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

CHRONICLES

Govt Research Labs

PRACTICE SCHOOL - I

Summer - 2019

From the Desk of the Editor

It is my great pleasure to bring forth the inaugural edition of the PS-I Chronicles. This edition features over 2243 articles from PS-I students sharing their experiences during summer 2019.

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 six 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
- Chronicle 6: Government Research labs.

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, Dr. 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

Table of Contents

Domain: Government Research Labs

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

Student

Name: Ajitabh Rawat (2017A8PS0258P)

Student Write-up

Short Summary of work done: My project involved design and development of Bi-directional DC-DC converter (Vin = 24V, Vo = 48V, Po= 700W) using MATLAB Simulink. In order to get a stable performance, designing an appropriate PID controller was also required. The work also focused on MATLAB simulation of voltage/current feedback PID controller along with DC-DC converter. The project also involved the design and analysis of a differential OP AMP in order to step down the output to a safe level for measuring equipments.

PS-I experience: I really enjoyed my PS-I. I also got to learn a lot about power electronics.

Learning outcome: I learnt basic concepts of DC-DC converters.

PS-I is an exposure oriented course: I strongly agree that PS-I is an exposure oriented course.

Name: Shagun Bhargava (2017B1A80413P)

Student Write-up

Short Summary of work done: My work during PS-I comprised the study of multispectral Imaging in the field of agriculture, so as to monitor the health of plants. To achieve this, I had to undergo a thorough study of various research papers. After the mid-term, to implement the idea on MATLAB, I switched to writing a code for detection of area of affected plant, the type of disease and related factors with the help of Image

processing. To be able to compile and run the code successfully with the help of a suitable algorithm, I scrounged different research articles and MATLAB directory.

PS-I experience: My PS-I introduced me altogether to a new field of multispectral Imaging and Image processing.
All through this one and a half month journey, I gained knowledge, friendship, met some brilliant scientists and got an insught about time management.

Learning outcome: I summarize my learning outcomes as follows,
1) Experiencing the work life of one of the finest government research labs.
2) Getting introduced to electronics as a whole new subject.
3) Getting well versed with Image processing and MATLAB.

PS-I is an exposure oriented course: Indeed, CEERI gave me the exposure to research and helped me develop a clear vision as to the functioning of the government research labs.

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

Student

Name: Soham Agarwal (2017A3PS0345P)

Student Write-up

Short Summary of work done: Our project was based on the autonomous navigation of drones. For this, we learnt Robot Operating System which is a platform to interact with robot nodes. We used Gazebo- a simulation world and PX4- a flight controller to interact with our drone.
Our aim was to design position controllers for our drone that would work better than the inbuilt controller present in the drone. We used the concept of a PID controller to control the drone's navigation and applied an Artificial Intelligence technique known as Particle Swarm Optimization to obtain the best parameters for our controller.
We used ROS, Python and MavROS which is a messaging protocol to program the code for our controller. After designing our controller successfully, we compared it with the original controller.

Next, we designed an outer loop controller using functions such as roll, pitch, yaw and thrust for navigation.
Finally, we worked with a Intel Realsense Depth Camera to perform simultaneous localisation and mapping- a technique to create a map and obtain the device's location inside the map at the same time.

PS-I experience: Working in CEERI was a great experience. The institute is focused on Machine Learning, Deep Learning and Artificial Intelligence. So, I got to interact with everyone in the office and got an entire new vision on the topic. We got to work on devices and expensive equipments which we would never have even seen and work culture there motivates you and inspires you to keep on exploring new possibilities in our domain.

Learning outcome: I got to work in one of the prestigious research institutes of the country. It gave me the opportunity to experience and learn from the work culture, where everyone was working on some new cutting edge technology. I learnt a lot of technical things about my project and got to work with devices such as drones and depth cameras.
I learnt how to present my work properly and interact with everyone in the office and learn from then and discuss ideas.

PS-I is an exposure oriented course: Yes PS-I definitely gives you a lot of exposure in working with in a company and how to interact with your colleagues and bosses. It allows us to examine and get involved in the process of work and allows us to use our knowledge in real life problems.

Name: Deepansh Goyal (2017A3PS0312P)

Student Write-up

Short Summary of work done: The project was based on the autonomous navigation system of drone. We used ROS as a medium to program the drone. The flight controller used was PX4 and all the simulations were performed in Gazebo. The controller for velocity used was a PID controller and we used Particle Swarm Optimization to decide the parameters of the controller that is Kp, Ki, Kd. Next emphasis was laid towards Intel RealSense d435i. It is a camera used to locate obstacles in the environment around the drone.

PS-I experience: It was a nice experience overall. I got to see and learn many things i have never seen before. Also, met a lot of great people developing healthy contacts with them. There were a lot of learning outcomes and it helped me improve my

presentation and communication skills. There's a lot of things that I got to learn these summers.

Learning outcome: There were several learning outcomes. First of all, I got to work in one of the prestigious institutions of the country and see how they work in their offices. Second, of all there were several things I learnt, that includes the Robot Operating System, simulator Gazebo, Flight controller PX4, Particle Swarm optimization.

PS-I is an exposure oriented course: Yes, PS-I is an exposure oriented course as it helps a second year student in providing him / her with industrial / office exposure and how work is done in reality.

Name: Abhishek Chaudhary (2017A7PS0095G)

Student Write-up

Short Summary of work done: Made an app in unity that projects 3D models on a particular image (target image) using vuforia (sdk extension in unity), made models in blender and animated them in unity. App aims to teach students about SI units.

PS-I experience: Great staff. Many fields to choose from. Timings - 9:30-4:30, 5 days a week.

