research experience has built a strong foundation for higher studies.

Name: SHAIKH AFRAJ SHABBIR (2019A3PS0294G)

Student write-up

Short summary of work done: My work was related to Design and Simulation of Silicon Photodetector. In the first month, we mainly focused on the theory aspect of the photodiodes and did a lot of literature review of different research papers and articles related to Silicon photodiode. I focused on the application of Silicon Photodiodes in photoplethysmography. In the next month I focused on reading different datasheets of

Silicon photodiodes and finally designed and simulate a silicon photodiode using Silvaco TCAD.

PS-I experience: My PS-1 experience was very exciting, as it was my first time doing an internship, it helped in understanding how research is carried out in a research center. It also helped in getting an idea on how to gather information/ specifications for your projects using different sources and finally simulate it. Overall it was a very good learning experience.

Learning outcome: I learnt a lot of things from the internship, one of the most important of them is how to approach a particular project from scratch by myself. I learnt how to do literature reviews. My PS-1 mentor gave me different sources which helped me in understanding different applications of photodiode.

Name: G.K.KIRUTHIK SRINIVAAS (2019A3PS0392G)

Student write-up

Short summary of work done: My work revolved around the development of a portable RF radiation intensity meter. The work was divided into 2 objectives. First objective revolved around simulating a RF power detector. It basically takes power as input and outputs a voltage value. So we simulate for various powers for particular frequency and then we simulate for various frequencies. After doing this we need to pass this data obtained(power and voltage) to a micro-controller(atmega128) and we display the voltage and power on the LCD. Atmega was used because it has an inbuilt ADC in it. So these objectives were achieved using various tools and softwares like ADS, Proteus, Atmel studio. So after this we can get the amount of RF radiation present in the environment.

PS-I experience: Even though the PS was in online mode, it gave a very good exposure to VLSI design,embedded systems and signal processing. The project revolved around all these fields.The industry mentor helped us understand the various aspects on how to approach the problem and break it down into simpler tasks.

Learning outcome: We explored several ways of simulating IC and coding efficiently and successfully completed the project. RF microelectronics has lot of importance in today's

industry and this project helped us to know about its practical applications. Simulation,designing were the various key areas which got to learn about.

Name: G. K. KIRUTHIK SRINIVAAS (2019A3PS0392G)

Student write-up

Short summary of work done: My work revolved around the development of a portable RF radiation intensity meter. The work was divided into 2 objectives. First objective revolved around simulating a RF power detector. It basically takes power as input and outputs a voltage value. So we simulate for various powers for particular frequency and then we simulate for various frequency ranges the IC can work. After doing this we need to pass this data obtained(power and voltage) to a micro-controller(atmega128) and we display the voltage and power on the LCD. Atmega was used because it has an inbuilt ADC in it. So these objectives were achieved using various tools and softwares like ADS, Proteus, Atmel studio. So after this we can get the amount of RF radiation present in the environment.

PS-I experience: Even though the PS was in online mode, it gave a very good exposure to VLSI design, embedded systems and signal processing. The project revolved around all these fields. The industry mentor helped us understand the various aspects on how to approach the problem and break it down into simpler tasks.

Learning Outcome: We explored several ways of simulating IC and coding efficiently and successfully completed the project. RF microelectronics has lot of importance in today's industry and this project helped us to know about its practical applications. Simulation, designing were the various key areas which we got to learn about.

Name: MUSALE TEJAS DNYANESHWAR (2019A3PS0409G)

Student write-up

Short summary of work done: The process of designing wearable device sensors for health care systems using flexible materials like Graphene, PDMS, Carbon fiber, etc. was studied and discussed. The design procedure of various flexible sensors was simulated in COMSOL Multiphysics and the results were analyzed and interpreted for their application in IoT based wearable devices. Also, its application in the development of skin-like flexible strain sensors for the realization of multipurpose human-machine interfaces was studied.

PS-I experience: Although due to the pandemic, the PS-1 was conducted remotely, I enjoyed the learning and the exposure to the core concepts. Thanks to BITS Pilani PS Unit for their effective planning and execution. The guide from CEERI and also the faculty in-charge were very helpful and provided the necessary support and guidance time-to-time. The project gave me a good insight on the designing and practical aspects of the core concepts. In a nutshell, it was indeed a great learning experience.

Learning outcome: The learning was two-fold: Firstly, gained a detailed understanding on flexible sensors, their design procedure and their applications in wearable device technology. Secondly, achieved expertise in COMSOL Multiphysics, a software that engineers and scientists use to simulate designs. The key prospect that I learnt is that 'The use of flexible electronics is making foldable or rollable devices a reality'!

Name: SAMARTH AGARWAL (2019A3PS0418G)

Student write-up

Short summary of work done: I was tasked to design a microfluidic viscometer which could be used to check the adulteration in fluids.

PS-I experience: Although a very short span of time, the experience was good and enriching.

Learning outcome: The major learning outcome was expanding my knowledge about microfluidic devices and learning how to use simulation softwares like COMSOL Multiphysics.

Name: VISHWAS VASUKI GAUTAM (2019A3PS0443H)

Student write-up

Short summary of work done: Worked on the numerical analysis of microfluidic devices for lab-on-chip applications. The microfluidic device in consideration was a Viscometer. This device is useful in differentiating fluids based on their viscosities. Designed and developed the device on COMSOL multiphysics software.

PS-I experience: Overall it was a positive experience. The industry mentor and PS faculty were supportive and helpful. Although, it took some effort to maintain contact with the mentor due to the online nature of PS-I.

Learning outcome: I was introduced to a completely new field, helping me explore the field of electronics further.

Name: BHAMBURKAR ATHARVA RAHUL (2019A3PS0456G)

Student write-up

Short summary of work done: Project Title - Portable RF Detector Circuit
1. Read research papers to get an insight into how a particular IC used for the project(LTC5508) worked.
2. Implemented code and interfaced 16x2 LCD display with ATMEGA16 microcontroller.

PS-I experience: It was a great experience. Even though it was online, the scientist from CEERI made sure that we are working by having regular meetings, discussions, etc. I also learnt new softwares/skills and get a basic idea of research work happens.

Learning outcome: Microcontroller Coding, Simulation Softwares (LTSpice) and Literature Review.

Name: ANANTHA SAI SATWIK VYSYARAJU (2019A3PS1323H)

Student write-up

Short summary of work done: My PS 1 project is on "Design of Pyroelectric Based IR Gas Sensor using Aluminium Nitride". Initially I had to learn about the Pyroelectric Topics from scratch since i don't have much idea on it other than the theory that we learnt in Electromagnetic theory. I had to approach various research papers for knowledge on the topic since the topic is not that much extensively published in textbooks except for a few. After that for the implementation of the sensor we had took the help of COMSOL. COMSOL is a Multiphysics simulating software and learning the took quite an amount of time. Continuing we had to implement the sensor module in the software and try to match up with the experimental results obtained till now.

PS-I experience: It is an okayish experience. If you want to go for Masters or further in your career in microelectronic systems, sensors it would me nice.

Learning Outcome: Learnt COMSOL.

Name: SHIVANG THAPLIYAL (2019A8PS0509G)

Student write-up

Short summary of work done: Mathematical analysis of deformation of different microstructural geometry involved in the modeling of a capacitive pressure sensors and analysing theortical trends of sensitivity and capacitance.

PS-I experience: It was great. Got to work in an esteemed organisation. I had weekly discussions which kept me in track. The PS1 faculty as well as the mentor enlightened me in gaining the right knowledge and utilising it in practical field.

Learning outcome: Learnt working in a team, working professionally. Also doing literature review helped in building apatite for research work.

Name: SHREYA GUPTA (2019A8PS1310H)

Student write-up

Short summary of work done: I, with two others, was assigned the project of modelling a novel 2-dimensional humidity sensor. Under this project, I had to design a circuit that would convert input current from the sensor to a voltage which can then will be used to display the ppm value of humidity. The sensor we were working for was a resistive type of sensor, which gives different current values for changing humidity levels. To incorporate the microamp current from the senor, a precise and power effective current amplifier was used.

PS-I experience: I had pleasant learning and working experience. The mentors assigned to me were very helpful and understanding. They made sure I was able to grasp all the knowledge required to carry out the project. We had flexible work conditions.

Learning outcome: During my PS, I gained an aptitude for research type of work in core electronics. I read many research papers and online material related to resistive sensors, humidity sensors, and circuit designs. PS-1 also improved my soft skills like communication and delivering presentations through online mode. I got to know about the many amplifiers available in the market and how to choose them effectively.

Name: LAD KAUSTUBH PRASHANT (2019AAPS0187G)

Student write-up

Short summary of work done: Designed Microstrip Antenna

PS-I experience: Decent

Learning outcome: Antenna design

Name: NAREN VILVA (2019AAPS0236H)

Student write-up

Short summary of work done: Our PS1 Project was on Flexible sensors and their simulation. First, we read papers on the various kinds of flexible sensors, their designs and their applications. Then, we simulated the designs of previously published works using COMSOL software. Finally, we designed and simulated a novel flexible sensor based on previous designs. Simulation and design were done in COMSOL, and its results were analyzed for potential use in real-world applications such as wearable devices and healthcare monitoring.

PS-I experience: Good learning and experience.

Learning outcome: I learnt to simulate flexible sensors in COMSOL and gained rudimentary understanding of the software and the domain of flexible electronics. I learnt to coordinate with my teammate in order to meet the station's expectations.

Name: M. S. NARAIN SHRIRAAM (2019AAPS0250H)

Student write-up

Short summary of work done: The title of our project was "Analytical And Mathematical Modeling And Implementation Of Capacitive Micromachined Ultrasound Transducers". It is related to the topic of MEMS. In the starting few weeks we did extensive literature survey to understand MEMS and CMUTs. We were supposed to design a single cell CMUT so we read up about different materials to be used as the membrane for the CMUT and decided to go with Silicon (100) and Polysilicon. We found out the properties of the materials which were then used for determining the design parameters like the pullin voltage and the membrane radius.

PS-I experience: I had hoped for getting a project related to VLSI/Circuit Design but landed up with MEMS. Nevertheless MEMS was an interesting new topic and our PS mentor was very helpful. I feel that the online experience was good but an offline PS would have been much better.

Learning outcome: Explored various applications of MEMS and CMUTS, worked on Matlab to determine the design parameters.

Name: VEDANT SACHIN BANG (2019AAPS0251G)

Student write-up

Short summary of work done: Design and simulation of Pyroelectric based IR detector for gas sensing applications. I read about the theory of such a device and reviewed many research papers. Further I simulated a model of the device on the software COMSOL Multiphysics.

PS-I experience: The PS program was good, since I learnt a new software, and learnt about a new and upcoming research area.

Learning outcome: New software - COMSOL Multiphysics
New research - Pyroelectric materials for gas sensing

Name: VEDANT SACHIN BANG (2019AAPS0251G)

Student write-up

Short summary of work done: I worked on the design of pyroelectric based gas detectors. Specifically, I explored new materials which displayed good pyroelectric action. This was done through molecular simulations. Further, I studied the heat interaction of the new materials, since it is an important metric of performance of the detector. This was done through micro-scale simulations.

PS-I experience: The experience was great. I had regular meetings with a scientist from CEERI Pilani, who guided me on this project. We might publish a research article in the next month or so.

Learning outcome: I learnt about the technology of pyroelectric detectors, which is an innovation in infrared detection. Further, I learnt how to use two different softwares for physics simulations.

Name: SI MADHEN VYASS GURU (2019AAPS0302G)

Student write-up

Short summary of work done: Our project statement was, "Analytical and Mathematical modelling and implementation of Capacitive Micromachined Ultrasound Transducers". We had to find the optimal membrane material properties for the manufacturing of the CMUT as well as find the design parameters of the CMUT using the respective material properties. We had to use MATLAB to implement the formulas for Pull-in voltage, membrane thickness and so on. The formulas were obtained via literature review of academic papers.

PS-I experience: The mentor was helpful in pointing us towards the proper resources to learn about Ultrasound and useful papers to read about CMUTs.

Learning outcome: I learnt about how to use MATLAB to use in a professional setting. I also learnt about the various issues one might face while manufacturing CMUTs and how do tackle those issues. In the end, we were able to obtain the basic design parameters of the CMUT.

Name: MUNDADA ROHIT RAHUL (2019AAPS0343G)

Student write-up

Short summary of work done: We were given the task of modelling a 2d-material based humidity sensor and a circuit to drive the humidity sensor. My work was to implement the circuit to display humidity values on a TFT screen. Initially I used 8086 based microprocessor system to display the humidity value on an LCD module as that was taught at BITS. But later on, due to issues like complexity in writing assembly code for handling decimal arithmetic, 8086 is outdated and hardly anyone uses it in practical applications and also the fact that Proteus 7 (software on which initial simulation was done) did not have any module for TFT screens, I had to learn and use Arduino programming to make the new circuit. The new simulation was done in Proteus 8 which had the TFT module and Arduino had in-built libraries for handling TFT screens which made the task a lot simpler and commercially viable. Also added an extra feature to view and edit date and time on the TFT screen so that variations of humidity can be seen during different parts of the day.

PS-I experience: The experience was great. Our PS mentor was very helpful and never burdened us with a lot of work and we worked at our own pace. The deadlines were pretty flexible which helped in learning the necessary tools to do the simulation. Also looked into the commercial aspects of making a sensor and the practical feasibilities while designing the circuit. The seminars and group discussions were held regularly and helped me develop my soft skills which are sometimes overlooked at. It would have been an even greater experience if we were physically present at the station so that we could see how the work is done and used physical hardware to implement rather than only simulations.

Learning outcome: 1. Learnt the mechanism by which humidity sensors sense humidity and how the circuit is developed.
2. Revised about all the concepts about microprocessor programming and interfacing and utilized them to make a working simulation.
3. Further learnt Arduino programming and made a new simulation meeting all the project requirements and also adding new features.

4. Gained soft skills via seminars, group discussions and report writing.

Name: ROHAN CHOUDHARY (2019AAPS0402G)

Student write-up

Short summary of work done: My project was based on Design and Investigation of LTCC Based Microstrip Antenna for 5G Applications. The Project was divided into phases. The first phase involved a literature survey of Microstrip Antennae: their Working, market players, bands used, materials involved, design aspects, arrays, feeding methods, limitations, LTCC (Low Temperature Co-fired Ceramics) based designs, and application examples. The second phase of the project was to review the current antenna solutions operating at mmWave frequency bands and propose a new design to enhance several performance parameters of the antenna radiation working at an operating frequency of 28GHz. The work involved rigorous calculations, modelling and running simulations on CST Microwave Studio. After several optimizations, I compared the results with the current solutions available in the literature and prepared a report on the same.

PS-I experience: The project's domain was completely new for me, as we get to study about antennas in the 3rd year. Thus, all the concepts and related theory seemed a bit overwhelming at first. But I gave it time and tried to grasp as much as possible by getting a good physical insight. I also got to learn the CST Microwave Studio which I used to model and simulate my own antenna design. Overall, I enjoyed these 7 weeks of experience in the research field and influenced me to explore more in the Microwave Engineering.

Learning outcome: I learnt about the antenna theory, specifically about the microstrip antennae, LTCC technology and basics aspects of 5G. I gained the experience of working on CST Microwave Studio for antenna design and simulation. I also got to write a research article on my proposed antenna design. The GD and seminars were also helpful in working upon my verbal skills.

Name: ISHAAN SARMA (2019B5A30559P)

Student write-up

Short summary of work done: Our project title was "Development of Flexible Capacitive Pressure Sensor for E-skin Applications". The project comprised of two people, both assigned the same task. The working principle of a capacitive pressure sensor is the change in capacitance on varying the Plate distance. The sensitivity of the sensor can be changed or manipulated by altering the dielectric arrangement. We were asked to mathematically derive the deformation of various dielectric structures. This included finding out stress and strain for various solids and comparing among those to tune the sensitivity of the pressure sensor.

PS-I experience: Good learning experience.

Learning outcome: Structural analysis of solids.

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

Student

Name: SIDHARTH S. NAIR (2019A3PS0178P)

Student write-up

Short summary of work done: VPG is an advanced signal processing technique which enables remote measurement of heart rate (HR) measures. MTCNN is one of the most popular Face detection methods used. We compare MTCNN with other such models like the VJ algorithm. We used region based methods for skin detection using threshold from RGBA, HSV and YCbCr color spaces with watershed algorithms. The extracted skin pixels are then used to extract pulsatile information by implementing the rPPG algorithm on it. The POS algorithm used the skin reflection model to analyze the signals captured by the camera sensor.

PS-I experience: We had a good experience working with implementing face detection models. It was my first experience with computer vision field.

Learning outcome: I improved my communication skills, learnt to work well in a group and effectively articulating my ideas using presentations etc. GD were also effective.

Name: AGRAWAL MAYUR ASHISH (2019A3PS0198P)

Student write-up

Short summary of work done: My project was related to signal processing techniques. Using signal processing techniques to remove motion artefacts from PPG signals. Where I was supposed to write python code for pre-determined algorithm.

PS-I experience: It was good.

Learning outcome: Learnt about signal processing techniques.

Name: MIHIR KUMAR (2019A3PS0218P)

Student write-up

Short summary of work done: I worked on feature extraction of EEG signals and its classification using ML and DL models for fatigue detection. I learnt about various methods for feature extraction and went ahead with extracting relative power of various frequency band of the signal. I then applied ML classifiaction models and an ANN to the features and selected the model which provided the greatest accuracy.

PS-I experience: Although the PS was on online mode we had great expericence interacting with our mentors who video called us whenever we were extracting experimental data from a subject or running an importanr piece of code on the data. It was a really nice and enlightening experience.

Learning outcome: I learnt how to present myself in front of a technical crowd and various other interpersonal skills. Technically, I learnt Machine Learning, Deep Learning and Signal Processing.

Name: ASHITA BHARDWAJ (2019A3PS0457G)

Student write-up

Short summary of work done: My PS1 problem statement was Comparing material parameter extraction algorithms from Time Domain Spectroscopy- THz data.
My work mostly involved going through relevant research papers and developing the algorithms on MATLAB to derive accurate results.

PS-I experience: PS1 was great experience as the industry mentor was very supportive and helpful. I used to implement different algorithms on MATLAB, prepare for presentations and then formulate the reports. It was very engaging and informative for me.

Learning outcome: I enhanced my MATLAB skills during these 2 months. One of the biggest takeaways for me would be the skill of analyzing and implementing research papers. Beside this, I learnt lot while preparing presentations and reports, which will surely be beneficial for me in future.

Name: SUMUKH SUBHASH PHALGAONKAR (2019A7PS0011P)

Student write-up

Short summary of work done: I worked on a project on Texture Classification using traditional Machine Learning and Deep Learning methods. In the first half we worked on implementing algorithms for feature extraction using ORB descriptor and used them for training machine learning models. In the second half the same result was obtained by using Deep Learning techniques.

PS-I experience: PS-1 was my first ever real world working experience. I learnt lot of things and got connected with some of the top scientists at CEERI. Overall, I would describe my PS-1 experience as a valuable part of my degree.

Learning outcome: I improved upon my existing knowledge in Machine Learning and Deep Learning. Other learning outcome was knowledge about image processing.

Name: CHANDAK ATHARVA MAHESHKUMAR (2019A7PS0062P)

Student write-up

Short summary of work done: I worked on a project on texture image classification and segmentation using Machine Learning(ML) & Deep Learning(DL) techniques whose final application was going to be to differentiate between the types of industrial leather produced. We started off with traditional computer-vision algorithms for feature extraction & used ML classifiers like SVMs, Naive Bayes, etc. for texture classification. Later in the latter half, we fine-tuned CNN based architectures like AlexNets, ResNets, InceptionNets, etc. (transfer learning) for improving the results. This was followed by learning and running DL networks specialized for texture classification (as texture classification differs slightly from object classification). Finally we spent last 1-1.5 weeks exploring the texture segmentation problem and implementing a network for that.

PS-I experience: The mentor was really helpful all along and was closely involved in what we did. Right from week 1, he let us learn at our own speed and also allowed us to explore different solutions which we wanted. We continuously implemented what we learnt which gave me first hand experience. I also had some previous experience with DL so I found those tasks a bit on the easier side, but none the less, I got to actually implement the backbone architectures of DL based computer vision. Overall, it was decent experience as a first real world project.

Learning outcome: *A good idea about how to structure an ML/DL project.
*Understanding about why texture classification is difficult and important.
*Learnt about traditional CV techniques for feature extraction and description.
*ML Classifiers (with sk-learn).
*Implementing various CNN architectures (with Pytorch).

Name: ARCHIT BHATNAGAR (2019A7PS0133P)

Student write-up

Short summary of work done: We worked on one of the most relevant problems related to pattern recognition i.e. Texture Classification(it was intended that we found models with high accuracy metrics and implement them so that they can be used for Leather Classification tasks in the future).We worked on Local Binary Patterns to extract relevant features using different components in an image and converting it to a histogram, train a model on these images and feed them to different kinds of ML(Machine Learning) classifiers/We implemented 2 such techniques namely CLBP and MRELBP on 3 different texture datasets. Then as there was a cap to accuracy in the ML techniques as the features were manually extracted we switched to implementing Deep Learning Models. There we started with Transfer Learning on our Inception V3 models. Then we further implemented different supervised learning techniques like B-CNN and compact B-CNN and We also further read and tried to implement a combination of supervised and unsupervised learning called Rand-Net. We were able to match the accuracies as in the paper.

PS-I experience: The experience was pretty good. We worked in the teams of 2 under guidance of Prof Suriya Prakash. The mentor guided us constantly with us throughout the duration of the PS. We had meets once every days. Also we were allowed to remotely access the NVIDIA Titan X GPU which was a great experience. Also the Group discussions and seminars were very insightful.

Learning outcome: I acquired skills related to Image processing ,Machine Learning and Deep Learning. I worked with various python libraries mainly Tensorflow, Keras and Pytorch. Overall I was able to gain an insight into how the research in these areas works.

Name: NEIL MEHTA (2019A7PS0177H)

Student write-up

Short summary of work done: I worked on texture classification using different machine learning and deep learning techniques. The main aim was to successfully extract the details from the images dataset and able to classify them into different classes.

PS-I experience: I worked on texture classification using different machine learning and deep learning techniques. The machine learning techniques, such as Complete Local Binary Pattern(CLBP) and Median Robust Extended Local Binary Pattern(MRELBP),were used for feature extraction from the given image. Deep Learning techniques used for the same were InceptionV3 - GoogLeNet, Bilinear CNN, Compact Bilinear CNN and RandNet. I was able to successfully implement these techniques and tabulated the results for a complete comparison for the texture datasets of KTH-Tips-2a, OuTex, VisTex and FMD. Overall the PS-I experience was enjoyable.

Learning outcome: I learnt more about the machine learning techniques. I got familiarised with deep learning and tensorflow and made models to accurately predict the texture image. I also implemented severeal research papers into python code and tabulated the results for the same.

Name: ADITHYA M (2019A7PS0181G)

Student write-up

Short summary of work done: I had to read several research papers, and find implementations for many Machine Learning and Deep Learning models. I used these models, and datasets, to classify images.

PS-I experience: My PS1 was extremely good and beneficial, as I learnt a lot about Deep Learning and Image Classification. I also got a taste of what a research job looks like. Searching for the right implementation, and debugging my models were very frequent. My PS faculty was extremely helpful and welcomed our suggestions. Our mentor was also very knowledgeable and very helpful. He had regular meets with us.

Learning outcome: I learnt lot in my PS1. Technical skills include Deep Learning, Machine Learning and Image Classification. I worked with libraries like TensorFlow and Keras. I had to read a lot of research papers and implement them on my own.

Name: DEOLASEE SRUJAN ABHIJIT (2019A7PS1139P)

Student write-up

Short summary of work done: Worked on feature extraction of PPG Signal data, and trained ML Classification models using it to classify the state of a person into alert or fatigue. We used kNN, RF, Naive Bayes and SVM algorithms and achieved a 90%+ accuracy.

PS-I experience: It was a very good experience as we learned something new. We had almost weekly meets with the CEERI scientist as well as our BITS ps1 mentor. The scientist was very good in mentoring us and getting the job done. Overall it was an excellent introduction to Machine Learning, even if I didn't know anything when I started PS1. It was a learn as you do type project.

Learning outcome: Learnt how to build ML pipeline from scratch. Learnt the importance of data preprocessing and normalisation.

Name: AVI TANWAR (2019A8PS0332P)

Student write-up

Short summary of work done: Project Title: Signal processing techniques for the study of motion artefact reduction in PPG signals. We have explored techniques for detection of cardiovascular diseases through PPG and development of a non invasive, inexpensive screening technique suitable for home monitoring using wearable devices like smart watches. However, any movement of the wrist along with frequent loose contacts

significantly corrupts the PPG signal as it introduces motion artefacts into it and reliable peak detection from the corrupted PPG signal is essential for any further processing. Our work included study of various methodologies used by different researchers and also their efficiency, for reduction in such artifacts. First few weeks of work involved mostly literature review before we could actually work on implementing the algorithms on actual datasets.

PS-I experience: PS-1 was a great learning experience. I understood the operations of the organization and varied research domains being explored at the CSIR-CEERI Chennai center. I also got an opportunity to interact with experienced scientists working at CEERI Chennai and tools and technologies developed by them. PS-1 also provided me an opportunity to work in a team with students across different campuses of BITS, improving my communication and interpersonal skills along with enhancing technical knowledge and presentation skills through the project.

Learning outcome: I understood the use of wearable tech and engineering in healthcare and medical industry. I learnt the correct way to read and analyze research papers and then implementing them into actual algorithms applying Python and Signal processing. Through evaluation components like GD and seminars I developed soft skills like presentation, communication and team-work and also the technical skills like writing formal technical reports with proper structure used in the research sector worldwide.

Name: AMEY GUPTA (2019A8PS0429P)

Student write-up

Short summary of work done: I had research project in the field of Computer Vision and Texture Classification. We used Gabor Filters for feature extraction from texture dataset images and built classification models using various ML algorithms and compared the accuracies that we were getting. In the last few weeks of the project we moved to DL and built 4 different CNNs for the classification job.

PS-I experience: It was a completely research based project in the domain of Computer Vision. I had no experience with ML/DL before PS-1 and basic proficiency in python. Throughout the process I learnt a lot in these fields and built real good models and classifiers. CEERI Chennai can be looked into by people who are interested in ML as most of the projects here are related to it. We had meets every other day with presentations on our progress and the way forward. The scientists were really supportive

and hardworking and encourage you to continue your project even after PS-1. It was not exactly a lite station but the projects were really good for someone who wants to learn and wants to pursue research.

Learning outcome: Python, Machine Learning, Computer Vision, Image Processing, Deep Learning, Neural Networks, Report Writing.

Name: HRITHIK CHAND P. KANDALLU (2019A8PS0508G)

Student write-up

Short summary of work done: My project was related to Analog circuit design. I learnt to design Function generators and VCSEL(vertical-cavity surface-emitting laser) driver circuits and build PCB's for the same. Function generators were used here to supply voltage for the THz system. For the particular THz system, sine and sawtooth waves were required. As a part of the VCSEL driver circuit, I designed a constant current source and Sweep Frequency generator.

PS-I experience: The experience which I gained from the practice school was invaluable. Our faculty mentor ensured all the evaluations and events happened in an organized way. The Industry mentor helped me whenever I was stuck with any problems which I faced.

Learning outcome: I learnt how to use SPICE and PCB designing softwares efficiently. Also, I learnt how to pick components and ICs for designing circuits more. The process of preparing for GD and the seminar helped me in gaining lot of information related to the topic. GD helped me expressing my opinions with conviction. I honed my communication and circuit designing skills, which were the biggest takeaways from PS-1.

Name: PRANAV GOYAL (2019A8PS0548G)

Student write-up

Short summary of work done: VPG is an advanced signal processing technique which enables remote measurement of heart rate (HR) measures. MTCNN is one of the most popular Face detection methods used. We compared MTCNN with other such models like the VJ algorithm. We used region based methods for skin detection using threshold from RGBA, HSV and YCbCr color spaces with watershed algorithms. The extracted skin pixels are then used to extract pulsatile information by implementing the rPPG algorithm on it. The POS algorithm used the skin reflection model to analyze the signals captured by the camera sensor.