Learning outcome: Exposure to augmented reality, beginner level unity, beginner level blender.

PS-I is an exposure oriented course: PS-I is little theory and more practical application.

Name: Sakshi Paliwal (2017A8PS0607P)

Student Write-up

Short Summary of work done: The work done involved implementation of augmented reality project in education. The project was mentored in by top researchers and implemented.

PS-I experience: It was good experience. Learnt a lot.

Learning outcome: Well active in unity, vuforia and blender.

PS-I is an exposure oriented course: Yes, it's true.

Name: Anand Jyoti Tripathi (2017B1A10786P)

Student Write-up

Short Summary of work done: I was given a project to predict the air quality index for 24 hours in the future using a model developed using Machine Learning and Deep Learning.

PS-I experience: It was good and learnt a lot of new things.

Learning outcome: Machine Learning.

PS-I is an exposure oriented course: Agreed

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

Student

Name: R Hariram (2017A3PS0373G)

Student Write-up

Short Summary of work done: PS-I project was titled -"Design and development of non-contact ECG electrodes". Work was focused on researching possible methods to achieve an ECG acquisition system which invloved reading and undertanding various research papers on the topic. Finding and gaining access to relevant research papers to this topic was a task in itself and a lot of time was spent on the same. After understanding the requirements, design and simulation of circuits was done in multiple stages till a satisfactory result was obtained. Post successful simulation, the required electronics components were ordered and the hardware implementation was carried out. The mistakes were corrected and the circuit was refined until the expected output was obtained. Overall, the work involved a lot of initial reading and undertanding. Good knowledge of circuit simulation softwares such as PSpice and TINA was required. MATLAB programming also helped a great deal. Concepts from courses such as Microelectronic circuits and Electrical sciences came in handy when designing the circuit. It also invloved learning how to use many important lab equipments such as mixed signal oscilloscope, waveform generator, soldering machine etc. Finally, the report making and seminar presentation was also done, which was a test of communication and report writing skills.

PS-I experience: Overall, the experience was very productive and rewarding. The station made sure that we were provided with all necessary facilities to carry out our work. Scientists and mentors at the station were very approachable and helped in our work whenever needed. Faculty was also helpful and helped in our evaluation components as well. The team that I worked with was focused and helpful in completing the project.

Learning outcome: A lot was learnt from this PS-I. First off, I learnt the functioning of a government run research lab and the work done there. I learnt important skills related to my field of study - electronics, such as operating an MSO, a function generator etc. I learnt to design analog filters while applying theoretical concepts. To simulate them, I learnt softwares such as PSpice, TINA and MATLAB. I learnt best practices and things to keep in mind while practically implementating analog circuits. Finally, I learnt to make better presentations and technical reports.

PS-I is an exposure oriented course: I agree with the statement. PS-I gave a lot of exposure to the current areas of research in my targeted field of study. It also exposed me to the works of scientists in the field today and their research focus.

Name: Parekh Prashil Bhaveshbhai (2017AAPS0227G)

Student Write-up

Short Summary of work done: Today health monitoring devices have entered in all fields and are especially very much in demand in wearable devices. Our project was

designing and development of wearable device prototype which uses data collected from PPG sensor and process it using Python to predict heart rate and its variability measures. The methodology includes collection of PPG signals through pulse sensor interfaced with NanoPi NEO air and further using digital signal processing techniques and algorithms like Adaptive filtering, Butterworth filter, Moving Average filter etc. to filter out noise in the data collected. This filtered PPG signal data is then used to calculate heart rate variability parameters like RMSSD, PNN50, SDNN, LF/HF ratio which determines how healthy a person is.

PS-I experience: PS-I experience was overall nice for me. The mentor allotted to me was good and he used to monitor us almost daily during our project and used to help my group and me whenever required. Made some good friends from all the campuses and PS-I also helped to increase the leadership skills.

Learning outcome: Learnt about interfacing of sensors and digital signal processing techniques to remove noise from signals and also learnt a bit of biology concepts on PPG signals.

PS-I is an exposure oriented course: PS-I is an exposure oriented course if we are in an industrial PS-I station and my PS-I station is a research oriented PS-I station so for me it was a research oriented exposure.

Name: Rishabh Bajpai (2017A7PS0121G)

Student Write-up

Short Summary of work done: I helped improve the data extraction pipeline for a study aiming to correlate and eventually, predict arrhythmic conditions of the heart from a quick measurement of a person's heart rate using a smart watch. This included fixing bugs with the socket program between the watch and the computer; improving, verifying and adding to the data extraction algorithms that collect stats from the heart beat information. I also worked on a drowsiness detection system which used a video input to detect a person's fatigue levels. The first stage involved optimized the program written for a large CPU on a computer. I applied multiprocessing to improve the program's FPS from 15 to 50. The next step was writing a variant for small boards, such as Nvidia Jetson/Xavier. This program was demonstrated to industry professionals, during an exhibition at CEERI on 8th July, 2019. My work also involved adding documentation to every code related to the project.

PS-I experience: PS-I at CEERI was well focused on project work. There was no time wasted on long orientations. The projects were allotted on day 1 itself. The scientists

and staff were very helpful. While the scientists were pretty busy, most of them talked to us at least once a day. They were very patient while clearing our doubts. Any equipment / software required was provided promptly, given that its use was justified. The center is close to a local train station and is reachable by metro as well; so connectivity was not an issue. Overall, It was a professional research environment.

Learning outcome: I observed how projects are developed at research laboratories from ground up. I learnt about the TRL level of a project and how industries are invited for partnership. I also, learnt a lot of technical details and realized the importance of documentation of code. Working in a professional environment changed my perspective on what qualities one should focus on.