PS-I experience: The experience was really good, we had the opportunity to work with government scientist on innovative technologies. We learned about how technology are used in different domains to help people. Our faculty mentor Dr. Amalin Prince was very helpful and he helped us gain the best out of this opportunity . The work was so interesting and insightful that we decided to work on the project even after PS.

Learning outcome: I got to know about how research takes place in professional environments. I also learnt how to write professional technical reports, about latest technologies based on face detection models, skin detection methods and PPG algorithms.

Name: MUHAMMAD AATIQ (2019AAPS0192G)

Student write-up

Short summary of work done: EEG signal processing and feature extraction, classification using ML/DL: EEG data read from subjects was processed to find the relative power of different bands of the signal. Then using ML/DL techniques, this data was classified as either fatigued or normal. The goal of this project was to find out the state of the subject (Fatigued/Normal) using just their EEG readings.

PS-I experience: My mentor was very helpful and provided ample resources to go through to understand the project. He also clarified any doubts we had and was eager to help us.

Learning outcome: Learnt various things about signal processing, ML/DL, Python coding.

Name: JAGDALE ASHLESHA SUNEEL (2019AAPS0229G)

Student write-up

Short summary of work done: Image Processing Techniques are used to enhance the contrast in TeraHertz images. For this, the project required research by analysing the various Standard Image Quality Parameters and using different image operations like gaussian normalization, wavelet transform and edge enhancement on the images to derive various results. The analysis was further done using Image Segmentation that entailed use of histogram thresholding, filtering and deconvolution algorithms.

PS-I experience: It was a very enriching experience. Got to work on a research paper with my PS mentor. I learnt a lot during the process and simultaneously increased my proficiency in MATLAB.

Learning outcome: Learnt various filtering, deconvolution and thresholding algorithms. Worked on MATLAB extensively. Also learnt about various CEERI innovations and it's applications that could significantly contribute to the existing technology.

Name: YASH VIPUL GADA (2019AAPS0291G)

Student write-up

Short summary of work done: Developed circuits for powering electronic components of a TeraHertz Spectroscope as per specifications provided, and simulated them. Designed a circuit for the power unit of a Raspberry pi 4, performed simulations, created a schematic, and a PCB layout for the printing of the same.

PS-I experience: Most interactions with the professor were through email. The professor was very responsive and committed to the project since it was her own PhD project too. It was a great experience to work and contribute to something that is actually going to be developed and used in the industry. A little prior knowledge and experience with EAGLE and circuit design will be a huge advantage.

Learning outcome: Learnt about various components used in real electronic prototypes. Developed PCB designing skills and worked with close-to-real circuit simulations, which gave an in depth understanding of how research is done. Experienced how researchers communicate and the dynamics of an institution such as CEERI.

Name: ADITYA SHRIVASTAVA (2019AAPS0334H)

Student write-up

Short summary of work done: Our PS - instructor was working on economically-feasible methods of detecting fatigue in drivers and industrial staff to reduce the accidents that happened because of sleepiness and dozing off on work. There were several groups working under him on various projects - signal processing, feature extraction and machine learning classification methods. My group was working on the machine learning classification for PPG signals, where we experimented on various classifiers and found out which features were useful and which classification technique worked the best on the data. By the end of the project, we achieved over 95% accuracy in detecting the state (fatigue or normal) of the user.

PS-I experience: It was my first experience of research work and I definitely enjoyed it very much. Our mentor was was very helpful and we did not have any particular problems from CEERI's side even though our PS was online. I didn't know anyone in group before PS-1 started and so we had some difficulty in coordinating at first, a very big reason of that was the PS-1 being online, but by the end we were all working swiftly. It is a very good way to interact with students from the other campuses.

Learning outcome: I got an experience research work first hand, learnt about machine learning and also got to work on my interpersonal and presentation skills.

Name: KARTIK AGRAWAL (2019B1A30608P)

Student write-up

Short summary of work done: We developed a machine learning program that can detect the presence and absence of Atrial Fibrillation (a type of cardiac arrythmia) using the PPG signals obtainable from smartwatches or bands. We also found out the relative importance of each feature (extracted from PPG) in determining the result the algorithm provides.

PS-I experience: It was a decent experience.

Learning outcome: I got an experience to research work first hand, learnt about machine learning and enhanced my interpersonal and presentation skills.

Name: VANSH CHHABRA (2019B1A71039P)

Student write-up

Short summary of work done: We worked on creating a texture classification pipeline using various datasets and implementing the model using different Filter Banks with various Machine and Deep Learning techniques. Then, we computed different filter and model parameters, and used various feature extraction and classification techniques to correctly classify images of standard datasets. The processes were able to achieve more than 98% accuracy for all the datasets. We found that both Machine Learning and Deep Learning methods worked well with almost all our datasets and the results obtained could be further used to classify images and also in other Image Processing experiments.

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. Timely

meetings held with the PS-1 guides helped a lot in refining our work and they provided us with all the necessary study materials which saved our time.

Learning outcome: I learnt about Machine Learning, Deep Learning, Programming in Python, Image Processing and CNNs during the 8 weeks of PS-1.

Name: SHANTANU KUMAR (2019B3A70375H)

Student write-up

Short summary of work done: I worked on a research based project involving the concepts on texture representation and texture classification. Our work was to create a texture classification pipeline using various datasets and implementing the model using different filter banks with various machine and deep learning techniques. We used different feature extraction techniques by implementing Gabor Filter for our ML classification. For the DL classification, we worked on different models like ResNet, VGG and ScatNet.

PS-I experience: My experience with CEERI was really enriching. Even though the mode internship was virtual, there was still a lot to learn from the scientists and mentors there.

Learning outcome: I summarize my learning outcomes as follows:
1) Experiencing the work life of one of the fine government research labs.
2) Getting introduced to the field of Machine and Deep Learning.
3) Getting well versed with Image Processing and Python.

Name: SUJAY PATNI (2019B3A70575P)

Student write-up

Short Summary of work done: We worked to create a texture classification pipeline using various datasets and implementing the model using different Filter Banks with various Machine and Deep Learning techniques. Then, we computed different filter and model parameters, and used various feature extraction and classification techniques to correctly classify images of standard datasets. The processes were able to achieve more than 98% accuracy for all the datasets except LFMD.

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. 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.

Learning outcome: I learnt about Machine Learning, Deep Learning, Programming in Python, Image Processing and CNNs during the 8 weeks.

Name: ANSHUMAN VERMA (2019B5A30710P)

Student Write-up

Short Summary of work done: Project Title: "Generating Synthetic Terahertz Images using Generative Adversarial Networks (GANs)"
Terahertz (THz) waves are harmless to humans and have no ionizing radiation, unlike X-ray machines. So, they can be used in security body scanners for effective security imaging of threat objects like scissors, blades, and so on (e.g., airports). However, due to the lack of Terahertz technology for generation and detection (THz gap), very few images are available to build automated security systems based on unsupervised machine learning algorithms that can detect threat objects on their own. Generating fake images that somewhat resemble these threat objects might be able to solve this problem.
My task was to produce these fake images using a deep-learning-based generative model, known as Generative Adversarial Network (GAN). I was provided with some terahertz images of a pair of scissors by my mentor. A GAN is a model that is made up of two competing neural networks known as the generator and the discriminator. I had developed CNNs for each of these. The loss function used was Binary Cross-Entropy loss and for Optimization, I had used the Adam Optimizer. At the end of my PS, I was able to provide satisfactory images of scissors.

PS-I experience: My PS-1 experience was really enriching, I learned a lot in these 2 months. My PS mentor and faculty mentor were very patient, helpful, and supportive.
I gained valuable insights into the working of a Research Organization and consider myself lucky to have had the opportunity of working in a CSIR lab.

Learning outcome: I learnt how to build Convolutional Neural networks from scratch, and the basics of Computer Vision. I also did a thorough literature review on THz Time Domain Spectroscopy and gained an insight into THz technology and its potential applications.
Deep Learning (libraries: Tensor flow, Keras, Pandas, Matplotlib, seaborn), Computer Vision (library: OpenCV) and Python for ML/DL.

PS-I station: CSIR-National Aerospace Laboratories (NAL) - VLSI Design / Circuit Design, Bengaluru

Student

Name: SHUBHAM KUMAR JHA (2019A8PS0395G)

Student write-up

Short summary of work done: I was working on the project 'Equivalent circuit modelling of radar absorbing structures' and the main goal of the project was to derive the equivalent circuit of a given FSS structure and verify the model with the help of simulations on CST and ADS.

PS-I experience: This PS-1 was remote, so there wasn't any physical in-person interaction. But overall it was a pleasant experience . My PS-1 station faculty guided us on how to pursue the project and had also helped us in times when needed help regarding the project.

Learning outcome: Learnt to use ADS and CST software.

Name: ARJUN TYAGI (2019A8PS0579G)

Student write-up

Short summary of work done: Frequency Selective Surfaces (FSSs) are thin, repetitive surfaces designed to reflect, transmit or absorb electromagnetic waves across a certain frequency range. While there are several accurate ways of analysing FSSs, the Equivalent Circuit Modelling method is often used for the analysis of the structures as it involves fewer calculations, especially for simple periodic shapes. This method involves replicating the FSS model into an equivalent RLC circuit, whose lumped RLC parameters can be derived from various methods like the Vector Fitting Method for instance. In this project, the aim is to ultimately derive the equivalent circuit model of the given FSS structure and further simulate the circuit along with the structure using Advanced design System (ADS) and CST Microwave Studio to match and verify the correctness of the equivalent circuit. Following the literature review, two different structures and their equivalent circuit models were simulated. A full wave simulation of the meta surface was done using CST Microwave Studio software and the equivalent circuit was simulated in ADS. After running the simulations, the graphs of S-Parameter vs Frequency were cross-verified. For the first structure[11], the CST and ADS graphs were found to be the same whereas for the second structure[12], the graphs were found to be similar but with minor deviations.

PS-I experience: Great experience. The interaction with the station mentor was very knowledgeable and I got to learn 2 new industry-standard software namely ADS and CST. Overall a very nice experience interning at CSIR-NAL.

Learning Outcome: 1. Studied and learnt about FSS 2. Learnt software like ADS and CST 3. Presentation skill was also improved.

Name: ETHIRAJA SAMPATH KUMARAN BALAJI (2019AAPS0194H)

Student write-up

Short summary of work done: A literature survey of Deep learning approaches in the area of Lower observable structures was done. We went through 15-20 research papers in the particular area and was asked to prepare a summary of each paper with goal of integrating all the above summaries into a larger review journal which could be submitted.

PS-I experience: The mentors from CSIR were very professional. They were crystal clear with their goals and tasks that were asked of us. Over all it was a pleasant experience.

Learning outcome: Understood how a literature survey is done. Also got to understand how a technology as revolutionary as Deep learning has immense scope in developing core engineering domains.

Name: SARVESH RAJESH GARGE (2019AAPS0233G)

Student write-up

Short summary of work done: In this project of Practice School 1, metamaterial based high performance antennas for aerospace application was explored through an extensive literature survey. Microstrip antenna being lighter in weight, low cost, low profile, smaller in dimension and having ease of fabrication and conformity was chosen as the basic antenna for design. Towards preliminary design the essential concepts of antenna theory and microstrip antennas were studied. This was followed by a detailed study on metamaterials and their usage in antenna design. In the later half of the project, a microstrip antenna was designed and simulated using feeding methods such as microstrip line feed and coaxial feed. A metamaterial with double circular ring structure was then inserted into the antenna as substrate/superstrate and their effect on properties such as S-parameters, VSWR, gain and efficiency were observed and compared to that without the metamaterial. The design and simulation of the antenna was done using CST Studio Software.

PS-I experience: PS-1 was extremely fruitful. With help of constant support from both the faculty and industry mentors, we were able to explore a new learning curve. This helped us dive deep into the field of antenna design and observe various minute details that improve their performance. The project was very well paced and helped us to make the most out of these 2 months.

Learning outcome: The requirements for an aerospace application antenna includes lightweight, small size, high gain and bandwidth. From the literature survey, the microstrip patch antenna was found to be the most popular choice for a miniaturized antenna, by far. However, many papers have highlighted the drawbacks of the conventional microstrip antenna, such as low gain and directivity, low radiation power, smaller size, etc. To enhance some of these properties as well as introduce other useful parameters, many novel methods have been researched. One such method is the use of metamaterials in order to enhance properties such as gain, directivity, bandwidth,etc. Based on all the papers read thus far and the application to use is for aerospace communication, it has been decided to design a microstrip patch antenna that operates in the Ku band of communication.

Name: YAPARALA THARUN (2019AAPS0328G)

Student write-up

Short summary of work done: I have worked on the project Antenna Radome Interaction. The project is about how the equipment which is required to assist the antenna in terms of environmental factors such as humidity, lightning, air friction etc.

PS-I experience: My PS-1 experience was wonderful. I have learnt how exactly should I work in front of officials and how to be punctual at work. I also have learnt how to be punctual at work like submitting before the deadlines and how to speak to the colleagues and higher officials. PS-1 helped me a lot about how can I improve my presentation skills which is quite useful when it comes to doing an actual job in future.

Learning outcome: I have learnt about the different types of antennas and radomes. I have learnt what are the exact specific equipment are used in the industry and which material is used for which. Also I have learnt the CST Microwave studio software which is essential for my project to perform simulations.

Name: NIKITHA KANNAN (2019B5A80760P)

Student Write-up

Short Summary of work done: The project was titled 'Metamaterial Based High Performance Antennas for Aerospace Platforms'. During the first month of PS-1, a literature survey was conducted on the work that is currently being done in the field. This included the various types of antennas, metamaterial, the properties of the antenna that were enhanced on introducing the MTM, softwares used for simulation etc. Post midsem, CST Studio was used to design an antenna operating in the Ku-band. A double circular ring metamaterial structure was introduced to it and relevant parameters were optimized. The results that were obtained from both the cases were compared and analyzed, and they largely matched the outcome expected from the literature survey.

PS-I experience: It was a good experience overall, especially since it was conducted online. From the college's side the evaluatives were managed well and on time. As for the work that was done, it was interesting and provided an insight into the field and the station as well. It was not very rushed or too time consuming, but there was a good amount of learning that was gained. It was well conducted, right from the basic terminologies used to finally designing an antenna.

Learning outcome: The major learning outcome was using CST Studio to design and model an antenna and being able to analyze the results and being able to draw conclusions from there. Other than that, how a literature survey is to be conducted and summaries written, writing a report, approaching the people in an industry, working as a team were all also learnt.

Name: ANAS KHAN (2019B5AA0896H)

Student write-up

Short summary of work done: My research project was regarding the study of Radome obstructions on Antenna performance. I researched about the lightning dielectric strips used in aircrafts and the modelling effects of the nose radome structures used in the aircrafts. We are also trying to design antenna with better efficiency and low attenuation of signals using the CST design software.

PS-I experience: It was a good experience. I came to know about the research areas of the scientists working in the National aerospace laboratories. instilled a lot of knowledge regarding the antenna and radomes used in the airborne structures.

Learning outcome: Developed some soft skills like communication and discussion with the help of the PS-1 group activities.

PS-I station: Domtech Robotics and Automation - Electrical Power Systems, Nashik

Student

Name: YASH DAMA (2019A3PS0319G)

Student write-up

Short summary of work done: Firstly I did research on different types of Electric Vehicle Chargers, on board and off board EV chargers, infrastructure and standardisation and finally different components of charger. Then we decided the final output of EV dash charger which is 50kW as it meets the need of most of the Electric cars. After that we divided charger into 3 main components based on circuit design and divided our group accordingly where I worked on rectifiers. Firstly I did research on different type of rectifiers and studied the circuit diagrams of IGBT, VFD, Grid synchronised rectifier and 3 phase Active rectifier. Then I learnt the Simulink Software and made circuit design of these rectifier with some changes and discussed it with CTO of DomTech. Then i tested the design by putting different variable input voltages and observing the output. Then we that decided that grid synchronous rectifier best suits our requirement. After this we combined all the different components and tested the final circuit design on simulink and achieved the desired output.

PS-I experience: My PS-1 experience was really good. I got to learn a lot things about EV dash chargers and it also helped me to improve my technical and soft skills. I also got to know a lot about working of companies and startups despite of lockdown situation.

Learning outcome: I learnt lot from this project. I learnt about circuit designs of EV chargers, rectifiers, power control unit, Simulink Software. It also helped me to improve

my time management, research, group coordination, discussion and presentation skills. It also gave me an insight of how companies and start-ups work.

Name: THANUGULA SHARAN (2019A3PS0423H)

Student write-up

Short summary of work done: we are asked to design and simulate an electric vehicle charger. We, a team of six, divided the charger into 3 sub-categories (rectifiers, DC-DC conversion and voltage regulation) and worked on them. We collected some research articles, went through some youtube tutorials and learnt some new things.

PS-I experience: It is a good experience overall.

Learning outcome: Understood the working principle of rectifiers and the basics of simulink.

Name: SNEHIL S KUMAR (2019B2A30985P)

Student write-up

Short summary of work done: We had a task of building an industry grade EV dash charger along with simulations and integration if the componenets.In this PS we learnt about the electronic circuits and simulating the circuit, component structuring and integration of electrical circuits and learnt about how the individual component works in EV Charger and the industry standards.

PS-I experience: I had a great experience in PS1 by getting to know a lot of stuff and interacting with people and learn a lot of stuff in the electronics domain.

Learning outcome: Gainied knowledge about electronics core and simulation design architecture along with developing my communication skills and bonding with my team and completing the project.

Name: ANUBHAV DHAL (2019B4A30757G)

Student write-up

Short summary of work done: Some initial literature reading was required(research) - Read Literature on EV battery, charging, sector, policy, govt schemes, charger design.
Product Design & Development - Designed a product (dc fast charger) that could meet the needs of the current & upcoming Electric Vehicles (cars mainly) in India. Divided the charger into 3 main components- Rectifier, Dc-Dc Converter Variable Dc supply & Relay. Designed the Circuits for each component.
Testing- We tested our circuit design with Simulink by running some simulations, we got the desired output results & graphs.

PS-I experience: It was good experience. Learnt some useful tools & also learnt how an early stage startup functions.

Learning outcome: 1) Improved communication skills 2) Learnt basics of circuit design 3) Learnt Simulink 4) Learnt about current market scenario for EV sector in India.

Name: BONDALAPATI VARUN (2019B4A80685H)

Student write-up

Short summary of work done: The project allotted to us was designing a DC Fast Charger for an Electric Vehicle. We gathered all the data about EVs, types of chargers, and most used type of charger at this point of time in India. We identified the key components of the EV Charger and started to learn about them. Following it up, we

decided the output of the charger and learnt about simulink which is a simulation software. In the end, we simulated the design which we prepared and submitted the simulation.

PS-I experience: It was really good experience.

Learning outcome: Got a decent information about work ethics and learnt MATLAB and Simulink.

PS-I station: Domtech Robotics and Automation - Embedded Systems / IoT, Nashik

Student

Name: PAVAN PRATHAPA SREEKIREDDY (2019AAPS1225H)

Student write-up

Short summary of work done: Initially, we started work on an IOT farm monitoring system with sensors for various important factors that a farmer will need. Later I shifted my focus to developing a Machine Learning model to detect disease and infection on plant leaves.

PS-I experience: It was overall pretty fun experience, both the BITS Professor and the PS mentors were constantly in touch providing guidance and tips.

Learning outcome: I learnt about various machine learning algorithms and basic image processing techniques along with soft skills like working as a team and how to behave in a professional environment.

Name: SHUBHAM CHANDRA (2019B2AA1111G)

Student write-up

Short summary of work done: Made a disease predictor for plant.

PS-I experience: Was really good made some strong contacts.

Learning outcome: Learnt CNN.

PS-I station: Domtech Robotics and Automation - VLSI Design / Circuit Design, Nashik

Student

Name: PAURUSH CHAUHAN (2019A8PS0453H)

Student write-up

Short summary of work done: Made a prototype of a water dispenser , it included all the the three department which are filtration, designing and electronics, the designing included a rough sketch ofa dispenser which could be used in the future.

PS-I experience: Before midsem it was difficult to be work on the project due to inexperience however once we we able to make some progress things started to click and we able to come up with a prototype.

Learning outcome: Got more im depth knowledge on how does the electronic components communicate with each other and was also able to learn how to use cad software, which very important in today's world.

Name: C. V. SHYAM RAHUL (2019A8PS0634H)

Student write-up

Short summary of work done: A prototype for a pay to use water dispenser was made by the team of which I am a part.

PS-I experience: It was a good learning experience. I was able to learn about concepts which were new to me. This was the first time I worked on project and the company knowing this was patient and understanding.

Learning outcome: I learnt about how to speak in group discussion, how to write in report and also I was able to learn new concepts such as Raspberry Pi, etc.

Name: JATIN CHOPRA (2019B1AA1090G)

Student write-up

Short summary of work done: The project allotted was to design a pay to use Water Dispenser that can be used in public places across the country which can refill plastic bottles.The purpose of the project is to eliminate the use the plastic water bottles, which are harmful for the environment, so as to reduce the plastic usage.The work was segregated into three parts: Filtration system, electronics system and designing of the dispenser. A circuit diagram was designed which highlights how the various components will be used. Along with this, two algorithms were made. The design of the machine was made using Fusion 360 and the filtration system was designed keeping all the government guidelines in mind.

PS-I experience: It was my first hands on experience in an industry and was quite informative. It was a good experience to do a project which will have an impact on our environment and society.

Learning outcome: We learnt how to work in a team, we had to do extensive research and then come up with feasible design and system. We understood how an industry functions.

Name: SHOBHIT GUPTA (2019B5AA1497H)

Student write-up

Short summary of work done: We tried to make water dispensing system from scratch.

PS-I experience: Nice experience.

Learning outcome: Learnt everything about 1) Filteration part 2) Designing part 3) Electronics part.

PS-I station: Dynamic Elecpower Pvt. Ltd., - Electrical Power Systems, Bhilwara

Student

Name: AADITEYA PRATAP SINGH RAWAT (2019A1PS0931P)

Student write-up

Short summary of work done: We were first taught basic concepts about generation, transmission and distribution of power in electric grids. Then we were shown around the factory in the form of virtual tour where we saw how electric panels and switchboards are manufactured. We also had quizzes, presentations and group discussions where we enhanced our communication skills required for the industry. We were also given projects

where we learnt how to code Arduino and 8051 microprocessors and use them in various applications for industrial and commercial purposes.

PS-I experience: I was honestly surprised by the difference in academic learning and industrial experience. There were so many things to learn and it was all about applying the concepts that you have learnt. It was really an eye opening experience and it prepared me well with what all would be expected of me when I get employed.

Learning outcome: Project based learning and the industry experience really provided me with an active approach to learning and making deliberate efforts to imbibe as much as possible. All the PS components have actively enhanced my skill set as it taught me how to have passion and dedication for my work and how to become self reliant and hardworking to meet the expectations and judgements of my peers and seniors. All the presentations and group discussions taught me the communication skills required in the industry and how we should research and prepare for interviews and questions. I will always remember and incorporate whatever I learnt into my life and all thanks to this learning experience.

PS-I station: Dynamic Elecpower Pvt. Ltd., - Industrial Control & Automation, Bhilwara

Student

Name: TEJAS SURESH (2019A3PS1119P)

Student write-up

Short summary of work done: Devised a home automation system using an Arduino microcontroller. Demonstrated and coded the same.

PS-I experience: Pretty informative.

Learning outcome: Arduino and the basics of power systems.

Name: PRINCE PANJA (2019A8PS0503G)

Student write-up

Short summary of work done: We started off with an introduction to electrical machines. Since, it was online most of our work revolved around making presentations. We were given separate projects but physical demonstration was not necessary so it was more likely a research project. Collecting information about several components proved to be the central focus of the project. My project was based on the topic- protection of electrical equipments from undervoltage and overvoltage. I focused on using comparators and timers to measure any voltage fluctuation which surpassed the ideal limits of voltage.

PS-I experience: I learnt lot about industrial equipments related to protection / control systems. It would have been much better to get an offline / hands-on experience but we had to make the best out of the covid situation.

Learning outcome: When working in an industry, punctuality and professionalism are two very important qualities.

Name: PAURUSH PUNYASHEEL (2019B4A30184G)

Student write-up

Short summary of work done: Did a project designed for auto-intensity control of LED based street lights that uses solar power from photovoltaic cells. A charge controller circuit is used to control the charging of the battery, along with photoresistor (LDR) circuit to detect the ambient lighting. LED lights are the future of lighting, because of their low energy consumption and long life they are fast replacing conventional lights world over. An Arduino Uno development board is used to provide different intensities of LEDs at different times of the night / day using PWM technique. The data is displayed on 16X2 LCD interfaced to Arduino as user interface.

PS-I experience: Had classes regarding electronic devices and machines used in transmission lines. Good learning experience. The projects gave good practical experience.

Learning outcome: Learnt about electrical machines and Arduino development board.

PS-I station: E-Connect Solutions Pvt. Ltd - Embedded Systems / IoT , Udaipur

Student

Name: ANANYA KUMAR DAS (2019A7PS0001H)

Student write-up

Short summary of work done: The project aimed to develop conversational chatbot that can interact with user and collect various data from or give information to the user. The project had been developed as part of larger project under E-connect solutions, which aims to redress consumer grievances. The project consisted of four major phases of development: understanding the problem, research on how the problem could be solved efficiently, interaction model design and finally, developing a prototype. We used cxhatbot frameworks, RASA and Pytorch to develop the bot and MySql as database for the bot.

PS-I experience: My PS-I experience was great. It gave exposure to professional environment and industry requiremnents related to IT. It also had presentations, seminars and group discussions which could help improve one's soft skills.

Learning outcome: I learnt about industry grade chatbot frameworks i.e., RASA and Pytorch. Also learnt about various pipelines which were used to train ML data.

Name: DAMARGIDDA ROHAN RAJ GOUD (2019A7PS0065P)

Student write-up

Short summary of work done: Retrieval of data from Facebook using Facebook graph API. Also using Facebook SDK for Python, I made the API calls using jupyter notebook without having to explicitly use the Graph API explorer everytime we need to query. I have used Pandas as well for data manipulation, analysis and cleaning.

PS-I experience: It was good industry experience and also had great mentor.

Learning outcome: I learnt the concept of POC, worked on both web scraping and data integration using APIs. Understood the limitations of graph API having worked on it extensively and also observed that the documentation of the graph API wasn't adequate. Hence, I had to rely on various blogs, articles to get the work done. Having been part of the team, I had good experience collaborating with my friends. Also, I could see the importance of division of work among the team, which made our work more effective.

Name: ABHIRATH ANUPAM JOSHI (2019A7PS1136P)

Student write-up

Short summary of work done: For PS-I, I worked alongside ESPL's business team to satisfy government contract for state-wide E-Governance solution to grievance redressal. The project is aimed at creating a machine learning model for Citizen Relationship Management (CRM) software for grievance redressal. The project uses aspect-based sentiment analysis and multi-label classification of unstructured text (Posts, Articles, Feed Updates, etc.) collected from social media platforms (such as Facebook and Twitter) and map them with their respective complaint subject, area and department. The mapping results would help the administration to escalate the problem to their respective departments and work towards addressing the problem. The admin would interact with the developed machine learning (ML) model using an application programming interface (API) created in Flask which would take input via web scraping and/or data integration and analyze the data using the developed ML model. This, in turn, will convert the unstructured data into actionable intel and allow for better governance. The project will be pitched to the respective state government for use and be made publicly available for its citizens as platform for grievances and escalation of requests to enable quicker action from the authorities.

PS-I experience: I learnt lot working with an organization which works on government contracts to create an impact in the society by providing end-to-end solutions to popular problems. I was given the reigns to carry-out new system for E-Governance which would shorten the duration and improve the efficiency of the grievance redressal pipeline for particular state. It was challenging eight weeks long project but the experience I gained while working on the problem statement along with their in-house technical and business team is invaluable. Furthermore, I was able to deliver the problem statement and create an efficient solution to the problem. The outcome of my work impressed the station mentor and I was offered position of software developer intern at their organization to continue my work on a stipend basis.

Learning outcome: With this project, I did not only acquired industry-ready experience in NLP modelling and data engineering but also created an impact by contributing to improving the grievance redressal pipeline of a state by providing state-of-the-art E-Governance solution for tracking, evaluating and automating the process.

Name: IPSHEET AGARWAL (2019A8PS0399P)

Student write-up

Short summary of work done: During PS-1, our task was to create chatbot that would interact with users and help them in complaint registration process. We were able to create chatbot that used deep learning to -
a) Identify the intent of the user based on input.
b) Identify the subject and department user complaint belongs to
We also worked to create complaint database.The chatbot could retrieve existing info from database and also add new info based on user needs.
e.g. the chatbot could tell the status of complaint from database and also add reminder to complaints in database. We learnt about, researched and used the following in the project
1) Python Programming Language
2) Understanding of ML, Deep Learning and Natural Language Processing.
3) Use of various Python libraries e.g. NLTK, Numpy, Py,Torch
4) Frameworks to build the chatbot e g. Dialogflow RASA
5) Databse management system

PS-I experience: During PS-1, our industry mentor had goal but we didn't know how to approach the problem exactly. So as a result, I explored vast number of topics like deep

learning, DBMS, Natural Language Processing, backend web development, artificial intelligence,etc., in pursuit of finding solution. Although, it took most of my PS time, I was able to find an approach from the knowledge I gained. Finally, I was able to make successful working model.

Learning outcome: 1) I explored lot of domains in software development and got good idea about them.
2) I got an experience to real industry working environment.
3) I learnt how to systematically find solution for problem at hand.
4) I learnt how to write mails and messages that are professional to communicate formally within the industry.

PS-I station: Edutech Learning Solutions Pvt. Ltd., Vadodara

Student

Name: DIVYANSH SHARMA (2019A4PS0753G)

Student write-up

Short summary of work done: The project on which I was working upon was to build a face recognition model for security systems that can be used in real time. For few weeks in the beginning, I was asked to learn the basic concepts required and research on technologies that are being used in today's time.

PS-I experience: It was an amusing experience. My mentor as well as my faculty in-charge were very supporting and considerate. It was very pleasing time working with the company.

Learning outcome: The most important thing that I learnt is how to work in real company environment with deadlines on head. I learnt several new things within this PS-1 span. Working with libraries like Tensorflow, Keras and OpenCV, etc. The PS-1 has great learning environment and one can learn great deal of things.

Name: DEVANSH SHARMA (2019B5A30895G)

Student write-up

Short summary of work done: I made a program which can detect and classify vehicles in an image or video in real time using YOLOV4, darknet and OpenCV. It can detect 8 classes of vehicles. YOLOv4 is deep learning based object detection algorithm. Darknet is an open source neural network framework written in C and CUDA. It serves as the base for YOLOV4. OpenCV is an open source computer vision and machine learning software library. It supports multiple languages such as C++, Python, etc. I trained my model in Google Colab on 15326 images for total of 16000 iterations.

PS-I experience: PS-1 provided the opportunity to explore new fields that I have been wanting to do since long. My project was not very big and it was individual, so I was able to set my own deadlines for work. This also allowed me to spend more time in learning the required skills for my project in detail. Also my PS faculty and Industry mentor were very supporting and provided constructive feedback and help whenever required.

Learning outcome: I learnt new skills such as Git, Git-LFS, Machine Learning, Deep Learning and Computer Vision Development skills. I also improved my report writing skills and soft skills.

PS-I station: EFY Group - Embedded Systems / IoT, New delhi

Student

Name: REDDYGARI SAI SARAN REDDY (2019AAPS0191G)

Student write-up

Short summary of work done: My work was to verify the working of Do It Yourself (DIY) kind of project and after successfully verifying the project I need to make video of steps followed while doing the project.

PS-I experience: Overall, it was very good experience working on different projects. It would have been better if it was offline as the equipment required for the project would be readily available at the station. Due to current pandemic situation, I was required to order equipment online and there was too much delay in deliveries and in this way lot of time got wasted.

Learning outcome: I learnt how to work on various IoT equipment. I learnt about the process which would be done by the magazine companies before publishing the articles. I have improved my technical and soft skills.

PS-I station: Electronics Corporation of India Limited - VLSI Design / Circuit Design, Hyderabad

Student

Name: MEHTA JEMIN MEHUL (2019A3PS0470G)

Student write-up

Short summary of work done: My project was modelling and simulation of an electromechanical system using MATLAB Simulink. The electromechanical system was separately excited armature controlled DC motor. The practical model of the motor (which includes the rotational mechanical parameters) with and without load was modelled and simulated. The final part of the project involved position control of the DC motor which was done with the help of PI controller and negative feedback system. The modelling part was done in the S domain. Graphs were obtained for the variation of the different motor parameters such as torque, current, angular velocity, etc were also obtained.

PS-I experience: My working experience with the company was great. Both my mentors were very helpful and made sure that work was going on smoothly. I mostly interacted with industry mentor via mail and we had a meet scheduled weekly. This project helped me put my theoretical knowledge into work and overall it was nice experience.

Learning outcome: 1) Learnt about how to model and simulate any type of system on Simulink.

2) Soft skills such as how to give presentation, write a project report, formal communication, etc.

Name: RISHABH ANIL KESTE (2019A8PS1021G)

Student write-up

Short summary of work done: Worked on NUCON PLCs for high speed automation, and within that, my work was mainly under signal and power integrity. Aim of the project was to interface an NXP semiconductor processor with Micron Technology DDR SDRAM. Most of my work was understating how to connect the pin out diagram on ANSYS SIwave and recommend trace length matching and termination strategies to maintain signal integrity.

PS-I experience: The experience was amazing. ECIL being a government agency, all 15 of us registered were given separate projects based on our strengths and weaknesses. The quality of work is also at par with the market, as ECIL has regular customers like BARC, ISRO. Since it was online, there were communication gaps, but if conducted offline, it'll definitely be worthy station in my opinion.

Learning outcome: I was able to apply my theory into practice, learnt some important industry tools and was able to gauge what the future might hold.

Name: GHANTA MANIDEEP (2019AAPS0228H)

Student write-up

Short summary of work done: Design and simulation of stabilization algorithm for SATCOM on the Move antenna for ground vehicles and ships.

PS-I experience: Mentors were very supportive, promoted self-learning and helped if any doubts or difficulties were faced during the project.

Learning outcome: Understood the working of professional industries and refine communication skills to project formal appearance.

Name: ABHAY SHRIRAM (2019AAPS0282H)

Student write-up

Short summary of work done: I was assigned a project titled 'Man-pack IED Jammer'. For the duration of the project, the following tasks were completed,
a) Studied and made document on sweep jamming
b) Studied and made document on components of jammer
c) Presentation on direct digital synthesis
c) Modeling of power amplifier module using AWR software

PS-I experience: My two -months, interning at ECIL as part of my PS-1 was very fruitful and great learning experience. Apart from learning new concepts, it was also great hands-on experience of working in an industry and I am sure that I will put this experience to good use in future.

Learning outcome: For the duration of these two months, I learnt great deal of concepts on RF signals, their generation, jamming implementations and their characteristics, also I familiarized myself with AWR software. Apart from technical aspect, I also learnt great deal of soft skills such as presenting ones ideas, group discussion and writing formal emails.

Name: SIDDHARTHÂ CHOUDHARY (2019B1A80197P)

Student write-up

Short summary of work done: I worked on the project titled "Development of Indigenous Under Vehicle Surveillance System" during the Practice School period. My project focused on learning and understanding the working of various electronic instruments and sensors (Induction Loop Detectors, Relay Interface modules, Under Vehicle plate etc.) installed in the Under Vehicle Surveillance Systems. Additionally, I worked with the OpenCV library tools on Python to learn image processing techniques used during Under Vehicle Surveillance. During the project, I learnt image stitching using OpenCV to create single panoramic image of vehicle's underbelly from multiple photographs in sequence.

PS-I experience: Although the idea of 'Work From Home" during the Practice School seemed a bit intimidating at first. I got adjusted with time and had decent number of interactions with my PS mentors. This PS-1 was my first ever internship, and even though online, I gained lot of industry exposure during this period. The PS mentors were very well aware of the problems associated with an online mode and were supportive throughout the time.

Learning outcome: I got in-depth knowledge about Security systems, Sensors, Relay modules, Cameras and Image processing techniques. I also worked on my programming skills in Python. Additionally, I got chance to work upon my soft skills, thanks to the regular group discussions and presentations during the PS period.

Name: PURVI SINGH (2019B2A30991G)

Student write-up

Short summary of work done: Power systems are affected drastically by the power quality at input mains due to large applications of converters, making it crucial to improve the output DC mains. The project mainly focused on comprehensive study and comparative analysis of different 230V AC, 50Hz to 28V DC converter configurations in isolation and also information on control strategies, selection of components and design considerations, performance evaluation, power quality considerations and selection criteria.

PS-I experience: I learnt lot of things on my own. The PS faculty mentor was there to guide us throughout the PS journey and was very cooperative too.

Learning outcome: I learnt great deal about different aspects of the core electronics industry. Got my hands on some critical working tools and learnt professional documentation of my work. Made significant advancement in my social and soft skills through constant coordination and peer learning.

Name: PRABHAT KUMAR MISHRA (2019B2A80225P)

Student write-up

Short summary of work done: I carried out my work on socket programming and keyboard interfacing. I wrote program for TCP communication using microcontroller for sending and receiving the data through Ethernet communication. Thereafter, I did my work on keyboard interfacing.

PS-I experience: I believe PS serves as good starting point for students to gain industry's necessary exposure, allowing them to experience real-world applications and ongoing research developments in their respective fields.

Learning outcome: I learnt about network programming, use of socket for inter-process communication between hosts where sockets act as the endpoint of the inter-process communication.

Name: ANIMESH GUPTA (2019B3AA0588H)

Student write-up

Short summary of work done: Earth station antennas need to point in the direction of the satellite to be able to send and receive signals. For this purpose, the Azimuth and elevation coordinate system is used to correctly position the antenna. My project explains the theory behind this system and how the coordinates are calculated. Furthermore, the literature describes how rotations are carried out in the real world using gimbals, the limitations of this mechanism and possible solution using quaternions.

PS-I experience: Decent experience.

Learning outcome: Learnt many interesting topics in Math, how to properly present research material and write good report.

PS-I station: Electrono Solutions – App / AR / VR, Bangalore

Student

Name: V. MANOHAR (2019A3PS0359H)

Student write-up

Short summary of work done: We were required to develop web application using Python and Mongodb. The application included login / sign-up page and facility to add various machines and their parameters, spare parts, etc.

PS-I experience: Good learning experience.

Learning outcome: Helped in improving presentation skills and learnt front-end development and use of Flask for web development.

Name: SHAIK SAHIL AHMED (2019A7PS0059P)

Student write-up

Short summary of work done: We made website in which we can login and add details of machines and their parts and get their status (operating, idle, emergency) in pictorial representation and get the graph of each machine's status over time.

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

Learning outcome: I've learnt html, css, react, bootstrap, bit of nodejs.

Name: KETAN RAUT (2019A7PS0150G)

Student write-up

Short summary of work done: We were introduced with industrial revolution 4.0 and sdlc.Then we were asked to prepare a login page, I belonged to team Python. So, we used Flask and Mongo db to create webpage. Backend was done with HTML and CSS along with node JS. Then, we were asked to prepare a system which showed machine ID, name, expiry date and power, etc. There, we were suppose to show different machine parts by different colours and show them as active or inactive. User was allowed to login as normal user or admin. Admins were allowed to add or delete machines. We had our normal quizzes and group discussion which involved discussion with mentor and also asking questions to other mates. We were also asked to prepare final end sem report on whatever we did throughout PS1 and submit it on PSMS.

PS-I experience: I really appreciate the time and efforts BITS took to organise PS1. I learnt many things and also improved my communication skills. Overall, my experience was good.

Learning outcome: Learnt web development involving Flask and HTML.

Name: PINDIPROLI SRI HARSHA (2019A8PS0565H)

Student write-up

Short summary of work done: The aim of the project was to create web application which allows user to login / register and then monitor the condition of machines. Created

the registration and login pages. User can register by providing appropriate details of the first name, last name, valid Email ID, valid phone number, department, user-role (user / admin), password. Both Email ID, phone number are used for authentication. The information provided by the user is stored in MongoDB. Login is done with single step authentication using Email. Created a Dashboard to showcase various machines and its subparts. The machines are color coded to display the status of each and every machine. Users, admin both can access the information of machines like temperature, rotating speed etc. and can also add new machines and new subparts. The dashboard displays information like machine condition, machine efficiency etc. at regular intervals of time. Admin had special priority over controlling the dashboard. Admin can remove un-authorized users, can remove un-necessary machines and subparts, can also access sensitive information of machines. Worked in Bootstrap framework using HTML, CSS, JS for front-end development of web page. MongoDB is NoSQL data-base used for the project. Used Flask framework in Python for back-end development, Jinja framework for machine layout tables, CanvasJS for machine simulations.

PS-I experience: Good working experience. Able to configure how real time applications were made.

Learning outcome: Acquired knowledge in web application development. I acquired skills like writing report and giving presentation. Improved my communication skills.

Name: SNIGDHA SINHA (2019AAPS1224H)

Student write-up

Short summary of work done: Built web application to view machine status and parameters using MongoDB, ASP.NET (C#) and HTML / CSS. We constructed web application with user registration / login page and machine master page to view machine status and parameters.

PS-I experience: PS-1 was great learning experience. Despite being online, the program was well structured for the most part and we were able to complete it on time.

Learning outcome: Through this experience, I got the opportunity to improve my soft skills and also learnt how to work as part of team. This project helped me learn more in

depth about web application development. I was also able to see how theoretical knowledge from the classroom translates into real world applications.

Name: RUCHIR RAJ (2019B5AA0778H)

Student write-up

Short summary of work done: We made sample login / registration website and small site to monitor machine in given simulation. We did it using Asp.net and bit of Ajax for CRUD operations.

PS-I experience: Good experience.

Learning outcome: Learnt bit about web development and win services.

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

Student

Name: MICHEAL ATOM (2019A3PS0009P)

Student write-up

Short summary of work done: My project at Electrono Solutions is on comparison of different battery types for Electric vehicles. I studied about the battery chemistry basics, electric vehicle specifications and gather various parameters about battery. A thorough understanding of battery and electric vehicle was done with the help of various research article and websites. Then, I moved on to MATLAB / SIMULINK and design a model for charging and discharging of various battery chemistry. Using the model, different batteries

were run and obtained the simulation results. Along with the data collected, the various batteries were compared.

PS-I experience: I would say that my PS-1 experience is good. Luckily I got a project I wanted . Various new things are added to my knowledge bank. Everything went well till the end. I felt it was good opportunity.

Learning outcome: I learnt many new things. As for technical skills, I learnt using MATLAB / SIMULINK software. Apart from this, I got grasp of how an internship looks like, the industry mentor interaction. The seminars and group discussions were insightful. The commitment requirements were good for professional to learn.

Name: ADITYA KRISHNA GUPTA (2019A3PS0338G)

Student write-up

Short summary of work done: Started working on the UI/UX development project, but switched to machine data analysis with Elasticsearch, Kibana.

PS-I experience: Good

Learning outcome: Learnt new tech stack and would use it in upcoming projects.

Name: RATHI ADITYA RAJESH (2019A3PS0444G)

Student write-up

Short summary of work done: Our task was to migrate their existing MongoDB database to elasticsearch and develop dashboard for machine data analysis using

Kibana. Kibana is free open-source tool use for visualising data. It provides various functionalities like pie chart, bar chart, tag cloud etc, we can drag and drop fields of our table to plot chart and graphs. It is fast and easy to use. While devloping dashboard, we learnt basics of user interface / user experience (ui / ux), machine data and role data plays in buliding great projects.

PS-I experience: It was good experience overall. It was my first industrial exposure and I got to know how industries work and built products. While doing PS, I also learnt soft skills like group discussion, presentation etc.

Learning outcome: Elasticsearch, Kibana, UI/UX, SQL, GIT.

Name: RACHIT GUPTA (2019A3PS0466G)

Student write-up

Short summary of work done: In this project, I started by focusing on the Indian market, collecting data on Indian battery and motor manufacturers. I gathered information about different motors and their specifications. Two problem statements were formulated to help compare electric motors. I spoke about working of induction, DC and BLDC motors, followed by control methods used to operate these motors. A MATLAB / Simulink simulation was done for BLDC motors about their back EMF, commutation logic, phase voltages and currents. I conclude with the inferences from my work and future use of the data gathered.

PS-I experience: It was very good learning opportunity, despite the fact that I wanted to do something in embedded systems or VLSI.

Learning outcome: I learnt lot about electric motors and batteries and was finally able to start learning MATLAB and Simulink.

Name: AYUSH KUMAR (2019A8PS0281P)

Student write-up

Short summary of work done: Build an app using ML/AI to predict the remaining useful life of fleet of engines.

PS-I experience: Learnt lot from the industry mentor and instructor as well.

Learning outcome: Was new to MATLAB and learnt quite much in the 2 months.

Name: BANKURU SRIKANTH (2019AAPS0216H)

Student write-up

Short summary of work done: I worked on DBMS using MongoDB in PS-1. The database management system is about managing the raw information into meaningful data. The database will store all the data; retrieving and modifying this data using software through commands is DBMS. MongoDB is the NO SQL and document-oriented database that stores information in the JSON format. It retrieves the data in unstructured form and can process data in any format (Ex: Media, Text, Binary). Built architecture for ticket searching solutions (Red Bus), commodity management solution integration (oil and gold purchasing), Content Management (Instagram, Facebook), Payment Management System (Gpay, phonepe, Paytm), Catalog Management (Amazon, Flipkart). I implemented some commands in MongoDB prompt for sample data. Connected MongoDB to studio3T and started data manipulation from data downloaded from Kaggle. Used Python as a driver for writing commands in Pymongo software. Ran commands like find, insert, sort, bulk, count, aggregate, group, match, index, the context for retrieving Netflix titles with the project was ended.

PS-I experience: It is good experience starting the PS omenta allotted the projects according to the area in which we possess the interest. The project helped me lot with my further assistance in my career. The knowledge I gained in this PS1 project will help me in the future projects which I'm going to attend. The mentor helped us to move forward in the project. So we completed the project with getting complete knowledge.

Learning outcome: I learnt technical skills like Python, Mongo DB. Modify data using Pymongo. Non-technical skills like presenting seminar and participating in group discussions helped me analyze topic, improving leadership qualities. Managing workload in a short period is the most important accept I learnt in this practice session.

Name: VENIGALLA RAVI TEJA (2019AAPS0232H)

Student write-up

Short summary of work done: Worked on project "Motor analysis for EVs." Collected the information about various motors making an initial surface comparison of different motors in the Indian market. Then compared different electric bicycles available in India and came up with problem statement to find which motor is best and reliable for electrical city commute and mountain bicycles. Using mathematical analysis, it concluded that DC motors or BLDC motors with Li-Ion batteries are the most suitable. Simulated the two motors on MATLAB and Simulink, providing an in-depth description of their work.

PS-I experience: I had regular sessions with my mentor. He helped to set targets and constantly persevere to achieve them on time. Through his help, I gained better understanding of the technology used in electric vehicles.

Learning outcome: I got to know about various specifications of different motors, studied which motor is suitable. Using mathematical analysis, it has been concluded that DC motors or BLDC motors with Li-Ion batteries are the most convenient. Then finally, I got to know how to simulate in Matlab and Simulink.

Name: ADITYA TOMAR (2019B4A80767G)

Student write-up

Short summary of work done: A project on database management (DBMS) using MongoDB software, worked on database of the company which contained information

about their products being consumed in a span of 1 year and details about their consumers, project included implementing aggregation pipelines on the database and analysing their previous data to know the progress made and used data science method, predictive analytics, statistical technique to predict future outcomes of their products.

PS-I experience: It was my first experience working in the field. My mentor and instructor regularly helped me in my project and were always there in need. Overall, it was very great experience.

Learning outcome: It was my first major project in DBMS, I realised more that how much necessary databases are for industries and how to work on critical aspects of these databases.

PS-I station: Electrono Solutions - Embedded Systems / IoT, Bangalore

Student

Name: ARYAN BALYAN (2019A8PS0193P)

Student write-up

Short summary of work done: Learnt use of MongoDB and how to connect it with other platforms to retrieve and store data. Used Python and Matlab to create data points and plotting the final graphs.

PS-I experience: Good learning experience.

Learning outcome: Learnt basic MongoDB usage and to certain extent time management skills.

Name: MOHAMMED ADNAN Y (2019A8PS0579H)

Student write-up

Short summary of work done: I read few research papers on the Internet of Things and its industrial, organizational and infrastructural applications. IoT refers to a system of interrelated, internet-connected objects that can collect and transfer data over wireless network without human intervention. So, databases are required to handle this massive amount of data and process them efficiently. The database we have been working with is MongoDB, as it is faster and easier for developers to build IoT applications. Also, learnt various tools and commands in MongoDB and performed manipulation tasks on it. I have been working with MongoDB and related applications to solve the critical challenges to deal with the main task, which is production dashboard data simulation. The project assigned mainly focuses on databases and the manipulation of the data. The production dashboard deals with data and displays the data insights in an organized graphical form for production optimization. The assigned tasks deal with reading and writing in MongoDB to generate sine wave based on the samples generated in real-time, which are discussed below.

PS-I experience: In this project, I learnt to work with MongoDB and its applications. And using the commands and features provided by MongoDB to manipulate a massive amount of data. As the organization of these data is essential to generate the required insights and patterns in the data. Starting from the basic Create, Read, Update and Delete operations to generate a sine wave using real-time data samples was great learning experience. Each task assigned pushed us further beyond the challenges and difficulties faced. This knowledge of MongoDB operations and functions can be used to simulate the necessary patterns utilizing database, which is the vital objective of working in the production dashboard.

Learning outcome: Learnt MongoDB.

Name: UDITÂ AGRAWAL (2019A8PS0814P)

Student write-up

Short summary of work done: We were supposed to make gauge data simulator and in the process have to learn few things. So, we learnt Mongodb to hold data points initially and then do the same in real time while plotting the points in real time.

PS-I experience: Good learning experience.

Learning outcome: Gauge data simulation and MongoDB.

Name: RAJAMURI SREE SANTH REDDY (2019AAPS0214H)

Student write-up

Short summary of work done: My project was "Tool life data source simulation", where I have to simulate the data. So, as part of this project I have worked on MongoDB where I can store and simulate data. Also for some tasks, I used MATLAB and PYTHON to connect to MongoDB to import and export data. Using MATLAB, I have created samples data of sine wave into csv file and imported them into MongoDB. I used PYTHON to connect to my MongoDB server to import and retrieve data in real time using PYMONGO.

PS-I experience: The PS 1 station allotted to me was (Electrono Solutions). The overall experience was good. The mentors were supportive and coordinative in all aspects. I was satisfied with the station allotted to me. Orientation was well organized and helped me understand the structure of the organization. Instructor allotted to us was very helpful cleared our doubts time to time. Overall, I recommend this station strongly to my juniors.

Learning outcome: The PS I project gave me an opportunity to enhance my communication skills overall. I learnt how to use MongoDB which is very good database in modern times. Improved my team work and presentation skills.

Name: RAHUL PETER (2019AAPS0230G)

Student write-up

Short summary of work done: We started learning few commands in mongoDB and using it to store and retrieve dummy data. Then, we were assigned tasks for generating a sine wave and then storing and retrieving the samples using mongoDB cloud and then plotting the graph in excel. The later task was to do the above mentioned task in real time. This was done in addition to the usual quizzes and Group Discussions that took place during the course of PS-1.

PS-I experience: It was just little satisfactory with respect to learning of the field of IoT and data handling using the cloud.

Learning outcome: Few commands in MongoDB, the significance of data management in IoT was learnt. Learnt about using Python libraries in MongoDB and using it to store and retrieve data in real time.

Name: YASH RAJ MISHRA (2019B5A30645P)

Student write-up

Short summary of work done: Learnt about database, MongoDB and CRUD operations in it and it's real time integration with PyMongo in Python with MongoDB. Analysis of time required for real time functionality on various platforms to decide best possible environment to work with MongoDB.

PS-I experience: Provides you an overview of IoT.

Learning outcome: Database = MongoDB (CRUD operations), Real Time integration in IoT.

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

Student

Name: ISHAAN SARNA (2019A8PS0388P)

Student write-up

Short summary of work done: I was tasked with creating level shifter PCBs using optocouplers and electromechanical relays separately.

PS-I experience: It was a good experience as I got to see how the work happens in professional electronics industry and was in contact with industry specialists.

Learning outcome: I was able to get a better idea of instrumentation engg. and of how everything works in a professional setting.

Name: SRIMAN SRIDHAR (2019A8PS0662G)

Student write-up

Short summary of work done: In the 1st week of PS1 at electrono solutions, we were divided into subgroups based on the field of work. I worked in the datasheet sub-group. In the 1st few weeks, I studied various datasheets of humidity sensor and proximity sensor. After doing some amount of research, I came up with the right sensor which would suit the application and specifications of the industrial perpose. In the 3rd and 4th weeks, we were introduced to a software called LabVIEW, which is used by many automation industries accross the world. Its a great software for design, testing and implemntation of automated systems. we were initially introduced to some basic funtions and daily tasks in LabVIEW to get a good hold over the software. In the last 2 weeks of PS we were given some basic projects to be implemented on labVIEW such as modelling traffic signal.

PS-I experience: My experience, working in electrono solutions was not soo great. Even though i was very eager to learn and implement differnt projects, the company mentor didnt show much interest in providing us with the right work or knowladge. Infact, the mentor didnt even show up for meetings in the last 2 weeks of the PS. we were only given daily tasks which were very basic. we didnt get to work on any dedicated project which

the company is working on, nor did were get the opportuity to work on a project ourself. On a whole, apart from being introduced to LabVIEW, there was no much learinig as an instrumentation engineering intern at electrono solutions. I would like to specially mention PS incharge from pilani campus for taking time out of his busy schedule to take leactures and teach us some key concepts in instrumentation. he gave us a great learning experience and i really appreciate his efforts.

Learning outcome: It was intresting to learn, interface and simulate the sensor on simulation softwares like tinkercad. being introducedd to LabVIEW and getting a good hold over it, was really helpful as it is a much neededd software for any instrimentaion engineer. Apart form the techinal learnings, I aslo had the oppotunity to develop my soft skills. I learnt how to present my ideas and work, professionally, in front of a group of people. The report writing helped me brush up and tune my report writing skills.

Name: SANSKAR JAIN (2019AAPS0333G)

Student write-up

Short summary of work done: Testing Documents for Industrial Components and system design software- LabVIEW.

PS-I experience: Good learning experience.

Learning outcome: Interfacing, simulation and documentation.

Name: NAMAN MEHTA (2019B2A80981P)

Student write-up

Short summary of work done: My action field was Hardware Documentation. Documentation is maintained, so that organizations can explain the costumers or other people in the organization about the product or a service provided by the company. It includes explaining the product, its components, testing procedures, circuit diagrams, etc. I did the same for the company.

PS-I experience: My experience with the company was fine and I learned the importance of documentation and how to make one.

Learning outcome: I learnt the importance of documentation, why they are still required, and how to make them by compiling different types of information about the product (including circuit designing, datasheet of components, testing procedures, bill of materials, etc.). Also, since I am a dualite and had no experience regarding my B.E. degree, the lectures by PS faculty about basics of Instrumentation, sensors, etc. helped me a lot and they are going to useful in my future years.

Name: ANGEL MARIA BABY (2019B2A80997P)

Student write-up

Short summary of work done: The project was to design a hardware assembly for two dimensional positioning system.For the same a work integrated learning experience was followed. Initial phase of ps included research and detailed stufy of different hardware components which were later used in design implementation.

PS-I experience: PS1 was god experience.The industry offered a work integrated learning platform. It would have been better if project details were disclosed beforehand.

Learning outcome: Gained experience in designing a hardware compliment placements diagram and preparation of hardware documents.