PS-I is an exposure oriented course: The exposure I gained at CEERI helped me put into perspective my place in academia and in the industry. I agreed with the above statement.

Name: Bhoomi Shah (2017A3PS0249G)

Student Write-up

Short Summary of work done: Interfacing and set-up of a lock In an amplifier for Terahertz Detection.

PS-I experience: A very different experience than I had expected wherein I learnt a variety of things in a broad field of electronics and computer science.

Learning outcome: Learnt python, desktop application development, data analysis, working with Raspberry Pi, interfacing, use of operational amplifiers, Arduino and how to conduct imaging experiments.

PS-I is an exposure oriented course: Yes, apart from quantifiable learning, I learnt a lot about the workings of the research community in India.

Name: Vibhu Verma (2017A3PS0189P)

Student Write-up

Short Summary of work done: Today health monitoring devices have entered all fields and are especially very much in demand in wearable devices. This report is about the design and development of wearable device prototype which uses the collected data from PPG sensor and process it using python to predict heart rate and its variability measures. The methodology includes collection of PPG signals through a sensor interfaced with NanoPi NEO air and further using digital signal processing techniques and algorithms like Adaptive filtering, Butterworth filter, Moving Average filter etc. to filter out noise in the data collected. This filtered PPG signal data is then used to calculate heart rate variability parameters like RMSSD, PNN50, SDNN and LF/HF ratio.

PS-I experience: The experience was great and came to know about the functioning of research center.

Learning outcome: I learned about python and microcontrollers.

PS-I is an exposure oriented course: Very True.

Name: Miloni Mittal (2017A3PS0243P)

Student Write-up

Short Summary of work done: The project assigned to me was based on the use of PPG and wearable technology to detect arrhythmias. Samsung watches are used to collect PPG data. We developed a web socket program to transfer the data to a PC. I also developed a program using python and MATLAB libraries to find out if the smartwatch-user has arrhythmia or not. We developed a GUI using python Tkinter libraries, so as to view the results on a personal computer live. The GUI displayed the moving heart beat graph on a live basis.

PS-I experience: My PS-I experience was decent. The project was good and I learnt a lot.

Learning outcome: I learnt how to use Python, Octave and MATLAB.

PS-I is an exposure oriented course: Yes, I agree with the statement. It is an exposure oriented course. Just after second year, we lack the knowledge of industrial applications of whatever we learnt. Moreover, we get hands-on experience in the industry. Mostly, we get to know about whatever is required to actually work on projects rather than just theoretical knowledge.

Name: Rajebhosale Omkar Veersingh (2017A8PS0321P)

Student Write-up

Short Summary of work done: With the advent of machine learning and signal analytics, the task of identifying and qualitatively assessing components in adulterated products has become fast and versatile. The aim was to develop an online process of identifying the hidden independent components in the NIR spectra of different commercially available products to detect adulterants present in these products. We proposed an implementation to perform Independent component analysis using MATLAB. The code is capable of finding the independent components of a mixture. Subsequently, the plots of independent components were obtained and deconvolution techniques were applied to identify the actual independent components.
We were successful in identifying jaggery and corn syrup adulteration in honey. Also, identifying jaggery in trikadu was successfully completed.
The peakfit software was used for peak comparison. It is a robust method but still fails for minor cases. It can be improved with further correlation coefficient analysis. We hope the next batch carries the project forward and leads it to success.
This can help in building an effective as well as efficient on-line instrument for quality assessment in any industry.

PS-I experience: Colleagues were very friendly and it was a socially enriching experience. Our mentor guided us sufficiently and made sure we didn't slack at work. Everyone worked hard and put a lot of effort in their work every single day. All in all, it was an amazing experience and I would recommend this PS-I to anyone who wishes to gain some experience in ML and is incessant by the water crisis.

Learning outcome: Learnt higher order statistics specifically Lagrangian multipliers. I have become proficient at Matlab programming and Peakfit software. Learnt the essence of implementing research papers. Gained social skills to gel with people and had some amazing problem solving experiences.

PS-I is an exposure oriented course: Yes. Exposure to all problems and solutions in the world. It is overwhelming at times but the people around you make it easier for you.

Name: Kshitij Chhabra (2017A8PS0691G)

Student Write-up

Short Summary of work done: Today, portable, compact and user-friendly devices have entered all fields of our daily needs. The physical activities performed by an individual are indicative of one's mobility level. On conducting a literature survey it was found that accelerometers have been widely accepted as useful and practical sensors for wearable devices to measure and assess these physical activities. In this project, we developed an accelerometer which gave us the raw values for the acceleration of an individual in all of the three-axis, signal processing was performed on it to find out the peaks and thus the number of steps taken. On integration with a GPS, a more accurate number of steps could be found and thus the exertion levels.

PS-I experience: It's a wonderful experience. People learn new skills and various life lessons.

Learning outcome: Most of the work done here was only first year stuff but gave us an idea how things work over here in an organisation.

PS-I is an exposure oriented course: Yes.

Name: Anhadveer Khokar (2017A8PS0714G)

Student Write-up

Short Summary of work done: The project assigned to us was 'Design and Development of Non-Contact ECG Electrodes'. Our initial research was done by reading related papers and datasheets to determine the best way to go about the project. Existing methods of ECG acquisition are contact methods and hence are ineffective while building a driver fatigue detection system. We designed a filtering and amplification circuit in TINA software using INA333 and a feedback circuit using OPA333 to accomplish this. We simulated the output and got a perfectly amplified ECG output. We then moved on to the hardware implementation where we learnt about various devices and real life circuitry building. We built a working circuit first using contact sensors. Then we built our INA333 filtering circuit and received a good output. Attempted to verify if the EPIC PS25253 sensor can be used for this application.

PS-I experience: The experience was very rewarding and informative. Our PS-I Instructor was very helpful and supportive. Our mentor and CEERI provided us with all the facilities we needed to work on our project. I highly recommend this PS-I station.

Learning outcome: I learnt a lot from this PS-I. I learnt about the functioning of a government research institute and its various labs and the work they do.
I learnt important skills related to my field of study - electronics, such as designing circuits, software simulations, hardware implementations etc. I learnt to design analog filters while applying theoretical concepts. To simulate them, I learnt softwares such as PSpice, TINA and MATLAB. I learnt how to use INAs, OPAs and other electronic components while building circuits. Finally, I bettered my soft skills including technical report writing and presentation.

PS-I is an exposure oriented course: I completely agree. PS-I gives us a taste of research and its industrial applications. We get to experience hands-on work and learn practical concepts to improve our studied theoretical concepts.

Name: R S Balajee (2017AAPS0212G)

Student Write-up

Short Summary of work done: PS-I project was titled "Design and development of non-contact ECG electrodes". Work was focused on researching possible methods to achieve an ECG acquisition system which involved reading up on various research papers. After understanding the requirements, design and simulation of circuits was done in multiple stages till a satisfactory result was obtained. After successful simulation, the hardware implementation was carried out. The circuit was troubleshooted and refined until the expected output was obtained. Overall, the work involved a lot of initial reading and undertanding. Good knowledge of circuit simulation softwares such as PSpice and TINA was required. MATLAB programming also helped with post-acquisition software filtering. It also involved learning how to use important lab equipments such as a mixed signal oscilloscope, waveform generator, soldering machine etc. Finding and gaining access to relevant research papers to this topic was a huge task in itself, and a lot of time was spent on the same. Finally, the report was made.

PS-I experience: Good, met interesting people from other campuses, heard about how things are done in other campuses and saw first hand how research works and what it is like.

Learning outcome: Learnt some new concepts from courses to be done in third year, and saw how existing concepts are put to use in applications.

PS-I is an exposure oriented course: Agreed. It is a good opportunity to see how research, core works and whether one might like it or not.

Name: Balaji Adithya V (2017AAPS0429H)

Student Write-up

Short Summary of work done: The project work allotted to me was "SINGLE IMAGE DEPTH ESTIMATION" using deep learning techniques. The main objective was to predict the approximate depth of each pixel of a given image and give output as a depth-map of the input image using Convolutional Neural Networks(CNNs) such as DenseNet-169.

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

Learning outcome: The learning curve in PS-I was huge. It taught me to set suitable achievable plans on a regular basis and achieve it. I got familiar with a lot of in-depth concepts related to my project and provided time and resources to implement it. It gave an idea of the various workplace scenarios that one would encounter after getting a job.

PS-I is an exposure oriented course: It sure is!

Name: Atharva Ajit Dinkar (2017AAPS0218G)

Student Write-up

Short Summary of work done: Terahertz imaging revolves around making Terahertz pulses incident on a surface. Once this happens, a small photocurrent will be developed at the point of incidence, which generates a voltage, and this voltage can be measured using an oscilloscope. My job was to "scan" the entire surface of a sample, for which

two stepper motors had to execute serpentine motion. Their motion had to be synchronised with the Oscilloscope's act of saving the voltage waveform as a .csv file. The control was done through National Instruments' LabVIEW, using tools like Thorlabs' APT software, ActiveX controls, Keysight IO Library Suite and VISA functions. Once the photocurrent had been measured, details about the surface could be deduced. This could help in detecting defects in the surface.

PS-I experience: Over all, it was very nice.

Learning outcome: I gained knowledge about programming languages like LabVIEW. I learnt how to interface multiple instruments with one central control. Most importantly, I learnt that no matter how foreign something appears, it is possible to gain a working knowledge (basic, nothing too deep) of the subject in a few days of dedicated practice.

PS-I is an exposure oriented course: Yes.

Name: Rohit Dwivedula (2017A7PS0029H)

Student Write-up

Short Summary of work done: The project we became a part of was using data from wearable technologies (such as PPG-signals) to detect Atrial Fibrillation (or heart flutter). When we began with this as the project in mind, we started by spending around two weeks reading up on the heart, what PPG does, some basics of digital signal processing and then reviewing the existing code and devices in our lab. After that, we began trying to reimplement some of the research papers we read, and make minor changes in the code that our mentor needed. We worked on making GUIs for certain specific use cases. All in all, while we couldn't do much groundbreaking work due to constraints on time and limitations on our skill levels, we did manage to help with minor additions to the project.

PS-I experience: Over all, it was very nice.

Learning outcome: We understood how research works and it's progress. We had to piece through code that had little to none documentation, figure out how the datasets were formatted and I had to learn to use Octave for the first time. We also learnt some socket programming and python plotting libraries because one of our tasks was to make a GUI to showcase the signal in an industrial exhibition conducted at CEERI.

PS-I is an exposure oriented course: Exposure - definitely. PS-I definitely taught me a couple of realities of the workplace - the monotony of work and the discipline to stick to deadlines is way different from what you experience in college.

Name: L Srihari (2017A7PS1670H)

Student Write-up

Short Summary of work done: The project was about predicting cardiac arrhythmias and categorising them as tachycardia, bradycardia and normal heart rate using photoplethysmography (PPG) signals from wearable technology like smart watches. This project involved the use of python programming language and some machine learning approach. We were first asked to study some research papers to understand the problem at hand and the approaches taken towards it. We were then given the pre-existing code to get familiar with the approach being taken. We later, suggested improvements to the procedure and code. We tested the working of the code with fellow PS-I mates and corrected the errors. We later, spent time on developing a python based GUI to plot live data from the wearable technology and show the evaluated decisions based on certain conditions.