Name: SATVIK SINGH (2019B5A80894G)

Student write-up

Short summary of work done: At Electrono Solutions, I was a member of the Test Documentation sub-team which was a part of the IC&A team. Test Documentation is an important part of a electrical products datasheet, this part of the datasheet helps a user in testing whether the product is working properly or not. I Test Documented various industrial components such as Temperature sensors and motors. Also, I simulated the circuit of these components on the online simulation software called TinkerCad.
Second major part of the project was LabVIEW software. Laboratory Virtual Instrument Engineering Workbench is a system-design platform and development environment for a visual programming language from National Instruments. I created various programs on LabVIEW using different types functional palettes (arithmetic, arrays, logical, cluster, IO, etc.) available in the software.

PS-I experience: PS-1 helped me to gain industrial experience that is essential for a student for my professional growth. The overall experience was very good and unique too. It gave me a golden opportunity to interact with some industrial experts and mentors. I was a able to learn a lot from my mentor and I plan to enhance my skills based on the things I learned through this Internship.

Learning outcome: Working on my project helped me to enhance various types of skills. I learnt the importance of Datasheet and test procedures of various industrial Components. I can use this knowledge in further personal projects related to industrial electrical components. PS-1 also helped me to gain interpersonal ,presentation as well as communication skills through Group Discussions and Seminars conducted in this time period. Working on Labview helped me to enhance technical as well as analytical skills as well.

PS-I station: Indian Society for Education and Environment, Chennai

Student

Name: RAJOLI SUDHESHNA (2019A8PS0548H)

Student write-up

Short summary of work done: In this station we have been instructed to chose a topic and do research on the taken issue and to submit an article.

PS-I experience: I had a very good experience during the due course and the feedback given by our course coordinators is helpful for doing better work.

Learning outcome: I learnt how to do a proper research and also to write an article. The minute details which are to be taken care during a research and also writing an article.

Name: ANTO FELIX IMMANUEL (2019AAPS0012G)

Student write-up

Short summary of work done: The main aim was to learn about the steps involved in writing and publishing a research article. Starting with identification of a research problem, literature review, research objective, methodology, results and discussion and the conclusion. We were asked to write a research article on a topic relevant to our locality by following the steps as taught by the mentors. In addition to this, other important aspects of article publishing such as the role of the research forum, the importance of peer review and avoiding plagiarism were also discussed along with guest lectures from different industry experts on different fields related to engineering and research.

PS-I experience: The PS-1 experience was good overall, it was paced well and the work assigned ensured that we apply what was taught while simultaneously not being stressful.

Learning outcome: Learnt how to write and publish a research article with proper reference citations, how to peer review an article and use a research forum.

Name: ANTO FELIX IMMANUEL (2019AAPS0012G)

Student write-up

Short summary of work done: Learnt about the steps that go into writing a research article: formulating a research problem, literature survey, research objective, methodology, results and discussion, conclusion. Also learnt about peer review, plagiarism and importance of research forums.

PS-I experience: It was good experience, learnt about different aspects of research. The work assigned every week ensured application of what was done in the lectures while simultaneously not being too stressful.

Learning outcome: Learnt about the research process, writing and publishing a research article.

Name: PRADYUT KUMAR (2019B1A80943P)

Student write-up

Short summary of work done: The station inspired us to focus on research problems in our surroundings. I worked on the alternate uses of rice stubble in the neighbouring states of Delhi to reduce the air pollution that happens in the winter due to their burning. I devised a novel rice stubble insulation system with help from the course coordinators that will help in reducing pollution and building affordable housings. The 7 tasks were divided on the individual components of a research article from research problem identification, to conclusion. Each sub-part was given as a separate task, to be fulfilled by a given deadline. Once the research problem was identified, a thorough literature review was conducted followed by a survey of existing methodologies of testing the thermal conductivity of insulating materials. A simulation was then conducted to calculate the thermal conductivity of the rice stubble insulation system and its results were discussed. Finally the conclusion pointed out the research gaps and extent of research in the field for the future. Additional 4 tasks were allotted to compilation of a research article, analysis of three research forums, peer review and a plagiarism check.

PS-I experience: The PS experience was very enriching. As a research oriented person myself, the station proved of immense value as they are India's first research forum. They broke down the various aspects of a research paper into individual tasks for better understanding and learning. The faculty-in-charge also kept constant updates with us through email, WhatsApp group and the evaluation components.

Learning outcome: I learnt the various aspect of a research paper. The steps involved in publishing a research article and the importance of research forums for amplification of one's work. Through special guest lectures, I also learnt about the various job opportunities research as a career present in India.

Name: AKSHAT SHISODIA (2019B5A30280G)

Student write-up

Short summary of work done: Wrote a research paper on Intelligent Traffic Lights and their implementation in Bangalore. Learned about the different aspects of a research paper and their significance. Also learned about the topics of Peer Review and Plagiarism.

PS-I experience: Enjoyed working with the course instructors and mentors. Received a lot of assistance when needed and greatly furthered my understanding of research.

Learning outcome: Learnt about the intricacies involved with writing and publishing research work.

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

Student

Name: ARSH KUMBHAT (2019A1PS0444P)

Student write-up

Short summary of work done: I have worked on the design and simulation of a heat exchanger for the removal of decay heat from radioactive waste storage tanks by natural convection as my project that I had received from IGCAR. The work primarily focused on obtaining temperature profiles of the heat exchanger fluids using a simulation software. The simulation software I chose was COMSOL Multiphysics. I had to learn the basics of working on COMSOL and go through heat transfer specific modules of the COMSOL documentation in order to come up with a solution for the project. Apart from the actual project, my time was spent preparing for the seminars and project reports describing the work I had done during the PS-I.

PS-I experience: My PS-I experience was decent, and it would have been better had the PS-I been in an offline mode. The project allotment took place quite late, almost 3-4 weeks into the PS-I because the research lab IGCAR was not able to remain fully active due to COVID restrictions. However, we were kept engaged by our PS-I faculty mentors for some amount of the time for those 3-4 weeks. We were also addressed by the Group Director of IGCAR which was an insightful talk. For those 3-4 weeks, I worked on developing my skills related to fields I had an interest for, that helped me use my time to its full potential. After the project had been allotted, I began my work immediately and remained in touch with my IGCAR mentor. The research work done for the project allowed me to learn a completely new software and get acquainted with the world of simulation and modelling. The instructor at IGCAR was extremely helpful and would try to sort out any problems that I had during the project. The PS-I experience allowed me to add a decent research level project to my profile and gave me the opportunity to work at an establishment I would have not worked at otherwise.

Learning outcome: Most of the learning outcome was through working on the project, I learnt a completely new software and also used the concepts I had learnt in my Chemical Engineering courses taught in my 2nd year at BITS Pilani on a practical project. Staying in frequent touch with my IGCAR mentor gave me an insight on how an industrial project works.

Name: HARSH SOLANKI (2019A1PS0670P)

Student write-up

Short summary of work done: PS-I project was titled "FISSION GAS RELEASE MODELS FOR MIXED OXIDE FUELS DURING OPERATING TRANSIENTS". The main objective of the project was the analysis of various computational models for release of gaseous fission products from mixed oxide (MOX) nuclear fuel. My project needed knowledge regarding various process like fuel pin assembly and restructuring of nuclear fuel. Later, comparative analysis of steady state fission release and transient release was done.

PS-I experience: PS-I provided a platform for me to work with industry experts, to view on-going research and the liberty to work at a comfortable pace. Overall, it was a great experience.

Learning outcome: Got to know various mechanisms of fission gas release and how restructuring of nuclear fuel take place.

Name: SANSKAR PATHAK (2019A2PS1414H)

Student write-up

Short summary of work done: Service life prediction models play an important role for reinforced concrete structures as they help predict how long a structure might remain operational. Thus, for assessing the serviceability of concrete structures or elements, end-of-life should be defined. In reinforced concrete buildings or structures chloride ingress is the main cause of degradation especially in coastal areas as it can potentially damage the reinforcements present inside the structures. Hence, I completed a literature review around the topic and prepared a simple code based on the Andrade's model.

PS-I experience: So far, doing different courses and acquiring different software skills has been an incredibly enriching experience but the actual implementation of these skills had been lacking. Hence, by the medium of PS-1, I was able to explore the possibilities of how these concepts and skills can be successfully applied in various industries. It was a wonderful experience to learn and understand how work is carried out in IGCAR.

Learning outcome: After the project, I understood a lot about different parameters that were important for the model and also got to know about the chloride diffusion coefficient and different models implemented for this purpose. As an added bonus, I was also able to improve my coding skills.

Name: TANNA DEVANSH PIYUSH (2019A3PS0158P)

Student write-up

Short summary of work done: Our project was to develop the SCADA (Supervisory control and data acquisition) control screens for Analytical Robot used in Reprocessing Plants at IGCAR. Analytical Robot will perform sampling and mixing of Radio active chemicals, so we require minimal human interaction. We used Movicon 11.5 software, which comes with its own library for different tool-boxes, communication drivers, database systems. We had to make screens using its components like rectangles, edit-box display, switches, regulators. After that, we tested this screen by using Software Defined Modbus TCP/IP Client to check it can work with actual PLCs (Programmable logic controller).

PS-I experience: Firstly, I was expecting project related to Electronics but I got project in totally different domain and we got projects by two and half weeks after starting date, but our mentors were very responsive to our queries, and they provided enough tutorials and other materials to proceed with. We had daily meetings with our mentor, and got to learn so much from them. We had a nice experience with working on a totally different project than our curriculum.

Learning outcome: I learnt about SCADA system which used at almost every industries. I also gained some some experience in soft-skills like writing technical project report, giving presentation about project, having a group discussions.

Name: PRABHAV SHAH (2019A3PS0200P)

Student write-up

Short summary of work done: My project was related to Heat Transfer. I firstly read about Heat Transfer methods and then started working on actual problem given. COMSOL Software was to be used to make the model and analyze it. Most of the work was on COMSOL software.

PS-I experience: It was a good experience to learn about different field.

Learning outcome: I learnt how to use COMSOL software. I learnt about heat transfer mechanisms.

Name: KUNAL (2019A3PS0229P)

Student write-up

Short summary of work done: I and my colleague was asked to build a interactive gui application for windows to extract all the features from response vs time graph of sensors and then use dimension reduction techniques on it.

PS-I experience: My PS-1 experience was overall very informative. My mentor for this project was always there to help in any problem which I faced in my project. Also, after the PS also valuable advice was given to me so that I do not repeat any mistake.

Learning outcome: First of all communication skills get a huge boost due to presentation and group discussions that we have. Secondly I got to learn many things about application bilding in Python. Also, I learnt about sensors in my project.

Name: SANYAM SHAH (2019A3PS0287P)

Student write-up

Short summary of work done: Computer vision and image processing have evolved from being topics of academic interest to becoming essential tools for modern life. The recent growth of these fields may be attributed to the availability of computational resources, the ready availability of image data and the intersection with areas of artificial intelligence. In the current project, the potential applications of computer vision to the study of microscopic images is explored, with relevance to modern research in materials science and engineering. Microscopic images of materials, also called microstructures, occupy a central place in current materials research efforts. These microstructures are complex images with a multitude of features which greatly influence the properties of materials. The traditional approach to microstructural studies is human-centric and dependent on qualitative observations. On the other hand, a machine-centric, quantitative effort is envisaged in the current work, in order to achieve greater automation, efficiency and precision. Towards this, the current project includes elements of image classification and feature identification in different microstructures, followed by improved measurement methods, and concludes with the development of data-driven approaches to achieve these objectives.

PS-I experience: It was great experience. My mentor was really supportive, understanding and open to my queries any time of the day. His feedback was also very informative.

Learning outcome: Learnt about various concepts of Image processing and Feature Recognition and how to apply them in Python. Also learnt concepts of Machine learning like SVM and CNN.

Name: MANUJA GEETAGYA SANDEEP (2019A3PS0303P)

Student write-up

Short summary of work done: Design and development of a multi-factor authentication system for Linux based operating system.

PS-I experience: It was good experience.

Learning outcome: Technical skills: Linux, GitHub, Android Dev.

Soft skills: Effective communication with peers and mentors, public speaking.

Name: YUVAM KULKARNI (2019A4PS0171P)

Student write-up

Short summary of work done: Objective of the project was to study the Effects of Defects on Hexagonal Duct (Wrapper) on the Life and Performance of a Fuel Subassembly(SA) used in the Fast Breeder Reactor(FBR) at IGCAR. It involved Finite Element Analysis (FEA) of Cracks on the wrapper due to Physical Handling damages of the SA in and out of the core, and Irradiation effects on the Fuel SA. A number of different cracks were simulated and analyzed for the stress, strains and deformations produced to study the decrease in the life of the Fuel SA. An overall approach to study the design and construction of the Fuel SA, as well as related assemblies like the Blanket SA were done alongside the in depth working of the LMFBR reactor developed at IGCAR.

PS-I experience: PS1 at IGCAR has been an amazing experience. Despite being an online mode of PS, it was a great learning experience and gave me a chance to apply the knowledge of Solid Mechanics in a practical Nuclear Reactor based problem statement. Overall the mentors ensured a smooth experience with regular updates on the project.

Learning outcome: Working of a LMFBR, Finite Element Analysis (FEA) using Ansys.

Name: VIVAAN GANDHI (2019A4PS0208G)

Student write-up

Short summary of work done: For future FBRs, spherical header and primary pipe assembly are major components that need to be designed to withstand pressure of the liquid sodium flowing through it. Fillet shoulders will be used at the junction of the spherical

header and primary pipes so I have done a parametric study on the effect of fillet radius on the stress concentrations at those junctions and provided a design recommendation.

PS-I experience: I did not have any prior significant experience of Finite Element Analysis but throughout this tenure I learnt lot about Static structural modelling and simulation. I have got exposure to softwares like Ansys, SpaceClaim, CATIA and worked on it to solve an industry level project. My Industry mentors were really helpful and guided me patiently throughout my internship.

Learning outcome: Softwares like ANSYS and SpaceClaim, soft skills, time management.

Name: PRATHEEK RANJAN MITRA (2019A4PS0273P)

Student write-up

Short summary of work done: My project was titled "Estimation of failure load of crimped plug of FBR fuel pin". The fuel for a nuclear reactor is placed in long metal tubes known as fuel pins. The lower portion of a fuel pin consists of a plenum space to accommodate the fission gases below the fuel column placed in the upper portion. The crimping on the clad, which is the outer casing of the fuel rod, restricts the middle plug to slide through and ensures that the fuel column remains supported. However, the assembly could fail when the middle plug slips through the clad or when the clad ruptures due to high stresses. Hence, there is a necessity to estimate the maximum load which the assembly can handle safely to ensure that such failures do not occur during operation. The CAD of the clad-middle plug interface is created in Autodesk Fusion 360. A 2-D axisymmetric analysis would lead to lesser computational time, and hence a 2-D CAD consisting of the clad and the middle plug as surface bodies is created. Once completed, the CAD is exported to ANSYS Workbench to carry out the FEA simulation. Materials are assigned to the geometry, and meshing and boundary conditions are applied. Once the simulation is complete, a grid sensitivity analysis is done to verify mesh independency. Lastly, the FEA results are validated by comparing them to analytical calculations based on the concepts of Strength of Materials, and they are found to be in good agreement.

PS-I experience: My PS-1 experience was quite enjoyable. Despite the online mode, I was able to use my resources efficiently and was quite productive as most of my work involved Literature review and Simulations. Moreover, my mentor was helpful and guided me at every stage of the project.

Learning outcome: Through this project, I dwelled more into Computer-Aided Design and Finite Element Analysis, which were my fields of interest. I got to know more about the exact procedure of conducting an FEA simulation from start to finish and how the results of a simulation should be validated before they can be applied to the real world. Apart from the technical skills gained during this time, I developed some other valuable skills, such as time management and critical thinking, which would prove to be extremely useful in the long run.

Name: ISHU KUMAR (2019A4PS0495P)

Student write-up

Short summary of work done: The project given to me was - Flow-induced vibration (FIV) study for inlet Ar (argon) pipe in a periscope under given design temperature and pressure. I was given the design of the periscope, where key elements were – Optical tube, Xenon arc lamps, end supports and flexible hoses. The operating temperature of Xenon arc lamps was 150 degrees Celsius and they heat up during use. So, to maintain them under operating temperature, a cooling system is used. The flexible hoses, the end supports for the hoses and the coolant (argon gas) form this cooling system. Earlier, metal (corrugated) hoses are under use, and now, the use of silicon flexible hoses is proposed. When the coolant passes through the flexible hose at high speed (~35 m/s) (because of the space constraints, area of pipe has limitation), there occur flow induced vibrations in the flexible hose. So, I had to find the frequency and amplitude of these vibrations, and the reaction forces on the end supports. I also had to discuss the effect of several parameters on the vibrations, namely – length of hose, wall thickness of hose and outer diameter of hose. In the end, I suggested some ways to reduce these vibrations. One major achievement was determining the exact geometry of free flexible hose between the end supports.

PS-I experience: Once we received our project, we had lots to do - learning the required software, doing lots of literature survey and communicating with our project guide. So, there can be some big takeaways from PS-I, if one keeps looking for them.

Learning outcome: I came to know a bit about IGCAR. I've understood the topic of FIV. I've also learnt somewhat about ANSYS. Besides this, I've grown my soft skills. Taking

the GDs, seminar with PS faculty and especially the final seminar with IGCAR scientist, I do have come out more confident now.

Name: AQSHAT SETH (2019A4PS0660H)

Student write-up

Short summary of work done: My Project was on the Analysis of Surface Defects on a metal Rod using Machine Vision. The Project entailed coming up with a design of a system which can be used to scan the entire surface of the rod in the most efficient manner. After this, the specifications and the design aspects of these components were investigated. This included looking at the orientation of the camera, the lighting conditions, the motors to be used, the sensors which would act like a trigger for the camera etc. Finally sample images were taken and MATLAB was sued to perform Image processing on them in order to look for defects. The Image was converted in to a grayscale image and then binarized for easy detection of defects. After this edge detection and blob analysis were performed to clearly see pits, cracks, bumps or other deformities on the surface of the rod. Thus, an efficient and accurate system for the detection of defects on the surface of a metal rod was created using the project.

PS-I experience: My PS experience was quite fruitful. We had amazing mentors who guided us through every step of the process. And despite PS-1 taking place in an online semester, we had little difficulty adapting and ensured that our project did not suffer as a result. While it would have been an amazing experience to work on the project offline, I still believe that we had an amazing session overall.

Learning outcome: We learnt -
1) Camera Design and Specifications
2) Affects of Lighting on image quality
3) Using a stepper motor
4) MATLAB for Image Processing
5) Soft Skills such as communicating using just online means

Name: VISHAL KUMAR N K (2019A4PS0693H)

Student write-up

Short summary of work done: The project assigned to me was "Binder Jet Additive Manufacturing(BJ-AM) process to fabricate yttria cup/lid: Feasibility study to achieve desired part quality". A literature survey was carried out in the beginning. The principles, steps and applications of BJ-AM process were understood based on the information gathered. This was followed by studying the key factors affecting the BJ-AM process (for example, powder, binder, equipment, post-treatment process and other binder jetting printing parameters) and how these factors affect the final part quality, roughness, strength, etc. The study provided recommendations on how the raw materials should be chosen and the optimal value of various parameters. Defects like shrinkage were studied and appropriate allowances were given to the green part(part obtained after 3-D printing is done). Finally, methods for analysis and testing were proposed to evaluate the quality of final part.

PS-I experience: The experience was great. I got to interact with highly knowledgeable scientists and understood how research works in an institute like IGCAR. Their guidance and key inputs helped me keep pace with the project. The online atmosphere was new, which opened doors for new ways of interaction and learning. The scientists and PS faculty ensured that the experience would be light-hearted and enjoyable.

Learning outcome: I got to learn a lot about Binder Jet Additive Manufacturing process. I learnt how research work is carried out in eminent institutions like IGCAR. The presentations during the course helped me improve my presentation skills and made me more confident while speaking.

Name: KUNAL GUPTA (2019A4PS0823P)

Student write-up

Short summary of work done: My project was thermal analysis of heat exchangers with different convolute expansion bellows and the design optimization. I was supposed to create CAD models of the heat exchangers with and without bellows and determine which structures underwent more stresses. I used APDL (Ansys Parametric Design Language) to create the modelling to be able to perform finite element analysis on them. I created

two types of models: a heat exchanger without a bellow and a heat exchanger with a bellow. Later, thermal fatigue and stress intensity analyses were performed which revealed that the designs with bellows had much lesser magnitudes of stress.

PS-I experience: It was really great learning opportunity for me. I learnt about software handling, finite element analysis and modelling on APDL among many other things. My mentors were extremely helpful and cooperative. Their willingness to help enabled me to finish off the project on time. They would regularly hold meets whenever I required, they would encourage me to call them anytime even on weekends so that I didn't face any confusion. I really learnt lot about India's nuclear program and the state of the art technology they incorporate at IGCAR. All in all, I believe it was a push in the right direction by my university to let me work under IGCAR.

Learning outcome: I learnt about the work carried out at IGCAR. I got hands on experience on the software used for thermal fatigue analysis. Literature survey, time management and speaking skills are among the many other things I gained during this experience.

Name: BALABHADRA KRISHNA CHAITANYA (2019A4PS1500H)

Student write-up

Short summary of work done: The project title was to "Design a ventilation system for proposed new microstructural characterization facility in Phase-IIB, RML complex". RML phase-IIB was constructed to enhance the PIE capabilities of RML by adding lead cells for mechanical testing of specimens extracted from irradiated fuel and structural materials. Polished surfaces of the metallographic specimens made out of carbide and metallic fuel materials get oxidized easily in the presence of air. Therefore, the parameters like gas environment, pressure, temperature and humidity inside the lead cell stainless steel containment boxes of the facilities have to be precisely controlled for the post-irradiation examination (PIE) of reactive fuel and structural material samples. The activities involved in the project work are: Heat and mass flow calculations for the SFMAC operating room air-conditioning system and design of sub-systems such as ducting, piping, control system to maintain desired pressure inside the lead cell containment boxes with respect to the operating room and to establish required flow through these containment boxes.

PS-I experience: I learnt many new things in PS-1. I was able to work in the core engineering domain and gained hands-on experience while doing real-world application. Each project was supervised by an IGCAR instructor who was an expert in the project domain. My mentor provided me with a good amount of resources to understand the principles and basics of the topic. He is very cooperative, conducted regular meets to clarify my doubts and asked for project updates. Overall, I learnt how the engineering community works and how things are developed from scratch. Our PS faculty were very helpful and responded quickly if we had any queries.

Learning outcome: Learnt how to perform simulations in Ansys. Learnt how the ventilation system is designed for laboratories also how radioactive materials are handled in a nuclear facility. The project has transference and relevance with the courses like Applied Thermodynamics and Fluid Mechanics. I also improved my soft skills and interaction skills through group discussions and seminars.

Name: UDAY SINGLA (2019A7B50023P)

Student write-up

Short summary of work done: I was allotted a group project "Design and Development of a Multi-factor Authentication Mechanism for Linux Operating System". With the COVID-19 induced lockdown conditions, administrators of IGCAR computer systems were forced to work from home. Their servers used the traditional access method – Secure Shell (SSH). Though it was able to provide security up to a level, the same could be greatly enhanced by introducing a second factor of authentication. In this project, we explored and implemented a secure second factor of authentication mechanism that could be used along with the standard SSH based access to a computer server running CentOS 7 operating system. We chose to implement a time-based one-time password to act as the second layer. We had to configure both the server side code and the client side mobile application in a way that was unique for IGCAR.

PS-I experience: I had an amazing experience at IGCAR. After the initial delay in the allotment of projects, the journey ahead was smooth. I was allotted a team project in the domain of Computer Science. The problem statement was easy to understand but I had no idea in which direction to proceed. My mentor from IGCAR was very helpful and provided me with the necessary tools to get started with the project. We had frequent video calls and exchanged emails whenever I was stuck on a problem, he was always there to help me out. The project was open ended in the sense that I had the flexibility to

choose what frameworks and open source tools I wanted to use. One thing that felt tedious at that time, but in retrospect, was very helpful was writing out reports. I realized the importance of documenting every step of the project. It helps in bringing clarity about the current state of the project and also helps in planning the path ahead in a structured manner. The problem statement that I worked on will have real impact on the IGCAR servers, and I feel that I was able to contribute meaningfully to it. I would have loved to have an offline PS1 at IGCAR, but I feel that the experience I had was good enough in the online mode.

Learning outcome: The broad learning outcome was to figure out how user authentication works. I learnt about Secure Shell (SSH) and various encryption schemes used for storing passwords and secure communication over an unsecure network. I also understood the underlying mechanisms for time-based one-time passwords and HMAC-based one-time passwords. I discovered techniques for hardening a server and adding multiple layers of security. Since, we had to prepare a client-side mobile application for generating TOTPs, I learnt the basics of Flutter and was able to build a demo mobile application to be used by IGCAR scientists. Apart from that, writing frequent reports and documenting every step of the journey was an integral part of PS1 at IGCAR, which is a useful skill to acquire.

Name: GAUTAM BHAMBHANI (2019A7PS0101P)

Student write-up

Short summary of work done: The project allotted to me was "Development of a VC application to conduct one-to-one VC meetings using WebRTC protocol". In the first week of my Practice School, I learnt about the WebRTC protocol, how it works, and its documentation. I also learned about the JavaScript APIs of WebRTC and created a demo application for the same. Then I researched and came to a final decision about the tech stack that I should use. I used React.js for creating the Client-Side User Interface of my application, The Express framework for creating the server application, Socket.io for dealing with Web Sockets and the client to server communication, and lastly PeerJS library for creating a peer server that enables group video / audio calls. Since, the state of my application was too complex, I even used Redux paired with React for state management to remove the process of passing on props from components to components. I started by writing the server-side and then moved on to writing the client-side code as well as creating a user-friendly UI for my application. I also deployed the website on Heroku Overall I learned a lot about web development.

PS-I experience: Overall, the PS-1 experience was positive. Despite the fact that it was a work-from-home PS, the flow of the PS and evaluation components were not affected. The project's quality was satisfactory. I also had the opportunity to work with a fantastic mentor who assisted me in learning vital project information and guided me through the PS-1.

Learning outcome: I learnt lot of concepts of web development. Technologies and framework that I learnt about and used are ReactJS and Redux (For Client Side Code), ExpressJS (for Server Side development), Socket.io (for Web Sockets) and PeerJS for enabling group VC.

Name: ADWAIT SUDHIR KULKARNI (2019A7PS0120G)

Student write-up

Short summary of work done: Project: Integrated Web Portal and Information System for deployed WSN Networks IGCAR has many sensors in its campus, whose data is collected with their WSN networks. I was tasked with building a website to show the sensors in a Map view with the list of sensors present at that location.

PS-I experience: Good learning experience.

Learning outcome: JavaScript, React, Node.js, Express and MongoDB.

Name: VEDANG AGARWAL (2019AAPS0267G)

Student write-up

Short summary of work done: Design and development of low level signal Amplifier for level-leak sensor output, with three port isolation.

PS-I experience: Good learning experience.

Learning outcome: I learnt little few things only, as I didn't have too much time to work on my project.

Name: GOVIND R SEKHAR . (2019AAPS0270H)

Student write-up

Short summary of work done: Design a circuit and make the PCB layout in the standard format for an analog electronics based pure AC sinusoidal current signal source with frequency varying from 100Hz to 20 kHz, to apply across a load varying from 0 to 200 ohms, with 0-200 mA AC current.

PS-I experience: The project assignment started out a bit late as the centre was affected by COVID and was working on 30% of its full capacity but after the project allotment, the work was interesting and done without any hiccups. The project introduced me into the work that goes into designing an analog electronics based system and the amount of testing needed to get a satisfactory result.

Learning outcome: PS-1 was definitely a learning experience for me personally. Keeping regular goals for the week and completing them helped me come out as a much more organised person. I also got the opportunity to see how the research and electronics industry works and got more insight to the problems and difficulties of the research world. The whole process was smooth from both BITS side and the station side.