PS-I experience: PS-I experience was wonderful and helped learning in multiple spheres. Got introduced to the conditions of working populace.

Learning outcome: I learnt basics of python programming, machine learning and making of a good Graphical User Interface.

PS-I is an exposure oriented course: I would agree with this and it must remain this way.

Name: Omkar Dhananjay Sathe (2017A8PS0277P)

Student Write-up

Short Summary of work done: A new approach to NIR spectroscopy using Independent component analysis, was the title of my project. It was related to signal

processing domain. I started with understanding the fundamentals of statistical domain analysis of signals and revisiting basic concepts of signal processing. I started implementing ICA on sound signals first and then started applying it on two signals. Started testing inbuilt matlab libraries, but they seemed to fail on highly correlated input signals. So, I developed algorithm for separating 4, 6 and 10 signals from data. Further, we worked on deconvoluting the output spectra. This approach was applied on detecting adulterants in honey. Broadly my project involved working in signal processing domain for which I used matlab and peakfit.

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

Learning outcome: Learnt about statistical domain analysis for signal processing. Worked a lot on matlab 2018b. It also included applying concepts from linear algebra.

PS-I is an exposure oriented course: It helps you in interacting with people in research, industry and people from other campuses. Exposes students to professional working environment and explore their interests.

Name: Mythreyi S S (2017B4A70989H)

Student Write-up

Short Summary of work done: I worked in the field of Deep Learning during my PS-I. I was not acquainted with ML or DL prior to my work here, at CEERI. However, my mentor gave me sufficient time to read the basics and familiarise myself with the common terminologies. I was given beginners' tasks and about a week's time to complete each of them. I implemented already existing models and algorithms and sought to achieve similar results and inferences. This went on until midsem, when I had to present my work to my BITS instructor and fellow students. Post midsem, I began working on autoencoders. My project involved using autoencoders for Image enhancement. I first implemented an image denoising code using an autoencoder trained on the MNIST dataset of handwritten digits. Once, I obtained results with minimised loss, I was motivated to try the same for colored images. The process was successful as the autoencoder removed the noise from colored images but introduced considerable blur in the output. My mentor then suggested that we try the same for high-resolution images. Then, we tried image recoloring (Grayscale to Color) using autoencoders. However, this was only partially successful. I later moved on to work with Generative Adversarial Networks (GANs). We used GANs to generate cars and hybrid flowers. My mentor was quite happy with the output we got for GANs. Then, we had the final compre seminar, when I had to present my report. My PS-I experience served as a good beginning to my future research plans.

PS-I experience: My PS-I station had 20 students from the three campuses. We were given a conference hall to sit and work. However, two of us, who were working on the same project, got a whole lab for ourselves. We were given LAN connection and left to work on our own. Our mentor spent about half an hour per day with us. He used to discuss what we have done and give us inputs for further work. He gave us enough time to work as he understood that we were beginners trying to foray new perspectives. It was onto us to take up the work sincerely. We could watch video lectures as we were the only ones working in the lab. This was a huge plus as it gave us the freedom to work on topics we like. Our head mentor was also friendly and ensured that we were comfortable at our workplace. Our PS-I instructor visited us regularly and kept us informed about the various proceedings that were held. The staff and helpers at CEERI were friendly in their attitude towards us.

Learning outcome: Answering the question academically, I learnt the basics of deep learning. Neural Networks, Convolutions, Pooling are some of the terminologies that have become part of my routine life. I understood various algorithms proposed for localisation and classification of objects in images by reading papers that have been published recently. I learnt how to manipulate images using in-built functions so that these can be fed as input to autoencoders and GANs. Also, I understood the working of autoencoders and GANs and tried to implement some of their applications.

PS-I is an exposure oriented course: As mentioned above, academically, PS-I at CEERI was a good experience. Learning basics of a new field all by myself was a new experience for me. Having been taught by teachers in classrooms for so many years, PS-I gave me the confidence to understand technical papers and books. It has always been my dream to work in a research institute. PS-I at CEERI helped me live this dream and understand how researchers think on a given problem. It has given us a chance to live our future selves after graduation. Also, working with experienced experts taught me one thing, ‘One need not know everything beforehand; Experience is the best teacher’. I have realised that research is the only field where one is constantly learning, equipping oneself to belong to the evolving world. It has nurtured my curiosity to delve deeper into small things that we learn. For, behind every simple statement is hidden an ocean of secrets yet to be explored.

Name: Rohan Deepak Ajwani (2017AAPS0990G)

Student Write-up

Short Summary of work done: I worked in the field of Deep Learning during my PS-I. My mentor gave me sufficient time to read the basics and familiarise myself with the

common terminologies. I was given beginners' tasks and about a week's time to complete each of them. I implemented already existing models and algorithms and sought to achieve similar results and inferences. This went on until midsem, when I had to present my work to my BITS instructor and fellow students. Post midsem, I began working on autoencoders. My project involved using autoencoders for Image enhancement. I first implemented an image denoising code using an autoencoder trained on the MNIST dataset of handwritten digits. Once, I obtained results with minimised loss, I was motivated to try the same for colored images. The process was successful as the autoencoder removed the noise from colored images but introduced considerable blur in the output. My mentor then suggested that we try the same for high-resolution images. Then, we tried image recoloring (Grayscale to Color) using autoencoders. However, this was only partially successful. I later moved on to work with Generative Adversarial Networks (GANs). We used GANs to generate cars and hybrid flowers. My mentor was quite happy with the output we got for GANs. Then, we had the final compre seminar, when I had to present my report.