Name: SHRIKRISHNA LOLLA (2019AAPS0345H)

Student write-up

Short summary of work done: The project alloted to me was a verification task. I had to develop a verification method and test a TCP/IP stack used in embedded devices in IGCAR. It was to be testeed against standard RFCs (791,792,793,826,5681) and IEEE 802.3. The project involved learning HDL languages - VHDL and System Verilog. It also involved reading basics of networking. Studying the verification methodology (UVM - Universal Verification methodology) was challenging as there were no beginner friendly resources available. To be frank, the project has a very diverse nature and covers several fields to considerable depth. The project reached the stage of testing on EMAC controllers and small IP cores. Due to lack of time, I could not get working on the TCP/IP stack but I did reach a few of the objectives of the project.

PS-I experience: PS-1 was a unique experience for me. It gave me a taste of the role of a verification engineer in an industry. The project domain was entirely new to me and it seemed to be a daunting task. However, as the weeks went by, I grew comfortable with the topics and was able to understand the true essence of the project. Working with scientists from one of the top organisations of the country was truly a memorable experience.

Learning outcome: The project exposed me to the overlaps between the designing and testing phase of several components and embedded devices. I learnt basic HDL programming, verification and several concepts of networking. Besides technical knowledge, I developed my soft skills. Communication, in these hard times, was a major challenege as my mentor and I could only interact via emails and occassional phone calls. Report writing and presentations were the other tasks that I grew comfortable with during this practice school. In the end, it was a memorable experience.

Name: NIKHIL SAINI (2019B1A30875P)

Student write-up

Short summary of work done: The project was titled "Development of a secured messaging app with VoIP support for Android". In this we had to develop an app for IGCAR to be used for internal communcations among the scientists. The app was made using Kotlin in Android Studio and used Matrix protocol at the backend for end-to-end encryption and high reliability.

PS-I experience: First good learning experience.

Learning outcome: Learnt Android development, Kotlin language, Matrix protocol and WebRTC. Made a working messaging app by the end of PS.

Name: ANUSHKA JAIN (2019B1A70904P)

Student write-up

Short summary of work done: We were allocated project on app development, we made a messaging app on android studio using Kotlin. The objective of the project is to develop a prototype Android application for secured messaging and audio / video calls based on Matrix and WebRTC protocols. Matrix is an open standard for interoperable, decentralized, real-time communication over IP. WebRTC is a free, open- source project providing web browsers and mobile applications with real- time communication via simple application programming interfaces. The student has to build the android application based on some open source Matrix client application.

PS-I experience: The experience of the PS-1 was very good. Our mentor was very helping and helped us in every possible way to overcome the challenges we faced while developing the app.

Learning outcome: We learnt many things while making the app. First a complete new language Kotlin. Then working with android studio and creating activities on it. like this by watching tutorials on you tube and following leads from the codes of similar existing apps we made our own app on android studio.

Name: GANDE AKSHAY KUMAR (2019B3A30647H)

Student write-up

Short summary of work done: The work allotted to me was design and development of low level signal Amplifier for level-leak sensor output, with three port isolation. The projects were allotted to us after 3 weeks of the start of PS1. We need to learn about the various types of amplifiers and make an amplifier circuit that could amplify an input voltage of 0-100mV to the range of 0-10V and attach a rectifier and so on.

PS-I experience: Good learning experience.

Learning outcome: I learnt using the softwares like Proteus and EasyEDA. I was able to learn some basics of electronics.

Name: SAHIL GUPTA (2019B3A70154P)

Student write-up

Short summary of work done: I was tasked with creating an android application to access the IGCAR webmail. For this, we used Centos 7, after which my scientific officer and I downloaded several packages necessary for construction of the web server. These included apache, alpine, postfix, dovecot, mariaDB and roundcube. We had to connect the MTA (mail transfer agent) to the user database (constructed on MariaDB). Once that was done, emails could be exchanged locally. Due to shortage of time, we were unable to connect the web server to an android mobile, but we successfully completed the creation of the webserver locally.

PS-I experience: It was great. My scientific officer was very helpful. Due to the constraints of online education, communication was a bit delayed between us, but we completed the work we set out to do.

Learning outcome: I learnt the workings of a simple email server, how to download and work on a virtual machine and create a simple email sever using postfix, roundcube, mariaDB and dovecot.

Name: RITU CHANDNA (2019B4A70667P)

Student write-up

Short summary of work done: My project revolved around defining the effective temperature and forming an expression of energy density for non-uniform temperature distributions and nanoparticle ensemble. From the expression of single temperature Planck's law, we derived an expression for a multi-segment Planck's law, where each segment volume and temperature were fixed and the total volume is fixed. We derived an expression of energy density, assuming continuous (well behaved analytic functions) variations of temperature along X-axis, keeping Y and Z variations constant. Finally we derived an expression for effective temperature for an ensemble of nanoparticles, treating them as a collection of blackbodies at varied temperature, where their total volume is constant.

PS-I experience: The overall experience of the PS-1 was good. There was a lot to learn as while solving the mathematical equations I had to also understand the physics involved in the background. Frequent report writing helped in gaining clarity about the project objectives, progress and possible improvements in the approach. The mentor assigned was very helpful, be it providing guidelines, explaining basic physics concepts or improvising the reports and presentations.

Learning outcome: Participating in group discussions and communicating with mentors helped me improve my soft skills and gain a sense of confidence. The frequent report submissions helped improve my report writing skills and also made me realise the importance of writing frequent reports. I learnt how to plot graphs and perform integration using python modules. Seeing the practical application of the theoretical knowledge deepened my interest in my field of study.

Name: SUJAY RASTOGI (2019B4A70741P)

Student write-up

Short summary of work done: The project explored the potential applications of computer vision to the study of microscopic images with relevance to modern research in materials science and engineering. Microscopic images of materials also called microstructures, occupy central place in current materials research efforts. These microstructures are complex images with multitude of features which greatly influence the properties of materials. The traditional approach to microstructural studies is human-centric and dependent on qualitative observations. On the other hand, machine-centric, quantitative effort is envisaged in the project in order to achieve greater automation, efficiency and precision. Towards this, the work done includes elements of image classification and feature identification in different microstructures, followed by improved measurement methods and concludes with the development of data-driven approaches to achieve these objectives.

PS-I experience: I was allotted project of my choice. My mentor was really helpful and put in lot of effort to make me and my partner comfortable with the technical details of material science before guiding us in implementing it. Further, some seminars were also held and I found them to be helpful.

Learning outcome: The evaluative components improved my presentation and report writing skills. On the technical front, I improved my knowledge of Python. I was able to work with numpy, pandas, matplotlib, seaborn, sklearn, skimage, pil and opencv libraries. The project also introduced me to the topics of Image Processing and Computer Vision.

Name: BHARATH VARIAR (2019B5A70930H)

Student write-up

Short summary of work done: My project was analyze and design a tracked mobile robot for inspection purposes inside the Prototype Fast Breeder Reactor (PFBR) which is currently being made in Kalpakkam. For the first few weeks, I conducted thorough literature review on the work done in the field of wall climbing robots and the methods they used to perform their tasks. In the latter half of the project timeline, I worked on conducting a force and torque analysis for the different motions to be carried out by the robot.

PS-I experience: I had very good communication channel with my industry mentor and he helped me lot with my understandin of project domain that was completely new to me.

Learning outcome: I learnt how to do real world analysis for the force calculations of robot movements. I also learnt operational basics of SolidWorks to explore the field of robotics. Lastly, I also refined my research, report making and communication skills while working with this prestigious organization.

Name: ANISH MUKUND MANDYAM (2019B5A71064H)

Student write-up

Short summary of work done: My project was research based project on designing argon purification column bed. Literature survey of the basics of fluid mechanics and chemical kinetics for reactor design, inert atmosphere glove boxes and their purification, temperature swing adsorption and its analysis were done. Theoretical calculations on some important quantities of the adsorption column were also carried out.

PS-I experience: Good experience. Learnt lot about carrying out research. Developed communication skills and learnt the importance of documentation while carrying out research work. Enlightening to work under scientist.

Learning outcome: Learnt the principles of fluid dynamics and chemical kinetics. Basics of COMSOL and other open source tools for TSA analysis. Process of carrying out research and documenting it.

Name: JASLEEN KAUR BHEORA (2019A2PS0840P)

Student write-up

Short summary of work done: The project assigned to me was deriving a conversion model to assess in situ strength of concrete structures using the test result data shared

by industry mentor. After the projects were allotted, I had to study document carefully and understand the entire process to derive a conversion model. My industry mentor provided me with the test result data which was to be used to arrive at conversion model. I was able to complete my project beforetime and submitted detailed report to my mentor.

PS-I experience: It was nice experience overall but the online mode of PS 1 offered some constraints in gaining hands on experience of working in an industry.

Learning outcome: The project assigned to me helped me in correlating concepts that I learnt during the coursework and also helped me to comprehend actual industrial data.

Name: GEETANSH HARESH MEHTA (2019A8PS0400P)

Student write-up

Short summary of work done: I had to design and develop a micro controller based embedded system to interface mitutoyo digimatic indicator with computer for creep, fatigue studies. The project required Mitutoyo Digimatic Indicator so I needed to learn MikroC programming for PIC microcontroller and PCB design on EASYEDA software that I learnt through online tutorials and videos. But due to lack of required equipment in a work from scenario and the instruments available around, an arduino based temperature sensor and Python based GUI was created as well. Filling up diaries, making multiple reports and presentations was also part of the project.

PS-I experience: The internship mostly included completing the graded evaluatives along with some project work. The mentor just gave tasks to complete on different softwares which were learnt online. And updates were taken near the deadline.

Learning outcome: I learnt about various softwares and equipment used in the industry. Reading research papers, writing reports and I also developed my soft skills.

Name: NIKUL JAIN (2019A8PS0412P)

Student write-up

Short summary of work done: Electronics core project based on analog electronics. To develop an amplifier to measure radiation due to ultra low current.

PS-I experience: Good learning experience.

Learning outcome: I gained experience about how to work in an industry. How work is actually performed. Theoretically, I learnt about analog electronics and use of some softwares related to our work.

Name: DESHPANDE TEJAS GIRISH (2019B1A80947P)

Student write-up

Short summary of work done: I worked on LED degradation - its study and modelling. I worked on various factors that can affect the lifetime of an LED and various degradation mechanisms that come to play. I also simulated the effect of temperature on LED on LT-Spice.

PS-I experience: The experience was kind of enriching. I had regular meetings with my mentor and had fruitful discussions with him. Then, I worked on the tasks assigned by him and got back to him.

Learning outcome: I learnt LT-Spice software. Apart from that, I learnt the basics of electronic devices like diodes, more specifically LEDs. I learnt how to present my work in front of esteemed scientists like those working at IGCAR. I also learnt how to skim through research papers and improved my soft skills through seminars and group discussions.

Name: DEBAAYUS SWAIN (2019B2A30983P)

Student write-up

Short summary of work done: We had to develop GUI desktop application for data analysis of semiconducting metal oxide sensors. This application included functionalities for extraction of features from response data and plotting of various curves.

PS-I experience: Good learning experience.

Learning outcome: Gained experience in Python and an introduction to signal processing.

Name: TANMAY DHAMA (2019B3A30591P)

Student write-up

Short summary of work done: Use Keras / Tensorflow to make neural networks and predict Human Error Probability (HEP).

PS-I experience: Good experience.

Learning outcome: Gained an industry experience.

Name: ADARSH AGNIHOTRI (2019B4A30723P)

Student write-up

Short summary of work done: The title of my project was “Performance analysis of Attitude Estimation Algorithms for Quad-rotor control”. In the course of the project, we first learnt about the theoretical aspects of Inertial Measurement Unit (IMU) sensors which are attached to Quad-rotor (a type of drone) for control and learnt how these are used for position and orientation estimation. We then went through different sensor fusion algorithms and selected 12 algorithms for the implementation as part of the project. For understanding the algorithms, we went through many different research papers and books. Our mentor also gave us 2 presentations about the detailed process. For the next part of the project, we started with coding the algorithms in Python and completed all the 12 algorithms. This quad-rotor will be installed by IGCAR for the seashore surveillance of it’s campus.

PS-I experience: PS-1 was nice experience. It was extremely nice to work with people from IGCAR and the topic of our project was very interesting. Our scientist mentor was very supportive. He gave us two presentations to make us understand our work in detail. We learnt about spacecraft dynamics and drone position and orientation estimation. More than that we got an opportunity to implement all the learnings. It feels really good to interact with the esteemed yet humble scientists and aid in a live project.

Learning outcome: Learnt how to implement sensor fusion algorithms in an IMU for drone control. Learnt how to code in Python language, use of various modules and packages. Sharpened communication and presentation skills. Developed an understanding of how to read research papers. Learnt how to work in a team as well as individually.

Name: ARPITH PETER (2019B5AA1393H)

Student write-up

Short summary of work done: My project title was 'Development of peripheral IP cores for 68000 soft-core processor'. I developed VHDL code for the UART controller. Simulation of the developed module was carried out using VHDL test benches in Xilinx Isim Software. Both behavioral and post route simulations were carried out. Sample C code was developed for sending and receiving the data through UART.

PS-I experience: PS-1 was great experience and got friendly mentor. I learnt lot of new things as part of my project.

Learning outcome: I learnt the basics of digital electronics. I learnt how to code in VHDL. I also familiarized myself with Xilinx ISE design suite 14.1, used for synthesizing and testing VHDL codes. I learnt the working of UART controller and developed VHDL code for the same.

PS-I station: ISEE- Literature Research, Chennai

Student

Name: MOHAN TEJA MUKKA (2019A7PS0056H)

Student write-up

Short summary of work done: We were introduced into the research methodology by helping us go through step by step process of conducting research. We were allowed to choose a topic of interest, which is to be worked upon during the course of a month. Each session was included a talk by renowned person who had decades of experience in research and were part of esteemed organizations such as IGCAR and BAR. The second half is focused on publishing of an article, the process involved in doing so, helping us learn some of the key components of research such as peer review and plagiarism.

PS-I experience: The station gave their best in providing us the required materials and helped us in every way they can. Most of the talks were good.

Learning outcome: With respect to research, I got grasp of the humongous work that was put in a paper. Having live experience in working on a paper was quite something interesting. The seminars, group discussions were actually good. A few things that I learnt from him. Looking forward for more knowledge I might gain in the coming days.

Name: NEERUKONDA HARSHA (2019AAPS1489H)

Student write-up

Short summary of work done: I was asked to identify research topics of social problem-solving nature and also learnt how to choose meaningful research topics when opportunity warranted or will generate / conceive idea during this course time with the help of an expert team. I was expected to learn theoretically how to execute the objectives by adapting a suitable research methodology with prepared data set, how to interpret the research (anticipated) outcome with the existing reports to develop how to draw a meaningful conclusion from the anticipated results and the existing research advancements also developed familiarity / knowledge on:

1. Submission of research articles to Journals
2. How to prepare / communicate research article to a Journal
3. Plagiarism; authorship
4. How to write an introduction; Results and Discussion; Acknowledgment; Citation and References
5. Citation and impact factors
6. The benefits of research interactive fora
7. Peer reviews

PS-I experience: I was used to develop knowledge / skill in conceiving research problem, develop theoretical and practical knowledge on how to communicate research piece for Journal publication; which will have the opportunity to interact with Journal editor “Indian Journal of Science and Technology” to imbibe valuable expertise in the research communication field.

Learning outcome: It helped me to prepare and get motivated by strengthening the research aptitude ready to kickstart for actual project work without time requirements for preparation.

PS-I station: Madras Mindworks Pvt. Ltd., - Electronics, Chennai

Student

Name: KIRAT BIR SINGH CHAWLA (2019B1A80735P)

Student write-up

Short summary of work done: Under the project, modular gearbox had to be designed which gave the organisation the flexibility to add and remove inputs based on the vehicle that was being simulated. To achieve this, circuit needed to be designed which had the capability of supporting various inputs that were independent of each other. I researched about various electronic elements to find the best option to achieve this goal. I designed the circuit using microcontroller, some switches and shift register. This project gave insights into practical circuit design and uses of different electronic and electrical elements such as shift register or potentiometer. Hardware had to be designed as well for the gearbox, this was done using Fusion 360 software, which I learnt from scratch during PS.

PS-I experience: The station was welcoming and they tried their hardest to accommodate as many resources as they could for a small company to the interns.

Learning outcome: I learnt about practical circuit design, uses of different electronic and electrical elements such as shift register or a potentiometer. I also learnt to use softwares such as Fusion 360 and Unity.

PS-I station: MELSS - Industrial Automation & Control, Chennai

Student

Name: YASH JANGIR (2019A8PS0526G)

Student write-up

Short summary of work done: Implementing CAN protocol on Arduino, developing software stack for monitoring CAN network.

PS-I experience: Good learning experience.

Learning outcome: We learnt C language and Python concepts, CAN protocol and interfacing of various sensors.

Name: AAKASH JAIN (2019A8PS1120G)

Student write-up

Short summary of work done: My project was based on CAN bus protocol used in automobiles. Initially, we had to review existing data and features of this communication protocol. Using Arduino microcontrollers, our objective was to enable communication between multiple nodes of the bus. Used various sensors and actuators to simulate real world data. The second objective was to make software stack in Python and C++ to make a dashboard and data collection system. Python was used to make the GUI.

PS-I experience: Overall, it was great experience. The people in the organisation were very helpful. The project assigned to me was pretty interesting.

Learning outcome: We learnt lot through this project such as,
• Strengthened our C language and Python concepts.
• Explored the world of embedded systems.
• Experienced how CAN protocol works and why it is so important.
• Learnt interfacing of various sensors and programming them using various libraries.
• Interaction with project mentor and other team members was also major growth.

Name: UDDHAV THAKORE (2019B5A80750H)

Student write-up

Short summary of work done: Calculation of OEE by taking input from user and displaying result on Amazon Web server and simultaneously on an LED matrix, using esp32.

PS-I experience: Company mentor was very professional and guided us throughout the project.

Learning outcome: I learnt several things. I had no exposure too, a lot of electronics concepts included.

Name: UDDHAV THAKORE (2019B5A80750H)

Student write-up

Short summary of work done: OEE study, calculation and upload to server. Simultaneously displaying on LED matrix.

PS-I experience: Extremely enlightening.

Learning outcome: A lot of understanding in the working of company. Also usage of Arduino, esp32, aws and p10 LED matrix.

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

Student

Name: KANISHK SHARMA (2019A3PS0230P)

Student write-up

Short summary of work done: The project was to develop bulk emailing desktop application that could send large number of mails with personalized & encrypted file

attachments. Every file password is unique and each file is annotated accordingly using the name field in the given database. Later on, an SMTP relay service was employed to connect securely and send personalized mail to the recipients with an optional file compression to speed up the process.

PS-I experience: My PS-1 experience was all-in-all adequate. The industry mentors were helpful and guided us along our project. They acknowledged that we were new to most of the tech stack, provided ample resources and time to learn the same. Meets were easy to schedule with them, they provided proper insights into the project and even indulged in proper conversations with us about the same.

Learning outcome: One of the learning outcome was the complete official conduct. Properly documenting tasks, doing them before in a set deadline, spreading out and planning a project over the complete timeline were some of the other things I learnt at MCEME. Talking about technical skills, I had prior experience with Python and this project helped me get better at misc. development tasks and strengthened my core concepts.

Name: KSHITIJ KUMAR (2019A3PS0256P)

Student write-up

Short summary of work done: My work involved in developing bulk emailing application. The email would contain personalized annotation and would be encrypted with a unique password for each recipient. We used SMTP relay service to send the mails. We also created an encrypted database which stores useful information about the army officers for the purpose of this application.

PS-I experience: The project mentor was helpful and gave us constant feedback regarding how to improve our project. We also had regular meets with our faculty mentor who kept giving us constant advice regarding our PS work.

Learning outcome: Learnt various Python modules which was required as part of this project. Understood how databases and SMTP relay services work.

Name: SHAILLY MANTRI (2019A3PS0330P)

Student write-up

Short summary of work done: We started the internship by getting acquainted with the concepts of Python, NLP, NLTK and the RASA framework, which are required to work on the project. Having learned all the necessary concepts, we started working on the chatbot. After receiving the data from our mentor at MCEME, we fed the chatbot with the queries, their answers and trained our chatbot. However, while interacting with the chatbot, if we said anything out of context or mixed up two or more queries, either the bot replies with the wrong message or the output message was not up to the mark. So we made a fallback mechanism which the bot can return to in case it is unable to find a query or if the user asks some random question. After this, we figured out how to deploy the chatbot as GUI (Graphical User Interface) onto a web server and completed its construction. So after almost two months of hard work and consistency, we successfully built a working chatbot that answers all the required questions. We believe that working on this project will be helpful for us later on in our careers and we worked on this project to the best of our abilities.

PS-I experience: Our faculty in charge and mentors at MCEME were really helpful and supportive. It was really great learning experience. However, I felt that if PS1 have had been offline, the learning would have been much more effective.

Learning outcome: We believe that working on this project will be helpful for us later on in our careers and we have worked on this project to the best of our abilities.

Name: ASHUTOSH SHARMA (2019A7PS0040P)

Student write-up

Short summary of work done: The work done was the development of an architecture for swarm of Drones, where the drones are capable of obstacle avoidance, as well as collision (with other drones) avoidance, using the onboard Laser sensors on the Drone.

The work required simulation of upto 6 drones on which the project would be run. The simulation environment was Gazebo, the ROS framework was used to control and communicate between the drones. A GUI was also built to control the drones and the obstacles in the Gazebo simulation environment

PS-I experience: My PS1 experience was relevant, interesting and meaningful. I was able to use several concepts which I learnt before, through online courses and the like. The Instructors were very supportive, understanding and were open to suggestions. Overall, it was very interesting project and was quite enjoyable for me.

Learning Outcome: By doing this project, I was able to implement and run an entire drone swarm from scratch. This knowledge and experience was very helpful and will certainly help me in the future. I also learnt about several problems and shortcomings that came during implementation. This will help me in avoiding such problems and errors in the future.

Name: RAHUL BATTINA (2019A7PS0129H)

Student write-up

Short summary of work done: The project we got was about creating AI based chatbot that answers queries about few domains and was meant for the military personnel. We started off by going through several research papers and articles to learn about current trends in the field of chatbots. After that we went through several different online courses and youtube videos to learn all the required concepts to build chatbot. We started off the implementation by using RASA framework to build our chatbot. We then fed the chatbot, all the queries and their solutions that it had to answer. We then fixed few bugs like giving default answer and asking the user to rephrase their query in case the chatbot is unable to understand what the query is. Finally, we built GUI for the chatbot to make it more presentable using Django framework. We successfully built functioning chatbot that answers all the queries pertaining to the required domains and has presentable GUI to it.

PS-I experience: It was very interesting. I learnt about so much. It was also nice working with two other people I had not previously known. It was nice working for an organisation. This being my first ever working experience, I learnt how to complete my work in the stipulated time, how to make professional reports. I believe it was good learning curve and might be very useful to my working career.

Learning outcome: I learnt about several concepts like NLP, NLTK, Spacy, RASA, Django, etc. I also learnt how to make professional reports and how to give seminars.

Name: SASHANK KRISHNA S (2019A8PS0184P)

Student write-up

Short summary of work done: The project's objective was to implement MIMO-OFDM communication system with polar codes for channel coding on a software-defined radio for HD video communication. We implemented Monte-Carlo simulator for the end-to-end system on MATLAB, implemented polar coding for the channel coding and used FFMPEG to compress the video using AVC and HEVC codecs. We graphed the performance metrics of the system and switched to using LDPC instead of polar codes. Overall, we implemented systems for evaluating performance by varying parameters, transferring files and live streaming webcam data. Additionally, we improved the simulator to employ parallel processing wherever possible and wrote scripts to detect and reason out the burst errors faced. As part of learning process, we took courses online on wireless communications, LDPC, polar coding, software-defined radios, digital image and video processing. I got to implement it all on MATLAB at varying scale using the communications toolbox, Simulink and the image processing toolbox as a part of either the project or the learning process.

PS-I experience: It was very educational and gave deep insight into different fronts of the world of communications, various problems faced and how they are being tackled. Since, the problem statement involved specific system and hardware, it helped me connect theory to practice and build on top of it very effectively.

Learning outcome: I learnt digital communications fundamentals, studied wireless communications and implemented MIMO-OFDM system, including the modelling and estimation of wireless channel. I also learnt about different channel coding schemes used, studied LDPC and polar coding schemes. I also studied image and video compression, with a special focus on AVC and HEVC. Lastly, I studied SDRs and various challenges faced when deploying a system on one. I am more confident now while using MATLAB.

Name: ADITYA SONI (2019A8PS1282H)

Student write-up

Short summary of work done: The project implements Monte-Carlo simulation of MIMO-OFDM system. The link employs LDPC for channel coding scheme. The video is compressed using H.264 / H.265 standards using FFMPEG and transmitted through the implemented model. File transfer as well as streaming capabilities were implemented. The model implemented is highly parameterized and supporting scripts for analysis and visualization were also written. Our initial objective was to implement polar codes in the system, but 5G NR polar codes function defined in MATLAB were very slow and were thus not at all suitable for both file transfer and live-streaming.
The following sub-problems were solved
• Modelling of an OFDM link
• Implementation of channel inversion
• Upgradation to MIMO-OFDM link
• Implementation of LDPC error correction
• Integration with MIMO-OFDM model
• Parameterization of the model
• Enabling of streaming and file transfer support
• Incorporation of H.264 and H.265 via the use of FFMPEG
• Writing of supplementary scripts

PS-I experience: This was pretty rich and informative experience. I got hands on experience of how work is done in the industry and how they valued practical implementations much more than the theoretical aspects of the project.
Learning outcome: 1. Proficiency with MATLAB and communications toolbox
2. A strong background in wireless communications and digital communications
3. A good understanding of 4G and 5G communication standards
4. A strong understanding of MIMO-OFDM, polar coding and LDPC
5. Insight into video compression and digital image processing
6. Familiarity with the theory behind SDRs

Name: ADITYA AGARWAL (2019AAPS0243G)

Student write-up

Short summary of work done: We used various libraries in Python to convert speech to text. Mainly chinese speech to hindi and english text.

PS-I experience: The mentors were very supportive and the 2 months went very smoothly.

Learning outcome: I learnt about different libraries in Python, different technologies and methods used in speech recognition.

Name: AMAN RAJ SINGH (2019B1A31483H)

Student write-up

Short summary of work done: My project was to develop self learning chatbot that can answer the following queries
(i) Q related queries.
(ii) A matter related queries.
(iii) FAQs with respect to MCEME.
(iv) Instructions for students joining for courses.
(v) Misc. SOP related queries.
(vi) Cyber audit related queries.
(vii) Conduct of stock taking boards.
(viii) Should be capable of working in offline mode.
(ix) Should learn from past user interactions.
We were successful in implementing CHATBOT that was able to answer the queries provided by the institute, our BOT was able to understand the context of each query and answer the questions accordingly.

PS-I experience: My overall experience was really good. My mentor was very helpful and helped me in developing the approach to the work to be done in each week. WFH experience didn't seem to be barrier in learning. Both Industry and Institute mentors guided and provided us resources to move ahead with the project. I learnt lot on new topics like NLP (Natural Language Processing), Python libraries etc.

Learning outcome: Things I learnt included NLP, used Python libraries like SPACY and NLTK which really helped in chatbot making. Learnt about few chatbot frameworks like RASA and Microsoft bot where you can implement bot in no time. Also, started learning about Machine Learning and how to implement different algorithms. Apart from the technical aspects of the project, I learnt how to present report, work with team, participate in group discussions and how some of the actual work gets done at PS station.

Name: BOBBA ADITYA NAIDU (2019B3A30456P)

Student write-up

Short summary of work done: Created an RNN model to predict hours left for servicing.

PS-I experience: Good learning experience.

Learning outcome: Learnt lot about machine learning.