PS-I experience: My PS-I station had 20 students from the three campuses. We were given a conference hall to sit and work. However, two of us, who were working on the same project, got a whole lab for ourselves. We were given LAN connection and left to work on our own. Our mentor spent about half an hour per day with us. He used to discuss what we have done and give us inputs for further work. He gave us enough time to work as he understood that we were beginners trying to foray new perspectives. It was onto us to take up the work sincerely. We could watch video lectures as we were the only ones working in the lab. This was a huge plus as it gave us the freedom to work on topics we like. Our head mentor was also friendly and ensured that we were comfortable at our workplace. Our PS-I instructor visited us regularly and kept us informed about the various proceedings that were held. The staff and helpers at CEERI were friendly in their attitude towards us.

Learning outcome: Answering the question academically, I learnt the basics of deep learning. Neural Networks, Convolutions, Pooling are some of the terminologies that have become part of my routine life. I understood various algorithms proposed for localisation and classification of objects in images by reading papers that have been published recently. I learnt how to manipulate images using in-built functions so that these can be fed as input to Autoencoders and GANs. Also, I understood the working of autoencoders and GANs and tried to implement some of their applications.

PS-I is an exposure oriented course: As mentioned above, academically, PS-I at CEERI was a good experience. Learning basics of a new field all by myself was a new experience for me. Having been taught by teachers in classrooms for so many years, PS-I gave me the confidence to understand technical papers and books. It has always been my dream to work in a research institute. PS-I at CEERI helped me live this dream and understand how researchers think on a given problem. Also, working with experienced experts taught me one thing, 'One need not know everything beforehand; Experience is the best teacher'. I have realised that research is the only field where one is constantly learning, equipping oneself to belong to the evolving world.

Name: Ishaan Tiwari (2017A3PS0866P)

Student Write-up

Short Summary of work done: Worked on modifying the state of the art algorithms in the field of single image depth estimation (SIDE) using deep learning techniques. Understood the code and the method being used and looked for better alternatives to the existing error functions in terms of speed and/or accuracy of the predictions.

PS-I experience: A wonderful experience. My mentor provided constant guidance throughout the project. However, there were some times the equipment would not work properly and would require long procedures to restart. My peers were knowledgable and friendly at the same time. CEERI gives you enough time for a perfect work-life balance during PS-I.

Learning outcome: Learnt a lot about Deep Learning and the methods of depth estimation that are being used as of now.

PS-I is an exposure oriented course: I would agree. While PS-I did primarily give me exposure, it also gave me a lot of knowledge along with it.

Name: Sharan Ranjit S (2017A8PS0506G)

Student Write-up

Short Summary of work done: My project title is Single Image Depth Estimation (SIDE) using deep learning. I started my work by referring existing research papers on SIDE. This helped in gaining an overall view of the model architecture and loss functions used in SIDE. Based on the different approaches I referred, I was able to modify the existing state-of-the-art approach by using new loss functions. Finally, I trained, tested the model and was able to get the predicted depth maps using the new approach.

PS-I experience: A very new experience and extremely useful one where the whole environment was encouraging that behaviour.

Learning outcome: AI, Deep Learning, Image processing,.. etc.

PS-I is an exposure oriented course: True.

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

Student

Name: Pratikmohan Srivastav (2017A7PS0929G)

Student Write-up

Short Summary of work done: The title of my project was "Image Processing of Cattle in Farms using Drone (Aerial Images). It was a deep learning based model which was completed successfully by me. The model used by us was RetinaNet which consists of ResNet50 and FPN (Feature Pyramid Network). The datset that was required by us was not available publically and hence we had to create a custom dataset by our ownselves. We came across videos of farms taken using drones on google and then we extracted images from theses videos, annotated them manually and then we trained on our model on the same dataset.

PS-I experience: It was a good experience as I got the experience to work in a team and was able to know what problems normally occur in carrying out real life problems.

Learning outcome: Completed a deep learning based real life project.

PS-I is an exposure oriented course: Will agree with that.

Name: Nirlipta Pande (2017B3A70728P)

Student Write-up

Short Summary of work done: Intelligent Data Analytics in air auality monitoring. The task at hand is to design a set of fusion net using a set of neural networks and that will take up the data from sensors strategically placed at various points as inputs and predict the next 48-hour quality of air by taking spatial and temporal parameters into consideration. The project requires the student to be well versed with Python and the implementation of neural networks and the various algorithms which are needed for the implementation of such networks, especially RNNs and forecasting algorithms.

PS-I experience: It was an enriching experience working closely with scientists and learning the practical aspect of learning.

Learning outcome: Data Analytics and report making skills.

PS-I is an exposure oriented course: You get to meet and work with real world problems and realize college life filters out a lot of these experiences.

Name: Gunpreet Kaur (2017A7PS1573H)

Student Write-up

Short Summary of work done: We built and trained a deep learning model which could detect 5 human activities (standing, sitting, laying, falling and bending) using 2D camera.

PS-I experience: It was a good experience overall. We got to learn a lot of new stuff.

Learning outcome: Got hands dirty with deep learning.

PS-I is an exposure oriented course: Getting to work on a problem for 45 days gives a different experience all together.

Name: Achyuth E M (2017AAPS0235G)

Student Write-up

Short Summary of work done: Multi person yoga detection using deep learning and 2D camera. We first had to collect the data (as this is an upcoming field, data wasn't available) in form of videos.The videos were collected of the volunteers performing the asanas and the keypoints of the person were extracted and passed through a deep learning algorithm. Once the model was trained, we tested it on videos and in realtime, for which the accuracy was pretty good.

PS-I experience: My experience of PS-I was pretty good. CEERI is one of the renowned institutions and working here was a great oppurtunity and experience for me. The project that I worked on was good and the mentor that I worked under was helpful and guided me, which helped in working well on the project.

Learning outcome: I learnt how research is carried out sequentially in research institutions and how to work on a project by conducting research on it. I also learnt how to adapt in new environments, how to write reports, make presentations and participate in group discussions.

PS-I is an exposure oriented course: PS-I was indeed an exposure oriented course as it introduced us to various aspects of research and projects and helped me in gaining more knowledge on various fields present here. Exposure can also be said in terms of travelling to a new place, meeting new people, connecting with them and also, collaborating and working with them, which was achieved through PS-I.

Name: Yadala Akhil (2017AAPS0456H)

Student Write-up

Short Summary of work done: Our project is deep learning based human fall detection using web camera for multiple persons. Initially we had collected data for our project using web camera to capture activities performed by different persons in different poses. Later we processed this data using openpose to obtain stick figures of persons in each video frame in json format. Then, we trained our deep learning model by supplying the generated json data. This trained model is then used to detect activities performed by multiple persons in real time. Then, at last we used OpenCV to display the activity generated in python console on to the video which is being captured simultaneously in real time.

PS-I experience: My overall experience at CEERI pilani is decent. I am happy to work on the project in the field which I truly like. Work allotted to me is quite challenging.
Glad that i was quickly able to get close to my project group mates.

Learning outcome: I got a good exposure on how research organizations function. Punctuality and dedication that scientists have towards their work really inspired me. I had also realised that it is very important to strike a balance between work and life. Presentations and group discussions helped me improve communication skills and report writing enhanced my writing skills.

PS-I is an exposure oriented course: PS-I is truly an exposure oriented course. I got hands on experience with the technologies that I have been studying during course work. I came to know how the research institutes function and experienced good atmosphere with talented scientists working around. I had also understood about industrial requirements.

Name: Pranay Mathur (2017A8PS0487G)

Student Write-up

Short Summary of work done: The project title was Autonomous Navigation of Drones using SLAM and obstacle avoidance using a depth camera. The problem fell under the field of artificial intelligence and researching and developing new methods of how intelligent aerial vehicles perceive their environment. The developed micro aerial vehicle had the capability to navigate autonomously through unknown GPS denied environments and map the entire area in 3 dimensions. The SLAM (Simultaneous Localisation and Mapping) algorithm was implemented to acheive this. This was achieved by coding in python using the ROS framework. A new algorithm was developed for optimal path planning while avoiding obstacles.

PS-I experience: It was an enriching experience and the level of resources that we had accessed was unprecedented. A lot was learnt about the practical implementation of how basic knowledge learnt could be applied to build something truly complex and magnificent.

Learning outcome: Learnt about new algorithms that are used by intelligent aerial vehicles in perceiving and localizing themselves in an unknown environment. Learnt about the hardware used in drones and mavros which is used to write algorithms to control them autonomously.

PS-I is an exposure oriented course: The statement provides a great deal of exposure about how an organisation works and what are the current trends in the industry.

Name: Aditya Agrawal (2017A3PS0201P)

Student Write-up

Short Summary of work done: My project was 3D soundscape generation. It is altogether a new domain in which I needed to learn everything from scratch except signals and systems which is a course of my second year. I worked in a group of 2 and we learnt about what is 3D soundscape and how can we generate a binaural sound from a monouaral sound. We first studied about head related impulse response, room impulse response and then wrote matlab codes to combine them and make a soundscape. We were able to generate a soundscape of a temple which consisted of different sounds such as tabla, bell, babble and even a moving priest chanting mantra to make our project more user friendly and appealing. We developed a GUI using tkinter library of python which helps the user to make his own soundscape, in which the sound sources are placed according to the demand of the listener. We also developed a more accurate solution of generating a filter using hrir and rir which can make our soundscape feel more realistic and accurate.

PS-I experience: I am very much happy and satisfied with my work environment. Scientists at CEERI are very good and there are a lot of resources to study with a proper guidance by our guide. It was a nice experience being at CEERI. I personally feel that a lot of good work is done at research institutes hence at any research institute we must first understand its each and every domain and then only decide what we actually want to do because I felt that I made a little hurry in deciding about the project without giving much thought to it and also of the fear that good projects may not become unavailable but then I realized that many more interesting projects were there which others students did. But, overall it was a nice experience working under the guidance of some renowned scientist and actually developing something of our own.

Learning outcome: We learnt signal processing in matlab and python programming language.

PS-I is an exposure oriented course: I feel it is a great initiative to give us an exposure about the outside world. After coming to CEERI, I understood that how the work is organised at any research institute and how research is carried out. It also helped me to develop some professional skills and how to deal with different kinds of people.

Name: Ronak Bhattad (2017A3PS0200P)

Student Write-up

Short Summary of work done: I worked on developing and implementing a deep convolutional neural network in Xilinx ISE for a Zynq 7000 FPGA in verilog HDL. More specifically, a deep network that recognizes the given patterns in the input images whatever may be the orientation of the pattern.

PS-I experience: I felt that the entire experience is completely dependent on the project and mentor you choose to work with. I was delighted to find the right project to work on under the guidance of my mentor.

Learning outcome: I got my feet wet in Deep Learning. I also earned familiarity in working with FPGAs which are actually very promising for huge computing such as in Deep Networks. I also learnt programming in Verilog which is a very important asset for anyone aspiring to be a hardware electronics engineer. This was also my first time working on an organized project, so I also gained experience in working in the field of research.