Name: MANAN AGRAWAL (2019B3A30465P)

Student write-up

Short summary of work done: During the course of this project, we learnt about the principle and methods used in modern speech recognition for both text-to-speech and speech-to-text. We also learnt about how to translate the text from Chinese to Hindi, Chinese to English and English to Hindi both in online and offline mode. We gained familiarity and proficiency with using various tools required for the project. Various libraries used such as deepspeech which is an open-source embedded (offline, on-device) speech-to-text engine that can run in real-time on devices ranging from Raspberry Pi 4 to high power GPU servers. We also used xpinyin library to translate Chinese hanzi to pinyin (拼音) by Python, 汉字转拼音. And lastly, we used PYTTSX3 which is text-to-speech conversion library in Python. Unlike alternative libraries, it works offline and is

compatible with both Python 2 and 3. Our main objective was to convert Chinese speech to English and Hindi text in offline mode which we were able to achieve within the given time and also compiled the programs within single file.

PS-I experience: PS-I session was very informative and new experience that we got to learn new things in industrial background. I was able to develop new skills and gain more experience along the way. I also learnt new technologies Natural Language Programing and neural networks by working on the assigned projects.

Learning outcome: I learnt new machine learning techniques such deep neural networks, recurrent neural networks, natural language programming, etc. Apart form the technical skill, I also learnt how to work on team project in an industry.

Name: ABHINAV TIWARI (2019B3A70547P)

Student write-up

Short summary of work done: Project assigned to me was related to machine learning / NLP. We have to create model which should work in offline mode and able to convert speech to text and text to speech / (English speech to hindi) and it should also be capable of converting chinese speech to hindi should work in offline mode.

PS-I experience: The project assigned to me was of my interest so enjoyed working on same. Created RNN model for machine translation and also use some prebuild library for converting text to speech. Learnt about various model which already exist for speech to text.

Learning outcome: Learnt about various deep learning techniques which could be used for machine translation.

Name: ABHINAV TIWARI (2019B3A70547P)

Student write-up

Short summary of work done: Project allotted was related to ML / NLP. We have to build speech recognition system. Features of model can be used for converting speech to text, text to speech. Additional features was that it should be able to convert Chinese speech to English / hindi speech and English speech to chinese speech / text.

PS-I experience: It was great experience working in MCEME. Project allocated to me was of my interest so enjoyed working on same. Built a neural networks (RNN) to achieve our objective and also use some open source engine for English speech to English text.

Learning outcome: Learnt about neural networks and how to implement it. How to train lstm model for machine translation.

Name: RISHIRAJ RAJKHOWA (2019B5A30828G)

Student write-up

Short summary of work done: The main objective of this project was to implement a stable and reliable architecture for swarm of drones, each of which is to run independently of each other and exchange minimal data. The swarm placed in random environment and given a set of goal points must determine the ideal pathways for each drone, so that the said state is reached without collisions with obstacles and other drones. I was tasked with making a random map generator to run the simulation.

PS-I experience: This PS1 station is really good and I would recommend it.

Learning outcome: I learnt ROS and Gazebo from scratch, which was required to do some meaningful work in this project. Rest of the code I did was in C++, which did brush up my coding skills.

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

Student

Name: HARIHARAN VENKAT (2019A3PS0244P)

Student write-up

Short summary of work done: We are working on implementing an architecture for frequency hopping in mobile ad hoc networks. We are basically trying to create block diagram and circumvent the challenges of interference etc. caused due to decentralized nature of MANETs.

PS-I experience: It has been great. Mentors are really kind and always ready to lend a helping hand. They encouraged literature review and were enthusiastic to help us on the journey of getting up to speed.

Learning outcome: Understanding frequency hopping and is up coming field of MANETs. Another learning outcome was understanding the process of innovation. About how we take an idea from a thought to reality.

Name: MEHTA DHYEY AMITBHAI (2019A8PS0372P)

Student write-up

Short summary of work done: I came across very new topic with vast number of applications which is Dynamic TDMA scheduling for MANETs with AODV. Until mid semester of PS, we read about all these terminologies in detail to gain technical knowledge needed for architecture part of the project. After that we also conceptualised a strategy of adaptive TDMA scheduling in MANETs as an integration of different existing protocols with some modifications and suggestions for improvement.

PS-I experience: It was quite learning experience. It was very new and memorable experience for me.

Learning outcome: I learnt lot about my project titled Dynamic TDMA scheduling in MANETs with AODV routing protocol. I also learnt the basics of how a company works and about the chain of command. I also learnt much from group discussions which were very new experience for me and seminars as well.

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

Student

Name: PATIL TEJAS SUNIL (2019A3PS0164P)

Student write-up

Short summary of work done: Documentation of the complete designing process and developing content for the company's website, newsletters etc.

PS-I experience: Hands on practical work, change from the usual schedule, opportunity to learn skills and develop as an engineer.

Learning outcome: A thorough understanding of the documentation process and all round content development skill. Ability to undertake tasks as team, manage time and meet deadlines efficiently.

Name: PATIL TEJAS SUNIL (2019A3PS0164P)

Student write-up

Short summary of work done: Documentation and content development.

PS-I experience: Practical learning and an opportunity to collaborate with industrial mentors. Real world experience.

Learning outcome: Complete understanding of documentation process, content development skills and marketing experience.

Name: SREEJAN JAGOTA (2019A3PS0399H)

Student write-up

Short summary of work done: Worked on website design team. Worked on different aspects of website like brochures and newsletters. Most of the work was shared between students. In the second half of the PS-1, the work included working on video project for the website. Used different softwares like photoshop and blender for the same.

PS-I experience: My experience was very advantageous. I learnt working with team and also learnt the basics of many softwares like blender and photoshop. I was given opportunities to use my skills in various projects.

Learning outcome: Learnt to work with various softwares and also had my first experience working in team on a project.

Name: DEBANGA SARMA (2019A3PS1297H)

Student write-up

Short summary of work done: Helped the company with documentation process and their marketing needs.

PS-I experience: Our internship with Pacify Medical Technologies is fantastic opportunity for learning and professional development. As a result, we consider ourselves extremely fortunate to have been given the opportunity to be a part of it. We're also thankful for the opportunity to meet so many lovely people and professionals who guided us throughout the internship. This opportunity represents significant step forward in our professional development.

Learning outcome: Learnt the documentation process for medical devices and how to set up newsletter.

PS-I station: Power Grid Corporation - Electrical Power Systems, Nagpur

Student

Name: VIJAY KUMAR HEEREKAR (2019A3PS0223P)

Student write-up

Short summary of work done: Our current age of technology results from many brilliant inventions and discoveries. But we can transmit information and the media we use to do it, which is perhaps most responsible for its evolution. Progressing from the copper wire of a century ago to today's fiber optic cable, our increasing ability to transmit more information more quickly and over longer distances has expanded the boundaries of our technological development in all areas. An optical fiber (or fiber) is a glass or plastic fiber that carries light along its length. Optical fibers are widely used in fiber-optic communications, which permits transmission over longer distances and at higher bandwidths (data rates) because light has high frequency than any other form of radio signal than other forms of communications. Telecommunication's most basic roots can be traced back to the invention of telephone. Various controversies surround the invention of the telephone. However, coming from basic can type telephone to modern mobile phones, telephone and telecommunications have come long way. This project will see brief overview of optical fiber technology, the history of the telephone and few telephony concepts.

PS-I experience: From the amount of research (mostly learning) I did, it was good experience. None the less I had fun on my own by learning about the history of telephone.

Learning outcome: Learnt few basics of telecommunication, optical fiber technology, telephony concepts, applications of mux and de-mux in communications and up to certain extent about how they are applied and the rich history of telephony.

Name: CHINMAY (2019A3PS0293P)

Student write-up

Short summary of work done: A software application with GUI over Python was made to find the impedances of transmission lines in there distributed, lumped and per-unit forms.

PS-I experience: It was fairly good for me. I got to learn many things from my industry mentor and also learnt Python as part of the project that will help in my resume.

Learning outcome: Lot about transmission line impedances, the basic structures and composition of conducting and insulating material was also learnt as part of PS-1 project.

Name: TAWDE VIRAJ SUNIL (2019A3PS0306P)

Student write-up

Short summary of work done: I researched various transmission system protection schemes. The power grid is supposed to work all the time without any interruption. But transmission line faults etc., are inevitable and much more common than we think. We need ways to detect and rectify these faults without wasting any time and power. We also

need other systems in place to continue power transfer while these faults are rectified. I studied and compared lot of such schemes and prepared a report.

PS-I experience: It was nice. The mentor guided me throughly. There weren't any strict deadlines and I could do things at my own pace.

Learning outcome: I understood the basics of transmission systems and how the power grid works. It was very interesting.

Name: ANJALI ROY (2019A3PS0351G)

Student write-up

Short summary of work done: The work that I was involved during my PS station was primarily research based. In the beginning, after a thorough virtual tour of the Power Grid telecommunications labs and offices, I was assigned to gain theoretical knowledge about fiber optics and present my research on the latest developments in this area. Further, after completion of the said assignment, I was to research more on the evolution of telecommunications (1G to 5G), multiplexers, demultiplexers, digital hierarchies in communications namely, Plesiochronous and Synchronous. In the end, the final coverage were the functions of Power Grid in telecommunications and its role in developing smart cities. It was very fruitful experience which culminated into deepening my interest in fiber optics and mobile communication networks.

PS-I experience: It was very good and rich learning experience. Although, there was lack of real life circumstance, the amount of work I could do and the knowledge I gained during this PS have been immensely beneficial. It has motivated me to further dive deeper into the field of fiber optics and study more on the relevant topics.

Learning outcome: I was able to research on the recent technological advancements in the field of fiber optics. During the latter phase of PS, I researched in the topics of evolution of telecommunication and digital hierarchies.

Name: PRATEEK SINGH (2019A3PS1314H)

Student write-up

Short summary of work done: I was asked to read more and research about renewable energy sources and how power grid is promoting it. I was provided with ample resources from my station which helped me gain enough knowledge to make project out of it.

PS-I experience: Power grid is reputed corporation so I was excited to work there and gained experience. I was assigned a mentor who helped immensely in providing me with ample resources. He also cleared all my doubts about the project and helped me understand the topic even more.

Learning outcome: I learnt how corporation as big as power grid functions and also got to know about various methods they are using to promote renewable energies.

Name: ANANYA CHAUHAN (2019A8PS0341P)

Student write-up

Short summary of work done: We were supposed to prepare a report on “The Telecommunications Industry in India and Role of Power Grid Corporation of India”. We gave a brief introduction of the organization and telecom sector. We summarized types of transmission lines and details of data transmission through optical fiber is present in the report. Types of optical fibers, fiber testing equipment, wave division multiplexing also were discussed. Marketing prospects in telecom sector for the organization were also analyzed.

PS-I experience: The practice school-1 experience was quite good overall but it could have been better if the external situations permitted to visit the station. It was an engaging experience working in one of the most profitable and sought after PSU.

Learning outcome: I learnt about telecom Industry in India, about power grid corporation of India. Types of transmission lines and different types of equipment used in Telecom sector by Power Grid Corporation of India. Types of data transfer using optical fiber and different equipment used with optical fiber. We eventually learnt about marketing in telecom sector.

Name: VARUN JAIN (2019A8PS0348P)

Student write-up

Short summary of work done: At first, the organization introduced us to the work culture of the corporate world, before explaining critical technologies related to the valve based electronics, thyristor technologies and their applications in HVDC / FACTS systems. We learnt about HVDC / FACTS systems which describes how modern power electronics gain increased importance for the power transmission and distribution applications. Particularly, the power thyristors play key role in the modern HVDC and FACTS systems, thyristors, thyristor valves, their losses with respect to snubber circuits and voltage divider losses.We also learnt about valve cooling systems, gating and monitoring systems were also studied. We also studied the protection methods of thyristors against various losses such as over-current, over-voltage losses, di/dt, dv/dt, snubber circuit explanation, its electrical components and the working principle. Since, our PS-I was organised online and is an electrical sub-station and everything is insulated, so most of our work was study oriented and not of any field work. Hence, we learnt major concepts of the above mentioned equipments and we also worked on online dissolved gas analysis for transformers along with oil drying mechanism.

PS-I experience: PS-1 is short glimpse about how the professional life is going to be like. It had group discussions, seminars, presentations, etc. which helped me improve my communication skills and also helped me know how to interact with professionals in the corporate world and develop my overall personality.

Learning outcome: Learnt vital corporate world skills like communication, presentation and group discussion skills. As the project title suggests, I learnt about valve based electronics, valve cooling systems, applications of high power Thyristors in HVDC and FACTS systems, thyristor protection methods like di/dt, dv/dt, snubber circuit components, over-voltage losses, over-current lsoses, etc.

Name: ISHAN GARG (2019A8PS0349P)

Student write-up

Short summary of work done: My project topic was "Automation system and Technologies used in power systems." I studied why automation is necessary for the power sector and how it is implemented. Further, I learnt about various technologies used in the process. Then, I focused on the multiple utilities used in power sub-station and did an exhaustive study of their work. I learnt about various advantages and disadvantages, cost, efficiency and many other features. Lastly, I studied the new trends which are used in power system automation.

PS-I experience: Good experience overall. I learnt about many things. It helped me gain lot of practical knowledge about power industry. The materials provided by mentors were also suitable.

Learning outcome: I learnt many things such as working of power plants, energy generation, distribution and how they are automated. I learnt how to interact with industry professionals in a company and also how to present in a seminar.

Name: NIKET AGARWAL (2019A8PS0378P)

Student write-up

Short summary of work done: Project title - Valve base electronics. We explored the thyristor technology and its development in application of HVDC and FACTS. Basically, we read about the fundamental features and characteristics of high power thyristors with particular reference to its application in high voltage and high current area. We also explored about the modern trends in the thyristor technology which included the introduction of direct-light-triggered thyristors that simplified the thyristor valve substantially.

PS-I experience: PS-1 was decent learning experience.

Learning outcome: We learnt about working of India's power sector and got introduced to the field of power electronics. Learnt about the working of thyristor technology and its development in the application of HVDC and FACTS.

Name: RANGA KOUSHIK (2019A8PS0614H)

Student write-up

Short summary of work done: My work is basically about erection testing and commissioning test in power transformers that includes many tests that are been performed from manufacturing process to usage of transformer. This includes processes like SFRA, DGA, magnetic balance test capacitance, tan delta measurement test and as the power transformer is very huge and costly one, it requires many tests that are thoroughly been checked and observation has been done by professionals regularly.

PS-I experience: As a student from BITS PILANI, I got an opportunity to do my summer internship at Power Grid Corporation of India Limited. With this internship, I aim to learn about erection, commissioning and pre-commissioning tests of transformer under the guidance of authorities at the power grid. There is big difference between the college projects and the tasks and activities during the actual work. In college, we learnt how to describe the work in projects, where in work we learnt how to implement them in reality. This internship was an introduction to the actual work field for me.

Learning outcome: The past months of my training have been very instructive for me. Power Grid Corporation of India Limited has given me opportunities to learn and develop myself in many areas. I gained lot of experience, especially in the erection, commissioning and pre-commissioning of transformer. A lot of tasks and activities that I have worked on during my internship are familiar with what I'm studying at the moment. I worked in many areas where I did different work.

Name: KALLEME SAI SREEKAR (2019AAPS0279H)

Student write-up

Short summary of work done: Learnt about SCADA systems in Grid operations. Learnt about various components that comprise SCADA and also the way the national electrical grid functions. Later, learnt about the importance of communication in power systems and the methods with which it is currently done.

PS-I experience: We had great support from industry mentor who took time to teach and guide us. Our faculty really helped us stay on track and had fruitful experience in PS-1.

Learning outcome: Able to understand the way SCADA systems work on our national grids. Able to analyze and appreciate the role of communication in this process.

Name: KUSHAGRA SHARMA (2019AAPS0310G)

Student write-up
Short summary of work done: We made project report on the topic "SCADA system in Grid Operations". Apart from this, we also learnt about Structure of Indian Electricity sector and role of Powergrid, also studied about various components of control center configuration.

PS-I experience: It was great experience, learnt a bit about PSU work culture and this internship made me realize how important electrical power system / core is for the growth of the country and its infrastructure.

Learning outcome: Learnt about SCADA (Supervisory Control and Data Acquisition) and how it has literally transformed Electric Utility Industry in India.

Name: AKSHITHA SRINIVASAN (2019AAPS1219H)

Student write-up

Short summary of work done: The project assigned as part of PS-1 dealt primarily with Extra High Voltage Power Transformer maintenance. This entailed a functional understanding of the erection and commissioning process, upon which study was done with the help of resources online and provided by the mentor. Further study was made on the different causes of failure in transformer components, along with compilation of various transformer maintenance procedures. The main focus was on planned / preventive maintenance of transformers so as to extend the average lifespan of the transformer as far as possible. This was inclusive of collecting cost impact data and understanding specific post-commissioning tests. The learnings of the course were compiled in the form of weekly diaries and final report. The final conclusion reached was the cost, preventive maintenance helps obtain greater productivity and thus better profits.

PS-I experience: PS-1 was good learning experience with its fair share of highs and lows. The assigned mentor provided and directed us towards the right resources and the webinars conducted on the side spanning across multiple domains were helpful. However, while communication plays fairly important role, there were gaps regarding expectations. The PS faculty guided us at crucial steps of the project.

Learning outcome: PS-1 greatly helps one improve their meticulousness and work on time-management. Having to record experiences in the diaries particularly served as motive to achieve as much as possible in the given duration. It helped to improve soft skills as well. The nature of the project also ensured greater fluency with the requirements of an academic report, understanding of how and where to acquire resources and paved the way to discover relevant information. It also helped me to develop cost-based perspective to the practical application of concepts learnt.

Name: PUGALENTHI SELVAN S (2019AAPS1284H)

Student write-up

Short summary of work done: My project title is Scada System in Grid Operations. Anything that reduces human effort is gift for any Industry and the name SCADA is not an exception. It is an automation control system that is used in industries such as energy,

oil, gas, water, power and many more. The advent and development of the smart grid concept to operate the electric power grids and microgrids have introduced number of opportunities for improving efficiencies and overall performance. A supervisory control and data acquisition (SCADA) system provides an appealing scheme for remote control and observation of renewable energy sources (RES). SCADA systems have been used widely in various industrial applications and have helped improve the efficiency of such systems. SCADA systems, however, still face some challenges in the effort to ensure reliability, safety and security for power generation, transmission and distribution. One of the consideration in designing the capabilities of smart grid is the integration of SCADA systems to enable remote control of electric microgrids and grids, supervise and control the electric network equipment as means of fulfilling reliability and desired efficiencies for the whole utility. Given the ability of these systems to control the flow of electricity throughout the network, additional planning is required to ensure that all possible measures for preventing compromise are considered. This report discusses the current overall system architecture and some of the security measures used. More importantly, it considers simplifying the implementation of many required standards. Because of the unpredictable characteristics of the RES, it has become important to constantly monitor their states in order to determine the amount of energy that is generated at all times. This will help in planning power usage and save energy when the sources are not enough for power generation. It will be practically impossible, however, to station personnel who will monitor the state of the sources constantly, hence the need for a remote monitoring system. This project provides an overview of utilization of SCADA systems in electric power systems. It presents the main components of SCADA platforms, including the master station hardware and software. The outstation hardware, including data acquisition devices such as remote terminal units and programmable logic controllers, will be presented. These devices are integrated with intelligent electronic devices, data concentrators and other communication equipment. The fundamentals and possible application functions of SCADA systems unveil the potential of smart grid and inspire more minds to get involved in the development process. SCADA systems can optimize and improve PV generation and can improve wind farm performance during operation.

PS-I experience: Good learning experience.

Learning outcome: I studieed about Pre dispatch and post dispatch of energy management, applications and also about power system for SCADA function, Transducers and Relays, Analog to Digital Converter, Optical Fibre Communications.

Name: SACHIT PANT (2019B2A31063G)

Student write-up

Short summary of work done: Learnt about the structure of power grid of country. Learnt about India's power generation, transmission and distribution. How data is communicated and used in power grid. Different methods of data communication in a country like Microwave, OPGW, PLCC and their advantages and disadvantages. Various calculations used to make data communication possible and cost effective. How a power grid is made smarter using various devices like RTUs, PMUs and SCADA system.

PS-I experience: Learnt lot, not too much workload.

Learning outcome: Learnt greatly about India's power grid.

Name: KASHISH (2019B2A31550H)

Student write-up

Short summary of work done: My project was based on transformers and how its insulation is done using transformer oil. First, I studied about the basic fundamentals and history of transformers. Also, learnt about its working and essential components like core, winding, bushing, buchhloz relay, cooling system, etc. in detail. My main focus was to learn about electrical, physical and chemical properties of insulation oil and how to improve these properties for better insulation as well as use better alternatives which are more environment friendly. Learnt about various problems faced during insulation process, important preventive measures and how to deal with these problems.

PS-I experience: It was really nice experience to work on my project. My mentor was available for me anytime. Whenever I wanted his help, he was there to help me. Overall, I am very much happy and satisfied with the project that I have done.

Learning outcome: My first degree being Msc. Chemistry and dual degree being Electrical and Electronics Engineering, this project not only helped me to gain knowledge in Electrical Sciences field but also helped me to gain knowledge in Chemistry field as well. This was the best thing to happen. In the field of Electronics, I learnt in detail about transformers, basic fundamentals and history, its working, various essential components,

how its insulation is done, etc. From Chemistry point of view, I focused on chemical properties and composition of insulation oil and how to improve those properties so as to have better insulation as well as use more environment friendly alternatives. Overall, a worthy learning experience.

Name: SURAJ CHOUBEY (2019B4A30667G)

Student write-up

Short summary of work done: I learnt about thyristors, TSC circuits, TSC valves, valve cooling, voltage stresses and application of high power thyristors HVDC and FACTS systems in power distribution systems.

PS-I experience: It was decent experience in PS-1 to explore the field of power distributions systems. We learnt lot of stuffs.

Learning outcome: Learnt about industry and corporate culture. Built strong interpersonal, communication and leadership skills.

Name: AKHIL RAJEEV (2019B5AA1287H)

Student write-up

Short summary of work done: The project was on "Communication Systems and Technologies used in Power Systems". It covered the communication systems and technologies used in power systems, the different areas of application and their requirements and the organization and specific characteristics of the power utilities. It also covered the upcoming technologies and innovations and how they are being implemented in power systems.

PS-I experience: Since it was an online internship, we missed the real experience of an industrial environment, but on the other hand it was good experience learnt new things and virtually interacting with mentors and gained insight about the industry.

Learning outcome: Learnt about the importance of communication systems in the working of power grid, their requirements, organisation and characteristics and the current upcoming technologies used.

Name: CHEEPURU DEVI (2019A3PS0405H)

Student write-up

Short summary of work done: Electricity plays an important role in our life. We are made aware of how the transmission of electricity is done. We too came to know about the various parts of the sub-station system. The three wings of electrical system viz. generation, transmission and distribution are connected to each other and that too very perfect. Thus for effective sub-station equipment and distribution a sub-station must:
Ensure steady state and transient stability
Effective voltage control
Prevention of loss of synchronism
Reliable supply by feeding the network at various points
Fault analysis improvement in respective field
Establishment of economic load distribution

PS-I experience: My internship experiences polished my knowledge, skills and abilities in the field of electronics and electrical and taught me valuable lessons that helped me land my first full-time job. My intern experience set a direction, a route which helped me set my career goals and objectives.

Learning outcome: Ensure steady state and transient stability, effective voltage control, prevention of loss of synchronism, reliable supply by feeding the network at various points, fault analysis improvement in respective field, establishment of economic load distribution.

Name: ARVIND IYER (2019A8PS0374G)

Student write-up

Short summary of work done: This project aims to explore the need for unified standard for the operation of sub-stations. It explores how sub-stations are automated, enumerates and elucidates the condition of IEC 61850 standard, lists the hardware requirements and explores the need for redundancy of said hardware in sub-station automation and its implementation.

PS-I experience: It was great experience. We were treated like equals by our Industry mentor and we learnt lot from such an experience and to work efficiently as part of team.

Learning outcome: Through the course of this project, we learnt about the way a Public Sector Undertaking works and how valuable their projects are to the Nation. Apart from that, we learnt the working of sub-stations and automation of such Grid. As part of the project, we also learnt about various network topologies and protocols for long distance industrial use. Moreover, we learnt how to coordinate and communicate to efficiently complete a group project.

Name: PERAM MANOHAR REDDY (2019A8PS0515H)

Student write-up

Short summary of work done: I have done the project based on electronics which is study of STATCOM and I also learnt some knowledge about SVC and FACTS and it was really good topic which was given by mentor, which I understood within short span of time and I like this project and I am satisfied with this project as well.

PS-I experience: It was very new and interesting due to this PS-I, I got some knowledge about these power systems.

Learning outcome: Some knowledge based on STATCOM, SVC, FACTS.

Name: DEBJANEE BHATTACHARJEE (2019A3PS0006P)

Student write-up

Short summary of work done: We prepared a report on various developments in the sub-station technologies being implemented in recent times. This includes GIS (Gas Insulated Switchgear) and HIS (Highly Integrated Switchgear) systems. We also learnt about various technologies used for monitoring partial discharges in insulated sub-station equipments and the techniques which are actively being used by PowerGrid in its sub-stations. We learnt using tools like MATLAB and LTSPICE to create circuit simulation of partial discharge monitoring system with the help of PS-1 faculty incharge.

PS-I experience: Our PS program began a week later than most of our peers in other organisations, but our faculty tried keeping us engaged by assigning certain Multisim and LTSPICE learning assignments. Our mentor from the organisation has regular sessions with us to do follow up on our learning and also gave valuable insights into working of the organization, and the project on which he was working, that included commissioning and testing of GIS. Our faculty incharge helped us with the circuit simulation.
Learning outcome: We learnt about various aspects of transmission of power at extra high voltage (EHV) and the new trends in sub-station designs and the use of circuit simulation softwares like MATLAB Simulink and LTSPICE.

Name: ANIRUDH SUBRAMANIAN (2019A3PS0274P)

Student write-up

Short summary of work done: The work done in PS1 consisted of understanding the basics of normal sub-system, then reading through the IEC protocols for the standardization of sub-station systems. Subsequently, we studied various methods used in order to implement sub-station automation and various problems that arose from it and how to combat them using redundancy. The various redundancy protocols that arose

were particularly informative on how intertwined the various systems in sub-station and how clever engineering can solve even the most difficult problems.

PS-I experience: My PS1 experience was quite nice. Both the PS faculty and industry mentor were very supportive and guided me throughout the course of the internship.

Learning outcome: I learnt how sub-station automation systems work, various interoperability profiles, how redundancy is implemented and what failsafes are there in sub-station.

Name: SHIVI NAGLA (2019A8PS0407P)

Student write-up

Short summary of work done: My project was- "Automation and Temperature Control of Hostel Rooms". I learnt about automation, data acquisition, SCADA, MATLAB and temperature control through PID. I simulated a basic temperature control system, however, its practical implementation was beyond the scope of this project.

PS-I experience: Good learning experience.

Learning outcome: I learnt bit about the use of SCADA and automation. I used the MATLAB / SIMULINK software for the project.

Name: ASHTEKAR AMOD SANJAY (2019AAPS0216G)

Student write-up

Short summary of work done: We were given to study on controlled switching device in power grid and its application and advantages.

PS-I experience: It was good experience with power gird and to work on the topic and to learn about it.

Learning outcome: We learnt its applications on capacitor banks shunt reactors transmission lines also its advantages.

Name: YADALA SAI CHAITANYA (2019AAPS0296H)

Student write-up

Short summary of work done: The most demanding task in any organization is attendance marking. In traditional attendance system, the students are called out by the teachers and their presence or absence is marked accordingly. However, these traditional techniques are time consuming and slow. The purpose of this project is to consider the attendance of the class by face recognition. The project detects the face of the student and marks the attendance. This model integrates a camera that captures an input image, encoding and identifying the face, marking the attendance in excel file. The training database is created by training the system with the faces of the authorized students. The attendance sheet marked is sent to teacher's mail in excel format. By this project, we can overcome challenges we face while taking attendance.

PS-I experience: It's really great to be part of the Power Grid company, the mentor and the faculty encouraged lot regarding our project. Also, I had my first online industrial experience regarding work about what to do and what not to do in the given project. Quizzes helped us to think more competitively in the given work.

Learning outcome: The goals that are achieved by this software are efficient management of data, simplification of the operations, user friendly, portable and flexible for further enhancement.

Name: CHIRAG AGGARWAL (2019A3PS0186P)

Student write-up

Short summary of work done: Made a project on Control Switching Devices for Transformers and Reactors. It was done in a group of 2. We studied various things related to CSD's. We studied issues and policies regarding CSD implementation by Power Grid. Also we studied about its applications and advantages. In this project, we also studied smart grids. Apart from this, we also did task on MATLAB for control systems given by our professor. In this, we solved some questions and thoroughly studied their concepts.

PS-I experience: PS-1 experience was very good. It was my first experience in company and it was amazing in which I learnt lot of things.

Learning outcome: As it was group project, I gained experience in working in a group. I came to know about the work environment of the company. In the project, I learnt many things about control switching devices and what are their uses and applications. Also, I learnt how to use MATLAB for solving questions of control system. My overall experience was very good and learnt lot of things which will be helpful in my life.

Name: PETULLA MISHRA (2019A3PS0249P)

Student write-up

Short summary of work done: We were given project on Latest trends of SF6 gas in sub-stations. Under this, we researched on various new technologies and existing components which are in action in these power grid as instructed by our mentor. Addition to this, we were asked to simulate various circuits used in sub-stations using softwares such as LtSpice and MATLAB.

PS-I experience: My PS-1 experience was good enough, though we all missed being on site. The mentors which were allotted were really helpful and gave enough material to understand the industry work in these sub-stations. Further, we had group discussions and presentation.

Learning outcome: We learnt about latest technologies and industrial terminology. Learnt the simulation of various advanced circuits.

Name: BIBEKAR MANASI ARUN (2019A8PS0518G)

Student write-up

Short summary of work done: I learnt about various basics of sub-station equipment, circuit breakers and their protection philosophy. We also did the simulation of transformer whose aim was to find the relationship between the ratio of primary and secondary winding with their respective voltages. For this simulation, LT Spice was used.

PS-I experience: During this PS, I got to know briefly how the industry works and got to learn how to go about presentations.

Learning outcome: I got to know how LT Spice works and we did simulation in the same. I also learnt various equipment used in Power Grid and their protection philosophy.

Name: PATIL NIRUPAM ATUL (2019A8PS0566G)

Student write-up

Short summary of work done: Researched on the topic, "Features of protection devices required for 400/220kV power transformers". Basically, we were assigned project topics and then depending on the industry mentor, we were assigned some work. In my case, it was the preparation of report containing information regarding Power Grid and the assigned topic. We submitted this to the industry mentor.

PS-I experience: It was good way to learn about things which are not taught in the college curriculum.

Learning outcome: I learnt about how faults occur in tansformers and what devices can be used to prevent damage to the transformers in such faculty cases.

Name: LAKKIREDDY LAKSHMI BHAVITHA (2019AAPS0222H)

Student write-up

Short summary of work done: I have developed online movie ticket booking website (frontend) using HTML, CSS, note JS and GitHub as hosting platform.

PS-I experience: It was good learning experience and an opportunity where we can keep our theoretical knowledge into practical. PS faculty and mentor were very helpful throughout and I learnt many new things.

Learning outcome: Web development (HTML, CSS and note js) and learnt many things related to computer science.

Name: BENDRE ATHARVA SACHIN (2019AAPS0271G)

Student write-up

Short summary of work done: My project was smart attendance system using face recognition with open CV and Python. We learnt about open CV library itself and also how it is used in face recognition algorithms. We also learnt deep learning, convolutional neural networks and other artificial networks that were used for facial recognition and marking attendance automatically.

PS-I experience: The experience was very good. Both the mentor and assigned faculty were extremely helpful and guided us throughout the course of PS-1.

Learning outcome: I learnt some new things and also got hands on experience while implementing those in my project. Learnt open CV, Python, deep learning algorithms.

Name: SHREYASH (2019AAPS0276G)

Student write-up

Short summary of work done: Read about different sub-station equipments and made daily reports.

PS-I experience: Good learning experience.

Learning outcome: I learnt about various equipments in sub-station.

PS-I station: Prama Instruments Pvt. Ltd., - Industrial Control & Automation, Mumbai

Student

Name: SOBILA VENKATA SAI CHANDRAVADAN (2019A3PS0352H)

Student write-up

Short summary of work done: Worked on making tooth brush disinfector using timer ic, proximity sensor, uv light.

PS-I experience: It was great. Learnt lot of things and improved my presentation and speaking skills.

Learning outcome: I gained practical experience. I learnt how to apply the concepts.

Name: CHIDDARWAR PRANAV JAYANT (2019A3PS0362G)

Student write-up

Short summary of work done: My work comes under the domains: microcontrollers and interfacing, Arduino and C/C++. The project was highly based on the knowledge of Microprocessors course. I got hands-on experience on Proteus simulation software, Arduino and IDE.

PS-I experience: It was good. The PS faculty was very enthusiast. He was encouraging us time to time. The project was very interesting. The concept was very good.

Learning outcome: I learnt about Arduino and IDE, more about microcontrollers, how to speak in group discussions, meeting, how to present a project, how to write a report.

Name: SIDDHARTH KEDIA (2019A8PS0364P)

Student write-up

Short summary of work done: I got to work upon some basic electronics like ingrated circuits and sensors. The objective was to design device that will sterilize the object kept inside it. Specifically, the particular device that I made was supposed to sterilize a toothbrush. It used germicidal UVC light to kill the unwanted pathogens on the toothbrush. This toothbrush disinfector was made on breadboard using timer IC, proximity sensor and UV-C LED. The device was made portable and convenient for households.

PS-I experience: My experience with Prama instruments had many aspects and learning was something constant in all.

Learning outcome: I learnt about op amps, integrated circuits, working of sensors, designing circuit architectures and about UV radiations. Also there was great learning in terms of developing leadership quality, effective communication and time management.

Name: SRIKAR BHAMIDIPATI (2019A8PS0377P)

Student write-up

Short summary of work done: Our Project was on the realization of gadget for the visually impaired and deaf people for the purpose of their daily commute. It has the following specifications, (1) A 4 digit seven segment display capable of taking input from a 4x3 keypad and (2) Must be portable to carry around, with a rechargeable battery. This task can be accomplished with the help of microcontrollers. Among the various options, we found that logistically and 8051 based architecture was able to fulfill the given needs. So with the help of Proteus in which we ran our simulations of various models, we were able to compile the code required by the microcontroller in an Keil C51 IDE environment. This code was then compiled and embedded into the microcontroller in the form of HEX file. The entire model required 5V to operate and produced negligible amount of Heat even under prolonged conditions. With the help and guidance of our mentors at Prama Instruments, the project neared completion in our 4th Week. We had additionally modified and added sound sensor component which detects sound nearby and alerts the user about the same on 16x2 LCD. Key bindings were also added in order to produce distinct set of vibrations and monotone sounds by buzzer every time an input was given, making the model more versatile. For the later part of the PS1, we produced similar model but this time with an Arduino controller to be more customizable and user friendly. With the added capability of an Arduino, we also implemented an ultrasonic sensor, which has the capability of detecting the exact distance to a nearby object, if any, by the action of a buzzer. This greatly boosted the value of the product, as this keeps the physically challenged from harms way by alerting them before hand of an approaching vehicle, etc. We also learnt lot about the economic aspects and production of these embedded and IoT devices in real life. Much emphasis was put in documenting whatever work we did, which greatly enabled us to work in professional environment and taught us the importance of soft skills that are required in this line of work.

PS-I experience: My Experience was fairly pleasant and informative. I learnt to work with simulating software and sufficient tools were provided to work with and execute the project.

Learning outcome: Learnt to manage and design embedded systems. Worked on the 8051 architecture and Arduino microcontroller. Simulation softwares used - Proteus, TinkerCAD. Compilation softwares used- Keil uVision IDE, Arduino IDE.

Name: ADITYA (2019B4A80604P)

Student write-up

Short summary of work done: Myself in a group of 4 members worked on making a device known as toothbrush disinfector which disinfect the toothbrush and kill the germs on toothbrush using the UVC light.

PS-I experience: PS-1 experience was good. It helped us lot in giving the basic idea of industry.

Learning outcome: I learnt various things about the circuit. Also, I learnt how to interact with higher officials which help us lot in the future.

PS-I station: Pyrotech Electronics Pvt. Ltd., - Embedded Systems / IoT, Udaipur

Student

Name: PARITOSH VARSHNEY (2019A8PS1033G)

Student write-up

Short summary of work done: In the first half, we were introduced to React JS and were assigned assignments (develop SPAs) to make out react concepts clear, then in middle we were assigned to make our DSA concepts stronger by solving problems on hackerrank, third and final part we developed components (graph plotting or other visualization components) for SCADA system using React JS and syncfusion.

PS-I experience: It was helpful in learning perspective, industry mentors expected to devote lot of time towards it.

Learning outcome: My programming knowledge / concepts got stronger, got introduced to web development (React, HTML, CSS).

Name: CITIGORI ABHINAV (2019B1A81560H)

Student write-up

Short summary of work done: The title of the project is - Visualization tools for SCADA system. The work involved building front end UI using React JS framework. We developed 10 components which are used as visualization tools for SCADA systems. We learnt HTML, CSS, basics of bootstrap, JavaScript along with React JS and then solved 4 assignments, after which the mentor allotted each one of us one component to develop. We used libraries such as AntD and Syncfusion for the project. My role in the project was to build Tabular graph component which displayed real time values of multiple parameters in a table, along with 3 graphs corresponding to the values of last 7 days, previous week and previous month of these parameter. A global configuration form is integrated to this component, where the user can select the parameters that are to be displayed on the component. The mentor was always available for contact to ask any doubt. Regular meetings were conducted to monitor our work. All the components had similar objectives so they can be integrated into single web page.

PS-I experience: It was good experience overall. I got to know how IT works are done in an organisation. It was good experience for front end web development project.

Learning outcome: It was great learning opportunity for us. Apart from the soft skills, I learnt mostly front end part of web development - methods to use libraries and other techniques to make user friendly interface.

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

Student

Name: SHAYAN MAJUMDER (2019A3PS0259P)

Student write-up

Short summary of work done: Worked on an asset project of the organization. Project was to make SCADA React JS component of the company, which basically requires web development. All the students were assigned frontend development. I was assigned frontend development. I learnt Syncfusion and Ant Design React Javascript library and worked on the project which was based on React, HTML, CSS, SCADA, API etc.

PS-I experience: Great learning experience. Improved communications skills, attention to detail, soft skills and made great friends.

Learning outcome: Learnt new languages: ReactJS, HTML, CSS, JavaScript. Also, improved communication and presentation skills.

Name: SHRAVIL SINGH (2019A3PS0279P)

Student write-up

Short summary of work done: The field of digitization holds huge scope for the future. As the method of education continuously evolve, the technology has to evolve as well to achieve effective learning. We as students of this program will be able to use our knowledge to offer advice to those in need of smart room technologies. All video wall technologies such as LCD, DLP and LED have range of unique characteristics that make them great fit based on the requirements of each individual installation—desired features, application, environment and budget. We also covered these aspects of digitalization:
1) VC Setup
a. Camera b. Codec c. Mic d. AV Matrix Processor
2) Audio Setup
a. Speaker b. Amplifier
3) Control Setup
a. Touch Panel b. IR receiver c. Modem / router / Wi-Fi d. KVM switches

PS-I experience: Through this project, we have developed a complete curriculum which incorporates all kind of digital technologies such as display, audio set-up, control set-up, security solutions, smart lighting, etc. With the help of this project, we can choose wisely among all the technologies that are available in today's world and select the most effective ones according to our needs. The PS-1 program has helped me acquire knowledge of Smart-Room technologies that I did not have previously, as well as helped me achieve better communication skills in formal environments. I am sure that this program will be useful experience for my career.

Learning outcome: To design an ideal curriculum covering all aspects and technology for the best available digital solution.
To analyze various options for designing test labs with various functionalities and features.
To develop complete curriculum which incorporates all the items which accommodate an ideal display lab.

Name: MEGHA MAHADEVAN (2019A8PS0459G)

Student write-up

Short summary of work done: The project work commenced with an understanding of key industrial production terminologies. This was followed by detailed study of SCADA (Supervisory Control and Data Acquisition) systems and IIOT (Industrial Internet of Things) systems used in factory automation. Further, the project dealt with the competitor analysis of the product the company was developing, which was cloud based IIOT system used in factory automation. Based on the competitor analysis performed, features required for the product being developed was recommended.

PS-I experience: PS-1 was great experience and exposure for me. I was able to understand about the technologies behind industrial automation and the strategic approach followed for the development of industrial products. The mentors were also very helpful and approachable.

Learning outcome: I learnt about factory automation systems and product management domain. I also developed my presentation, report writing and communication skills.

Name: UTKARSH BAJPAI (2019B5A80552P)

Student write-up

Short summary of work done: The work required knowledge of front end web development using React and few other libraries. As we were not familiar with these technologies at the beginning, the first few days were full of self learning from the resources provided to us.
(1) Then we were allotted four assignments for practice purpose. These included Tic-Tac-Toe, Single Page Application (SPA), API integration of SPA and sorting a multilevel menu.
(2) After completing these assignments, we were allotted another task to gain knowledge of various data structures. This task involved solving 200 specified problems on the competitive programming platform 'Hacker Rank'.
(3) After completing this task, we were finally allotted our final project. Each student was assigned different visualization component for SCADA. I was assigned component called 'Tabular' that represented various parameters (Temperature, Voltage, etc) of various devices in a machine in a table format. Its features included paging, sorting, optional scrolling button, excel format export for data and integration with configuration form that allowed users to choose the parameters.

PS-I experience: PS-I was my first experience where I was actually making something along with learning all the time. The internship gave me the push I needed to improve my programming skills. I developed my programming skills, learnt something new everyday and everyone worked hard to meet stringent deadlines. Also, all the mentors kept me motivated throughout the PS-I.

Learning outcome: The internship gave me the push I needed to improve my programming skills. I became well versed in data structures and React JS. Also the industry mentor really emphasized on enjoying the process as he guided along the way.

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

Student

Name: AYUSH SHARMA (2019A3PS0360G)

Student write-up

Short summary of work done: • Simulate 3-axis of a Gantry system using stepper motor
• Edge computer receives commands from the cloud over MQTT
• Edge computer controls stepper motor drivers
• Edge computer collects health of the system
• Edge computer transmits health data to the cloud over MQTT

PS-I experience: It allowed me to grow personally, but it also helped me to gain new skills in web development—experience that I did not previously have.

Learning outcome: I gained new sense of professionalism and clearer view of what it meant to be in the professional world.

Name: KUSHAGRA GOYAL (2019A3PS0515G)

Student write-up

Short summary of work done: Developed web app for the simulation of 3 Axis Gantry Robot.

PS-I experience: Good learning experience.

Learning outcome: Learnt about the significance of documentation.

Name: ABHINAV MANOJ (2019A3PS1294H)

Student write-up

Short summary of work done: To develop a web app to display the data received from the cloud in various formats. Also to develop an edge computer which would transfer data from the device onto the cloud and also onto local GUI if there is one such.

PS-I experience: It was good. It turns out that I learnt lot about applying the ideas that we have learnt into a real life project.

Learning outcome: Learnt how to apply my skills in a variety of manner with the help of my teammates and mentor. Was also able to understand the importance and implementation of documentation. I was also able to understand the working of an IT industry and its structural organisation of project works.

Name: DUVVA VAMSHI (2019A7PS0095H)

Student write-up

Short summary of work done: Developing web application for collecting data over MQTT from data acquisition system to monitor climatic conditions, e.g., Temperature, relative humidity, illumination, etc. Then, saving the data received from MQTT to cloud databases and analyze these data based on client requirements and display the analyzed data in tabular format on browser-based web application page. The project also includes plotting graphs on some filtered data, setting & monitoring the edge cases and alerts.
For the backend part: MQTT was used to retrieve data from sensors and an edge computer to send data from all the sensors.
For the frontend part: Angular framework was used along with various packages like chartJS, expressJS etc.

PS-I experience: We discussed our project briefly and about various essential elements of our project. First, we learnt basic programming languages like JavaScript and Python, necessary modules like Tkinter, Socket.Io, and some useful tools for web GUI like Angular and CSS that set the ground for our project. The basics of frameworks, the role they play in the project have been discussed, how these frameworks and programming languages combine to give us frontend of our webpage and web server running on remote computer machine.

Next, our project deals with MQTT, which is used for various types of conversations between devices and also brief introduction about the basics of IoT has been done. Then, we learnt some essential tools used in our project like sensors, MySQL database, D3.js, etc. We also learnt about various modes we used for data receiving and showing on the client-side GUI. Finally, we also learnt the costs of cloud computing, real-time monitoring of data and handling edge cases.

Learning outcome: We applied the basics of different tools and platforms like Node.js, VS code and the front-end framework Angular (Typescript based) for the successful completion of our project. However, to conclude, finally we worked on the client-side and the server-side of the application delivering cloud web-based application that monitors climatic changes over data acquisition systems and displays well presented chart of the same details.

Name: PRANAY TAMBI (2019A7PS0171G)

Student write-up

Short summary of work done: Basically, the first month was spent by the company mentor explaining how things actually work in the industry and the softwares that we will be using in our project. Our project was to build a cloud based web application using node js and angular js.

PS-I experience: Good learning experience.

Learning outcome: Got to understand the javascript frameworks, libraries and making report and presentations.

Name: HARSH PRAVIN DABHADE (2019B5A30196G)

Student write-up

Short summary of work done: We created a cloud based acquisition system for battery management system. This project was a confluence of IT and IOT. We had to collect data from various sensors and then display them on a web app to analyse and send commands whenever needed. For this, we used tools like HTML, CSS, JS, Angular, Python and MQTT broker.

PS-I experience: Even though this PS1 was faced with many challenges due to the online mode, we were successful in executing the project. Most important learning aspect was the collaboration of team members while everyone was working from home. Keeping the team updated about the progress was major challenge due to online mode. We had lot of interactive sessions with the Shalaka team as well as the faculty mentor which strengthened our understanding of the project and its immensely vast industrial applications. Over the course of 8 weeks we built, tested and deployed a working website with all the required parameters, all while following the industry standard practices. We got to know the nuances of the documentation that is required for deploying a product which is of vital importance in Industries.

Learning outcome: I became more proficient in languages such as HTML, CSS, JS due the vast usage of their libraries in our projects. Also I learnt completely new system i.e. the MQTT broker which is used in lot of industries. Team work and collaboration also were part of the learning experience.

PS-I station: Shalaka Connected Devices LLP - Embedded Systems / IoT, Pune

Student

Name: TUSHAR KHANDELWAL (2019A3PS0291P)

Student write-up

Short summary of work done: We developed web App for controlling 3 DC motors over MQTT and collect the health status of the system and plot graph for the same using selected data. We also tried to collaborate this cloud web app with SCD-BITS-PS1-2021-09 who are making control speed and direction of 3 DC motors using PWM technique

where MCU receives commands from another system over MQTT. Here, we would also be using cloud-based IDE specifically used for programming TI boards called code composer studio. Here scripts of Python were written by us to check our final program.

PS-I experience: Overall, this internship was great learning experience for me. From the first day of our internship, we got to know about many things like IoT and its application, product development and proper documentation. Later on, we got chance to develop cloud web app where we had to develop its frontend and backend then link it to SQL database and we completed everything on time, with lots of learning and implementation. We saved the data in the database and displaying the same in tabular form of the main page of the web application. Also plotted the graph for the same using filtered data Set and monitor alerts send control commands to the controller using MQTT. I also learnt about teamwork in real project, where we all together worked really hard to complete this project properly with proper documentation. Overall, it was great learning experience.

Learning outcome: We got to know about many things like IoT and its application, product development and proper documentation. Later on, we got chance to develop cloud web app where we had to develop its frontend and backend then link it to SQL database, and we completed everything on time, with lots of learning and implementation. I also learnt about teamwork in real project, where we all together worked really hard to complete this project properly with proper documentation.

Name: KARTIKEYA KANSAL (2019A3PS0329P)

Student write-up

Short summary of work done: Developed cloud web App for IMU for stability of mobile systems such as 3-Axis Accelerometer, 3-Axis Inclinometer, 3-Axis Magnetometer and obstacle presence. We collected the data sent to us by the embedded systems team and then save it into the database. We cleaned the data and display it in tabular manner on the main page of the website. We filtered out the useful information and plot graphs from that data. Also we set and monitored some alerts for the maximum and minimum levels of the data.

PS-I experience: In the early days, the main emphasis was on learning concepts and softwares. Due to the online mode of learning, we couldn't get hands-on-experience on the electronic equipment and the remote lab. But otherwise, the theoretical knowledge that we gained was unparalleled and will stay with us forever.

Learning outcome: In the world of rising IOT technology, my project work as an evidence that IOT technology can be used to help many industries in various verticals such as production, management or even logistics. The work that I have done to create this web application will help the client to sign into the application and control and manage the data of all components of IMU. The UI/UX design is ensured to be comfortable to use and follow through. Overall, this project was most productive thing that one could have done in the summer.

Name: SMIT SUNIL SAWANT (2019A3PS0394G)

Student write-up

Short summary of work done: Our project titled '3-axis Gantry Robot' involved making web application to monitor the gantry robot. It required the knowledge of IoT and control systems. The tools used to implement this project were Node.js, JavaScript framework, MQTT 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, 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 8 weeks of PS-1, I got decent industry exposure. I learnt how projects are implemented in an organization 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 realized the importance of team work.

Name: ANMOL PRATHAM (2019A8PS0417P)

Student write-up

Short summary of work done: My PS-I project was to develop battery monitoring system for industrial applications. I was supposed to program a development board in C programming language, to develop a system which constantly monitors various battery parameters such as voltage, current, temperature, etc, and sends the data to cloud. This data is used to manage the battery and enhance its life by preventing it from operating outside safe limits.

PS-I experience: This was our first industry exposure. It was good experience seeing how to apply theoretical knowledge into practical purposes. We learnt how the industry works in a systematic way, various things involved in project other than the work itself, such as writing documentations, following a convention etc. It also helped develop team work and industry presentation skills.

Learning outcome: I learnt about industrial IoT, how it helps in daily life. Also, I learnt about various procedures and protocols involved in the development of embedded systems / IoT projects, how the coding of development boards is done and how it is tested.

Name: PRIYANSHU GUPTA (2019A8PS0440P)

Student write-up

Short summary of work done: The objective of the project is to create functional model of the gantry system that can be used in virtual embedded system to create virtual device node. The project should also created an application program that uses the device module to read the data from the data registers of the device and send the same data to the cloud using MQTT protocol. We used MQTT protocol in order to subscribe publish data from the sensor nodes. The sensor nodes recorded temperature, vibrations, speed, direction, voltage and current readings. We used HTML, CSS, MyPHPAdmiin, Python, tkinter in order to implement the web Application.

PS-I experience: It was great.

Learning outcome: I learnt JavaScript, Python, MySQl, Tkinter, HTML, CSS.

Name: NIRZARI (2019A8PS0576G)

Student write-up

Short summary of work done: Project allotted was to develop cloud web App for controlling 3 DC motors over MQTT and collect health status of the system (which include parameters: temperature, vibrations, voltage and current) and plot graph based on it for data analysis.

PS-I experience: In the first 4 weeks, learnt about Industry 4.0, product development lifecycle, IIoT and best practices to be followed for feature and design documentation. It were conducted by our mentor through online lectures. 5th week onwards, started working on the project of development of cloud web app for DC motor control. Completed it in three phases of design documentation, UI/UX designing and website development. Hemant sir provided feedback on the work done at every stage of the project. It resulted in quite good industry exposure.

Learning outcome: Learnt HTML, CSS, Javascript, Angular, Node.js, MQTT, MySQL.

Name: SAI HARSHA MUPPARAJU (2019A8PS0583G)

Student write-up

Short summary of work done: We worked on an IoT / embedded system based project. Our project was Inertial Measurement System (IMU). After we are done with the hardware, we are supposed to collaborate with another team to integrate the hardware to cloud through the MQTT protocol. We used the Texas Instruments TM4C123GXL microcontroller and code composer studio to program and interface the microcontroller using C programming language. We learnt about the importance of documenting the

design document and feature document in developing a product. We also learnt about various aspects of product development cycle from documentation to deployment.

PS-I experience: PS1 made us understand the work ethic of the organization. The CTO dedicated us sufficient time whenever we asked for it despite his busy schedule.

Learning outcome: Learnt about how an organization functions. Understood product development life cycle and the importance of documentation. Learnt the basics of embedded system development.

Name: PRANAV SHASHIKANT PATIL (2019A8PS1034G)

Student write-up

Short summary of work done: Was part of a team responsible for creating a BMS (battery monitoring system) that keeps a check on batteries of devices used in industries. Using TI launch pad and a TI booster pack, we had to code the chip in C using libraries available on code composer studio. The BMS system would report different parameters of the battery and would report to the edge computer if anything parameter would exceed its normal range. Later, the system was connected to the cloud, where it was possible to send the data to the user. We had to collaborate with the cloud team who was responsible for analyzing the data and communicating any instruction back.

PS-I experience: The experience was quite nice but could have been much better if the PS was offline. It was good understanding and experiencing the company environment. Also there was so much to learn from the mentor and the projects, had the PS been on site.

Learning outcome: Learnt about different IoT protocols, got to use MQTT in the project. Learnt about various wireless protocols like Wi-Fi, Bluetooth, Zigbee etc. Got to learn about CCS and embedded coding. Other than that, experienced the company culture and working in a team.

Name: AGRAWAL KRISHI AJAYKUMAR (2019AAPS0235G)

Student write-up

Short summary of work done: Our project was to make a battery monitoring system which has wide use now all over the world. Its an IoT device which can calculate various battery parameters such as its terminal voltage, average current, its SOC, SOH and send all these values over the cloud server by the help of UART and MQTT and on server where a proper graph of all can be plotted for easy understandings and can also take action as per the user's commands.

PS-I experience: The project alloted to me was of IoT domain and I had great experience learning. We had chance for industry exposure and had chance to listen to few great minds of our country. Being in the time of pandemic had it's own problems, but overall outcome is good. Our PS-1 Instructor was very enthusiastic which eased our problem of communicating with them. Also, the speed of learning in the start was slow, but then the speed increased and it was good to know alot of new things coming up everyday.

Learning Outcome: An idea of how important the datasheets are for any board and how to read them. Also, I got exposed to some of the Texas Instruments's hardware as our project used that. Also I learnt about various communication protocols such as MQTT, UART, I2C. At last working in a team helped me alot in improving my communication skills.

Name: LAKSHYA PRATAP SINGH SHEKHAWAT (2019AAPS0295G)

Student write-up

Short summary of work done: We design a web app for dc motor controller. We used html css and javascript to design the website and analysed the health for dc motor by subscribing the data of edge computer using MQTT broker.

PS-I experience: It was very fruitful experience. I learnt lot of industrial practices. Also how the different teams collaborate to provide the required end product to the market. I also learnt web development during my PS and designed a responsive website using it.

Learning outcome: I learnt lot of new things during PS. I learnt that documentation is the most important part of production in industries and we need to prepare design document rather than directly jumping to the code.

Name: MANAN BHARAT (2019AAPS0455G)

Student write-up

Short summary of work done: During our PS-1, our project was to develop prototype of battery management system using BMS device, MCU and sending the data to the cloud for storage, analysis, alerts and control. The first four weeks of our eight-week-long internship centered around making us comfortable with the technologies required to execute this project. We had 1.5 hours long meets every day with CTO of the company, who was personally involved in each of our projects. In the following four weeks, we started working on our projects. They gave us precise instructions about deliverables at the beginning of our project. We would have deadlines for each part, such as completing the documentation, completing our coding, completing our hardware interfacing and finally completing the simulation used for testing. At the end of this internship, we made functional BMS that would allow sensors to send the required data to cloud server. The application and 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, and our faculty in-charge 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 how to work with embedded c, microcontrollers and boosterpacks. I learnt more about many tools used for designing an electronics product like code composer studio which is used for interfacing hardware and about testing software like AnyDesk. I also have fair knowledge

of what goes into making an IoT system. I also learnt about communication protocols and now have better appreciation for them.

Name: ANISHA ANILKUMAR (2019AAPS1016G)

Student write-up

Short summary of work done: The projected allotted to us was to develop cloud web application for a DC motor. The first few weeks involved understanding the basics on how a company works and how to develop a project in step by step procedure. We learnt about Industry 4.0 and product development cycle. We learnt the process behind documentation. After the first three weeks of developing an understanding on the concepts, we were allotted our projects. We worked in the software domain. We had to develop website that displayed the data. We used JavaScript and html to develop the website. We then obtained the data from dc motor and transferred it through cloud using MQTT protocol. The data obtained was stored in database and displayed on website. We used MySQL as the database. Lot of debugging and testing was done to make the site better. We developed six versions at the end. The final version has two tabs. One to display the speed, direction, voltage, current and temperature and the other to store DID and modal number.

PS-I experience: It was great experience overall. I learnt lot on how the company works, how projects are handled by team in step by step procedure. I also learnt on industry 4.0 and product development cycle. Lot of theory that I learnt was applied and getting familiarized with applying concepts was huge bonus and take from this PS.

Learning outcome: I had good learning experience overall. I got more familiarized with javascript and Mysql, worked with great team and learnt how to develop web application.

Name: RIPUNJAY NARANG (2019B1A30977P)

Student write-up

Short summary of work done: In the project allotted to us, we have to control the speed and direction of 3 DC motors and send the data to the cloud application (made by the other group) via the MQTT broker protocol. First, the data is collected by the microcontroller unit i.e. the Texas Instrument TM4CN294XL and then the data is sent to the MQTT broker which is then sent to the cloud app using the ethernet. The microcontroller unit is also capable of sending the values of various health parameters of the 3 DC motor like current, voltage, temperature and vibration.

PS-I experience: It was fine.

Learning outcome: During the two months of PS1, I learnt various things starting from getting to know about the common industrial practices to about technical platforms used in the IoT industry.

Name: NIPUN GUPTA (2019B1A81000G)

Student write-up

Short summary of work done: Our project was to develop web App to acquire data from Battery Monitoring System to monitor the battery charge and other parameters of an electric car battery. It required the knowledge of IoT. The tools used to implement this project were Node.js JavaScript framework, MQTT and Google Firebase.

PS-I experience: Due to online mode, we couldn't get proper data from the industry nor did we get lab access. Other than that my experience was good. I learnt new things including MQTT, Edge computing, etc.

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. 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: PODDAR DISHANT PRADEEP (2019B2A81032P)

Student write-up

Short summary of work done: We worked on Inertial measurment unit where we had to collect data from 3 sensors accelerometer, inclinometer, magnetometer and send it to cloud via MQTT and UART protocols.

PS-I experience: It was good learning experience where we learnt to code in c++. We had meets with our mentor every alternate days.

Learning outcome: We learnt about the product development lifecycle of embedded sytem and to document code. We also leant how to code in c++.

PS-I station: SNS Technosys LLP - Embedded Systems / IoT, Pune

Student

Name: SINGH YOGESH AJAY (2019B4A30780G)

Student write-up

Short summary of work done: Learnt about Modbus protocol and implementing an MQTT connection on AWS server for data transfer.

PS-I experience: The Modbus learning protocol was basically just looking up online sources of Modbus and making a report, problem statement was "learn / find a way to easily integrate two Modbus devices (as of now, integrating them requires changing the master code and addresses....in short changing the basic core scripts). As for the MQTT

part, I had told my mentor about my interest in web development, so I got the project. The project was that electronic devices will periodically send their data "readings" on MQTT Mosquitto based connection, you have to set up this MQTT connection on an AWS server provided by them, get that data, upload that data on SQL database and create website to display that data (creating a dashboard).

Learning outcome: Learnt Modbus protocol, MQTT Mosquitto based connection.

PS-I station: STAR Engineers India - Embedded Systems / IoT, Pune

Student

Name: YASHIKA CHOUKSEY (2019A3PS0185P)

Student write-up

Short summary of work done: My project was about use of Battery Management Systems (BMS) in electric vehicles (2-3 wheelers). First, I learnt about the basics of BMS and its applications. Our project was to design BMS that was in accordance with all the specifications required by the company. I learnt about the various components of BMS and their working mechanisms. I also studied Lithium-ion batteries, their composition and charging mechanism. I then studied three communication protocols - CAN, SPI and I2C. Finally, I gained a broad understanding of ADCs and operational amplifiers.

PS-I experience: The PS-1 provided first-hand experience in the research field and helped me to improve my presentation skills. Due to online mode, I missed the interaction with my fellow batchmates who were working on different projects. My faculty-in-charge was very approachable and guided me whenever I required their help. My company mentors were also very accommodating and there was regular correspondence.

Learning outcome: I learnt about BMS and electric vehicles. I also improved my soft skills such as email writing conduct, slides preparation skills, group-discussion skills and many more. I also got an idea about working on a research project which would be helpful in the future.

Name: ANOUSHKA PARWANI (2019A8PS0273G)

Student write-up

Short summary of work done: This project helped me understand the working of Electric Vehicles (EVs) and understanding the flow of Motor Control Unit (MCU) along with its comprising components as we proceed further beyond the duration of PS1 simulations on MATLAB will help me clarify the theory learnt. I am now familiarised with electric motors, mainly BLDC and PMSM, which are widely used and one of the major components of EVs. I also learnt various control techniques and will be simulating them in the future.

PS-I experience: PS was definitely a learning experience for me personally. Keeping regular goals for the day and to actually complete them helped me come out of this PS as much more organised person. I also got the opportunity to see how the industry working and got more insight to the problems and difficulties. The whole process was smooth from both BITS side and the station side with everyone doing their work on time and doing what they were expected to do. To conclude, this was an overall pleasant experience and quite a memorable one.

Learning outcome: 1) Maintaining a diary -We were asked to submit diaries every week to keep a log of our activities regularly. This has really helped me be more organised in dividing work and also plan my upcoming days and set goals and deadlines for myself. This skill of diary keeping has helped me a lot and I plan to continue doing so in the upcoming semester.
2) Searching online for research and learning new things - This project really helped me to learn from online resources and to implement those things in the project.
3) Understanding of motors and electric vehicles- Learnt lot in detail about motors and their control techniques through this project.

Name: SAHAJ JAIN (2019AAPS0057G)

Student write-up

Short summary of work done: Designed a vehicle telematics system. Learnt about the applications of IoT in electric vehicles. Learnt about vehicle telematics, communication protocols, microcontrollers and interfacing, selection of modules (GNSS and cellular), improving safety and efficiency through telematics.

PS-I experience: It was great first hand and practical learning experience which helped me gain insight about the work culture, learnt about IoT and electric vehicles and gave me an opportunity to interact with industry representatives.

Learning outcome: Working of a telematics system, cellular modules and GPS, research and analysis, presentation skills.

Name: GEMBALI VISWA SAI (2019AAPS0275H)

Student write-up

Short summary of work done: I worked on project named 2G/4G IOT which deals with the uses of IOT in an automobile industry and how it is used for the functions performed by the Vehicle Telematics System (VTS) and designed VTS which has the basic functions of any VTS like crash, theft, over speed, battery notifications.

PS-I experience: The PS1 has given an idea on how an industry functions and the way of interaction among the mentors and the students has been informative and provided an understanding regarding the working environment.

Learning outcome: I learnt how to collaborate on a work with other students and mentors, understood the importance of presentation skills and knowledge over technical aspects.

Name: JINAN AHMED SARMADI (2019B2A31070G)

Student write-up

Short summary of work done: We had to learn about different batteries existing in the world that are being used in the EV Industry namely: Lead acid batteries, Lithium ion batteries and the upcoming Graphene batteries. We learnt various aspects about the above batteries like their types, chemistry, C Rates, pros and cons, applications, etc. We learnt about different battery packs of Lead acid and Lithium ion batteries. We learnt their safety approvals that need to be met before mass production and all the safety guidelines that needs to be taken care of during their use by the customer. We learnt about some mathematical aspects related to making of the different battery packs for two, three and four wheeler vehicles. In addition to this, we also learnt about some of the upcoming batteries that can be used in the EV Industry which will help the Industry to grow. After self studying all this from the internet, we had to make PPTs and submit it to our company mentors according to the topics scheduled in the project plan given by our mentors.

PS-I experience: I learnt how to interact with company officials which will help me further in my life. It has boosted my ability to talk fluently. We were given the project topic EV battery from the 5 projects that the company offered. We were told about different topics that we need to study during the week from internet and to submit PPT about the same by the end of the week.

Learning outcome: We learnt about different batteries that are being used in the EV Industry. We also got to learn about the upcoming batteries which has scope for research and can help me in future. It also made by communication skills better and also helped me how to present my work on a power point presentation. We also learnt about in depth knowledge about different batteries like Lead acid and Lithium ion batteries.

Name: SAKSHAM MADAN (2019B2A80208P)

Student write-up

Short summary of work done: Our project was based on different batteries existing in the world, that are being used in the EV Industry. We learnt about Lead acid batteries, Lithium ion batteries and the upcoming Graphene batteries. We got an insight on various aspects about the above batteries like their types, chemistry, C Rates, pros and cons,

applications, etc. We also learnt about different battery packs of Lead acid and Lithium ion batteries. We studied about the safety approvals, that need to be met before mass production and all the safety guidelines that needs to be taken care of during their use by the customer. We also learnt some mathematical aspects related to making of the different battery packs for two, three and four wheeler vehicles. In addition to this, we also learnt about some of the upcoming batteries that can be used in the EV Industry which will help the Industry to grow. After studying all this from the internet, we had to make PPTs and submit it to our company mentors according to the topics scheduled in the project plan given by our mentors.

PS-I experience: I got to know about how to interact with company officials which will surely help me further in my life. The components like seminars, GDs, etc. has helped me lot to improve my communication skills . We were given the project topic EV battery from the 5 projects that the company offered. We were told about different topics that we need to study in the week on the internet and to submit PPT about the same by the end of the week by consulting the resources on the web.

Learning outcome: We got an opportunity to learn about different batteries that are being used in the EV Industry. We also learnt about the upcoming batteries which has scope for research and can help me in future. It helped me to improve my communication skills and I got to know about how to present my work effectively and concisely on a Power Point Presentation. We got to learn a lot of new things about different batteries like Lead acid and Lithium ion batteries and also about some of the upcoming batteries that have a really promising future.

Name: SRI RAM BADALGAMA (2019B2A81119H)

Student write-up

Short summary of work done: My project was about building a Battery Management System (BMS) for 2 & 3 wheeler electric vehicles (EVs) with the specifications mentioned by company. It's mostly a study project where I have to particularly study the components of this BMS thoroughly. I was supposed to study each component and memorise it's functions, specifications and other applications. I have been told that prime components of BMS are MC33771C, S32K144 evaluation boards and they come with coded software, which eases my job to build BMS of mentioned specifications by company. My work is mainly about managing the components effectively with the help of my industry mentor and requires indepth comprehension of each component. I was assigned new topic to

study, in an order, in every 2-3 days and I have to hold a grip of same and should submit a PPT of noted important points.

PS-I experience: Though I did not know the basics of my core branch as I am a dualite, I managed to study all components by taking considerable amount of time.

Learning outcome: 1. Get to know some basic topics like microprocessors, communication protoc protocols, etc. 2. Improved PPT preparing skills 3. Met new people.

PS-I station: Vidcentum R & D Pvt. Ltd., - Machine Learning / DSP / AI, Hyderabad

Student

Name: JATIN SINGH (2019A7PS0085G)

Student write-up

Short summary of work done: The project entrusts us to create a self-contained code library that helps us in visualizing sensors' data incoming through json packets by first analyzing the packets and populating the respective CSV files. After populating the files, respective pre-processing is done and required graphs were generated by reading the configuration requirements. The aim of this project is to deliver an executable written in C++ that performs these operations and harnesses the power of different C++ libraries to achieve this.

PS-I experience: It was good as the instructor was very knowledgeable and helped us in overcoming every roadblock.

Learning outcome: It was my first time developing with C++, so I learnt lot about how to write clean code and integrating various libraries and making them work harmoniously. We also got to know about various statistical and descriptive methods to visualize the data and plot it in C++.

Name: LAKSHYA (2019A7PS0123P)

Student write-up

Short summary of work done: Built a plugin for major data analysis project that provides descriptive analytics on data. This plugin is an independent library that I built. I also got to understand JSONs, gnuplot and C++.

PS-I experience: Good learning experience.

Learning outcome: Programming in C++, understanding data analytics at very detailed level, understanding library creation, better report making, data visualization, communication protocols, networking, parameterization, etc.

Name: RACHIT JAIN (2019A7PS0140G)

Student write-up

Short summary of work done: My task was to prepare CPP executable, which helped visualize the data collected by IoT sensors. The JSON packets received from each sensor will be used to populate the CSVs file for each sensor, pre-compute some data analytics results for each sensor's data, open the Gnuplot files and plot the required graphs mentioned in the configuration file. This executable file will be integrated into the company's main software helping the users visualize the data collected by the sensors.

PS-I experience: PS-1 was an amazing experience for me. My mentor held daily meetings, resolved all our doubts and kept special debugging sessions. The constant support of my mentor and my teammates helped me gain better insight and understanding of data visualization techniques using CPP and its libraries.

Learning outcome: PS-1project was my first industrial project. It gave me gist of how the industries work and how different codes are integrated into one library-like structure. I also learnt how to document the code correctly so that future teams could adequately work on the project. Some of the other things I learnt were properly debugging the code, understanding the documentation of different libraries, understanding how to use different libraries and properly integrate them into the main program. Making the entire code into a library-like structure was also something I never did before.

Name: PRANEETH CHAITANYA JONNAVITHULA (2019A7PS1111P)

Student write-up

Short summary of work done: The work done in PS-1 was the application of various predictive analytics algorithms such as K nearest neighbours and K means algorithms on data readings obtained from various sensors. We learnt the loading of query data and performed various clustering techniques on this data through reference training sensor data given to us by other projects and made predictions on this data. We were taught efficient tools and techniques to run these algorithms and their importance in edge analytics.

PS-I experience: It was good learning experience. Our mentor was very knowledgeable and was very enthusiastic in explaining us the project and concepts. Meets were conducted on regular basis to ensure that most doubts were cleared.

Learning outcome: I learnt about IOT and edge analytics and their practical applications through this experience. I also learnt about various predictive analytics algorithms and got better idea on how data clustering and prediction takes place through hands on experience and platforms like Orange which made visualisation easy. I also got better grip on C++ language and learnt the use of some important libraries like MLPack Taskflow and Armadillo.

Name: CHATURVEDULA LAKSHMI MOUNIKA (2019A8PS0621H)

Student write-up

Short summary of work done: My project was about collecting information on various Arduino-based non-Modbus sensors based on the SI units of the quantity it measures, the type of output (analog/digital), whether stored in 16 or 32 bits, etc. Based on collected information about sensors output, the data must be sent to the smart data loggers containing Modbus as web socket server in JSON packets. It takes the data from the Arduino-based sensors in a request and response method. The data collected is then formatted in YAML files, data serialization language and is sent to the gateway. The same data can also be used for predictive and descriptive analysis.

PS-I experience: It was good experience. PS-1 Industry mentor helped us understand these concepts well and clarified our doubts through regular sessions with all the teammates. Suggestions and feedbacks from PS-1 faculty mentor helped in honing my presentation skills. All in all, it was great learning exposure.

Learning outcome: Learnt about various communication protocols, network protocols, the need for data loggers and how to represent the data digitally using YAML files.

Name: ASIM ABDUL BARI (2019AAPS0215H)

Student write-up

Short summary of work done: Implementing predictive analytics using algorithms like K-means and K-Nearest neighbor. Firstly, the team was divided into 3 groups. Group 1 processed the data and passed this data as JSON file to group 2 and 3. Being part of group 3, we have to take this data and convert it into CSV file so that we could perform predictive analytics. We began with using the tool Orange which was taught specifically to get visual demonstration of the task that was to come. We were then supposed to code this flowchart in C++. This was done by loading reference data and training a model using this that would classify future query data into one of the categories. The classes were formed using K-means algorithm and the query data was classified using K-NN algorithm which looks for K number of closest data and classifies it on that basis. We looked up on the official Mlpack website in order to get an understanding on how to implement these algorithms. We worked on multithreading this code.

PS-I experience: Virtual internship with regular team sync that occurs everyday bar Saturday and Sunday. Team members and mentor were always helpful and responded to queries and made time for calls if I had extensive doubts. Expectations in terms of work involved regular updates on the program code and clear documentation of work done in a format that can be understood by the team.

Learning outcome: Tools used in data analytics industry like Orange and algorithms like K-Means, K-Nearest neighbor and execution of multiple threads in C++ using Taskflow.

Name: YATHARTH TANEJA (2019B4A30618P)

Student write-up

Short summary of work done: The main aim of the project was to use instance-based learning algorithms such as K nearest neighbors algorithm in order to find the points in the training model, that are the closest or most similar to the query data. These neighbours would then be sent for further analysis to find patterns among the query data and the nearest neighbours to understand the nature of the query data. The project's goal was to contribute to the development of feature of the project station's product that would receive sensor data from other projects and after some computations, determine which data points in the pre-constructed training model the query data was most comparable to. The project station would then use this information to do further in-depth clustering techniques to uncover underlying patterns in the query data's neighbours and to gain an idea of the sensor's current functioning status and visualise it.

PS-I experience: PS-I experience was very fruitful. Both, the industry mentor and PS faculty were very nice and organised. Regular meetup sessions were held every week. The industry mentor was very knowledgeable and taught some of the difficult concepts very well. He explained the project very thoroughly during the first week. Various communication channels were setup where in we had to provide daily updates about our work progress. Also, the same channels were used for doubt clearance. The project allotted to me was very much in line with my interests. So, that made the PS-I very fruitful for me.

Learning outcome: The key learning outcome was about the hands-on practice with C++. I had only basic knowledge about C++ but after implementing two of the most widely

known ML algorithms - kNN and k-means, I was able to gain more in-depth knowledge about C++ language. Also, the concept of multithreading was really helpful in the project.

Name: SHREYAS PANYAM (2019B4A70183P)

Student write-up

Short summary of work done: The aim of the project was to do predictive analytics and cluster incoming sensor data into categories using learning algorithm.

PS-I experience: The mentor was extremely patient and spent lot of effort to make sure we understood and learnt about the work we had to do. He was also easy to approach and clarified doubts so we were able to quickly understand the project and under his supervision, we were able to finish the project efficiently. The overall experience was extremely positive, as we were able to learn a bit about how the industry works and also build some skills in data analytics.

Learning outcome: I learnt about certain data analytics techniques and also improved some other skills like maintaining code and programming.

PS-I station: WeSwap Mobility Solutions - App Development, Indore

Student

Name: ISHAN GARG (2019A7PS0034P)

Student write-up

Short summary of work done: I worked on building a new mobile application for WeSwap mobility solutions. WeSwap mobility solutions is an Indore-based startup

working in the field of electric vehicles (EVs) to bring vast improvements in the sector. The platform helped to create can be used for finding nearby stations to swap batteries, choosing a battery for EVs and managing the payment process digitally. I worked mainly on the backend part of the application. I used ExpressJS to build the backend application and MongoDB for the database. I also used Mongoose for connecting the database to the backend application. I hosted the entire application on Heroku and used postman for the documentation, facilitating the process of API integration.

PS-I experience: My PS-1 experience was wonderful. This online mode of PS-1 was relatively new so there were lot of new experiences for everyone involved. I interacted with the founders of the company personally, the interactions were very friendly and laid back. The faculty assigned to me was also very responsive and helpful. Overall, I can say that it was an eye-opening and fruitful experience for me.

Learning outcome: I learnt lot of technical as well as soft skills. Having been a frontend developer for a long time, I was always curious about how things worked in the backend. This project gave me great opportunity to explore exactly that. Consequently, I learnt ExpressJS and MongoDB, technologies that are necessary and sufficient for building a backend application. Other than that I learnt about how things work out there in the real world, how actual industry work is done, which was very helpful. I definitely improved my communication skills and also learnt to manage my time and to work with specific deadlines in mind. All things considered, I learnt lot of new things.

Name: SAAHITHI SONATI (2019A8PS0522H)

Student write-up

Short summary of work done: We swap specialises in providing exchangeable batteries to two and three wheelers which when they die out can be easily swapped for another one. Our team was responsible for making an app for them which consisted of the user's profile, their vehicle (s) details such as SoC, range, temperature, etc. For this project we had used flutter framework for front-end and nodejs, expressjs and mongoDB for the back-end.

PS-I experience: This station might be little more demanding compared to an average PS station, but the outcome is worth enough. For developer enthusiasts, this is a perfect start. Knowing little JavaScript from get-go isn't necessary but definitely helps. I was part

of front-end team for the first three weeks and shifted to backend for the rest of the duration. My major role was to ensure smooth, safe and secure authentication of a user.

Learning outcome: We covered wide range of topics in these 7-8 weeks. Apart from the frameworks used for the front-end and back-end, we designed our pages in Figma. We used emulators and postman to get an accurate depiction of the code's performance, also learnt about the importance of version controls in the tech world and various functions of git and GitHub. Lastly, Google and stackoverflow helped in every way possible throughout our PS.

Name: AYUSH KUMAR SINGH (2019AAPS0311G)

Student write-up

Short summary of work done: An cross platform based app used by customers with the following functions: check the SoC of the battery, locate the nearest WeSwap stations, selection of number of batteries, electronic payment, etc.

PS-I experience: The experience was all together fascinating and the challenges we faced due to the COVID situation added up to the learning experience. Though, we were unable to get the industrial environment but the frequently scheduled meetings with the industry mentor gave no less than the actual experience which we would have got at the industry.

Learning outcome: I was new to this field. I learnt dart programming language and flutter for cross platform app development. I also learnt how to design UI/UX in figma, lot about storing data in back-end using database like MongoDB and Amazon web services, how to use Git and GitHub for collaborative work purposes. I also learnt how to code APIs for apps.

Name: MANAS CHATURVEDI (2019B3AA0488G)

Student write-up

Short summary of work done: I worked on building a new mobile application for WeSwap mobility solutions. WeSwap mobility solutions is an Indore-based startup working in the field of electric vehicles (EVs) to bring vast improvements in the sector. The platform helped to create can be used for finding nearby stations to swap batteries, choosing a battery for your vehicle and managing the payment process digitally. I worked mainly on the frontend part of the application. I used Flutter framework with Dart programming language.

PS-I experience: My PS-1 experience was wonderful. This online mode of PS-1 was relatively new so there were lot of new experiences for everyone involved. I interacted with the founders of the company personally and the interactions were very friendly and laid back. The faculty assigned to me was also very responsive and helpful. Overall, I can say that it was an eye-opening and fruitful experience for me.

Learning outcome: I learnt lot of technical as well as soft skills. On the technical side, I learnt all the aspects of how to build cross platform mobile application, render data dynamically, respond to user interactions and fetch data from the backend. Other than that I learnt about how things work out there in the real world, how actually industry work is done, which was very helpful. I definitely improved my communication skills and also learnt to manage my time and to work with specific deadlines in mind. All things considered, I learnt lot of new things.

Name: ANIRUDH SINGH (2019B5AA0768G)

Student write-up

Short summary of work done: Our project was to make an app for the company, which shows the battery status, nearest Weswap stations, etc. To start, we decided to use the Flutter framework for the UI design part and mongoDB, node.js and Express for the back end part. We started to code for some frontend pages and completed the UI/UX design on figma and started to work on the profile page of the app along with user flow and use cases. For the weeks to follow, we worked on various pages and combined them. We then started with API calls integration. As for the back end part, the first 4 weeks for learning and designing our database, making E-R diagrams and preparing the flow of the

application. We learnt how to use Nodejs for the backend and mongoDb for the database. The next 4 weeks were spent on actually implementing these. We started out the second half by preparing a schema according to the E-R diagram and connecting it to our express application. We added relevant APIs and hosted the application on a server for easy access to the frontend.

PS-I experience: My PS-1 experience was great. This online mode of PS-1 was relatively new so there were lot of new experiences for everyone involved. I interacted with the founders of the company personally and the interactions were very friendly but enlightening at the same time. The faculty assigned to me was also very responsive and helpful. Overall, it was an eye-opening and fruitful experience for me.

Learning outcome: It was great learning experience for me personally. I had some prior experience in front end for websites so learning app development for back end was great. Apart from the coding skills, we also improved our communication and interpersonal skills

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Name: OM PATHAK (2019A3PS0298G)

Student write-up

Short summary of work done: The work done in this project was primarily research based. We had to find different government policies and subsidies, both state and central which pertained to battery swapping technology. Apart from this, we also had to research about different certification that needed to be attained, specifications that needed to be satisfied by the company while making their product. Finally, we were also asked to research and analyze the EVs sales in India. Concluding, we had to make detailed report that will help the company after it completes its product.

PS-I experience: The overall experience of PS was good. The industry mentors were very helpful, they held weekly meetings and provided valuable feedback on the work done during the week, they were flexible with work deadlines and provided adequate time to incorporate changes and additions. The PS faculty was also supportive and provided suitable guidance.

Learning outcome: The project helped me to learn about battery swapping technology which is upcoming field in the domain of EVs technologies. I also gained valuable

research experience while searching about government regulations, guidelines, policies on battery swapping. The project also helped me to work on my time management skills as we had to share our findings regularly, though the deadlines were not so stringent. The company also had invited industry experts to guide us in the project, the interaction with them was also valuable experience.

Name: SAATVAT GUPTA (2019A8PS0161G)

Student write-up

Short summary of work done: I worked on technical research project that discusses the scope of battery swapping technology and evaluation of the existing and upcoming government & ARAI standards and regulations regarding batteries and swapping stations, particularly focused on 2 and 3 wheelers.

PS-I experience: The overall experience was good. Due to lockdown, we worked from home, so most of the time, I was studying and exploring various articles and documents about my research and created a brief report on that topic that the company assigned us. Towards end of the week, we had google meet with the company mentors that evaluated our report and set us the task for next week. The mentors and PS faculty were supportive and provided us with necessary resources to complete this research.

Learning outcome: Developed interpersonal skills, learnt various management skills, gained much-needed industry exposure despite the pandemic and enhanced technical knowledge on battery swapping technology and electric vehicles.

Name: SALAJ MALIK (2019A8PS0375P)

Student write-up

Short summary of work done: Read battery rules and regulations set by indian government and made a report. Read about battery cooling and sales data of 2 and 3 wheeler EVs and added it to the report.

PS-I experience: Company mentors, PS-1 faculty were good and helped whenever needed. Mentors were always there to help us.

Learning outcome: Learnt various management skills, knowledge on battery swapping technology and electric vehicles.

Name: PROJEET ROY (2019A8PS0618H)

Student write-up

Short summary of work done: It was research work on certifications and standards of electric batteries. It involved analyzing the government standards on electric batteries, battery swapping and diiferentiating the rules according to the requirements of the company. It also involved preparing a report on the above and investigating the different components of electric batteries.

PS-I experience: It was interesting and involved learning new fields. Online PS made the timings flexible but made it difficult to get to know about other people in the group.

Learning outcome: We learnt lot on battery technology and various other components. It helped us understand the various difficulties faced while applying for certification of new technology.

Name: R. ADITHYA KARTHIK (2019AAPS0212G)

Student write-up

Short summary of work done: Technical research in battery swapping industry, prepared a report titled standards and regulation evaluation for battery swapping in India.

PS-I experience: Good learning experience.

Learning outcome: Learnt about battery swapping industry in India.

Name: GOSAVI ADITYA SANDEEP (2019B1A80963P)

Student write-up

Short summary of work done: My project title was "App development" and along with me I had team of 7 members. Our final goal was to make fully functional Android and iOS application for WeSwap. The app will show all the information regarding the battery details and the weswap charging stations. So my work was to make the client side (development) of the app from scratch. In the span of 8 week, I successfully developed an app for WeSwap along with my teammates. We used Flutter framework for app development which is extremely good and flexible. We learnt flutter and developed the app in flutter environment.

PS-I experience: First time industry experience was good, but as WeSwap was a start up, we had lot of work to do.

Learning outcome: Learnt Flutter framework, dart Language, git, GitHub. Improvement in communication skills, presentation skills, etc.