PS-I is an exposure oriented course: It entirely depends on the will of the person himself. Sure, it does provide adequate number of opportunities to gain exposure.

Name: Harsh Gopalika (2017A3PS0308G)

Student Write-up

Short Summary of work done: Worked on the Xilinx Zynq Ultrascale+ ZCU102 FPGA board. Learned about the basic architecture of the board and the interconnections between various components present on the board. Also, studied about various interfaces like FMC, SATA, USB, UART, HDMI etc. Finally, simulated some example designs on Vivado, so that it can be implemented on the ZCU102 board.

PS-I experience: It was good as I got to work on new things.

Learning outcome: 1. Learned about FPGA's and basic FPGA architecture
2. Xilinx Ultrascale+ architecture
3. Vivado for simulating designs

PS-I is an exposure oriented course: It does give us some kind of exposure to the real work going on around us. However, the exposure is limited but more than enough to give someone an overview of how things actually work in companies or research labs.

Name: Sashwat Deb Samaddar (2017A3PS0534H)

Student Write-up

Short Summary of work done: My project was titled "VLSI Design and Implementation of RECTANGLE Block CIpher on FPGA". The project work involved a lot of self study and research. I needed to propose a new, more efficient architecture for the aforementioned cipher. For that, I had to learn about cryptography and network security, various ciphers and their hardware implementations. I could propose a basic architecture, whose schematic was approved by my mentor. I learnt verilog coding to implement this architecture on FPGA. While I implemented this architecture, I faced many challenges. By overcoming those challenges, I could gain practical knowledge of the concept taught in my courses. The project was a success and I could implement the architecture on the FPGA and verify the results.

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. By overcoming the challenges faced during my project, I could learn how to apply the theory taught in my courses.

Learning outcome: I learnt about cryptography, ciphers and their hardware implementation, VLSI design, Verilog coding and practical applications of all the theory taught in digital design.

PS-I is an exposure oriented course: PS-I exposes students to actual working environments where they can experience what it is like to work in the industry. It teaches students about work culture and the relevance of the theory they have learnt.

Name: Anjali Khantaal (2017B3A80702P)

Student Write-up

Short Summary of work done: This project involves collecting the data values from multiple sensors using Raspberry Pi board and then transferring it to the cloud (for instance, firebase) in real time, and then based on the data received, signals will be generated. As the signal generated will not be pure (that is, it will be a mixed signal), so by applying Fast Fourier Transform on it, it's frequency domain graph will be generated, wherein the mixed frequencies would be filtered out. Both the signal and its frequency domain will be displayed on the web in the graphical form. These graphs will be used for further analysis that will include machine learning. It will help to predict the remaining service life of the structure, how to improve future designs or to optimize the current structure, etc. The back-end part of this project has been set up using Django framework and the front-end uses HTML, CSS, JavaScript, etc. The data is continuously updated to the cloud from the sensors interfaced to the pi board until the number of values of the data reaches 50. After reaching 50, it is processed and the graph in time domain and frequency domain will be updated on the front end.

PS-I experience: It was satisfactory. The mentor guided properly wherever I had doubts.

Learning outcome: Learned interfacing of sensors.

PS-I is an exposure oriented course: I agree with the statement. Here, there were many projects in different domain and the students chose according to their interest.

Name: Gaurav S (2017AAPS0312G)

Student Write-up

Short Summary of work done: We worked with FPGA's and algorithms for optimising floating point computations to make machine learning algorithms faster. We also got to know about the latest FPGA board that was released this year. We also learnt about pipelining and parallel architectures and the advantages of these methods for fast computations. Overall, we were optimising hardware for machine learning algorithms

PS-I experience: It was really good experience working with scientists. I learnt how research is actually carried out. Moreover, I came to know about the state of the art technologies of some of the fields.

Learning outcome: I learnt many software's and tools used. I also learnt to manage time considering the work that was expected out of us.

PS-I is an exposure oriented course: Yes, it is very true. It gave me exposure to the outside world and it's working.

Name: Anurag Pandey (2017A1PS0891G)

Student Write-up

Short Summary of work done: The work was focussed on doing chemometric analysis on water parameters, to select the most effective parameter to encapsulate the water quality.

PS-I experience: It was great! You need to push the mentors as they are often busy. Outcome largely depends on the students, since I got the PS-I of my liking, I thoroughly enjoyed it.

Learning outcome: Much better in looking patterns in data!

PS-I is an exposure oriented course: Agreed, we often use scientific words with no understanding of it's reasoning in the actual world. PS-I helps in correcting that.

Name: Jay Kamat (2017A4B40275G)

Student Write-up

Short Summary of work done: At CEERI, I worked on MEMS (Micro Electro Mechanical Systems). My project was on the design, modelling and simulation of a micro cantikever based biosensor. I first had to learn the fabrication processes for MEMS. When I was comfortable with that I was asked to design the sensor using the

fabrication tools available. After the design was ready I was supposed to do the FEM simulations on the sensor and then iterate between the 2 to get an optimal design. I also had to do mathematical analysis to make sure the FEM results I got was acceptable.
During the project, I learnt a lot like simulation, meshing, using the coventorware software. This project gave me an insight into how to write research papers and also how to read them.

PS-I experience: CEERI was amazing, it was good and a pretty decent PS-I station.

Learning outcome: Learnt MEMS theory design, simulation, read and write papers and to make amazing friends.

PS-I is an exposure oriented course: Agreed, got to apply what I had learnt in the last 2 years at BITS.

Name: Abheesht Sharma (2017B4A71014G)

Student Write-up

Short Summary of work done: I was working on 'Anomaly Detection in Videos of Daily Living using Deep Learning'. Our job was to detect anomalies in daily life and we were worked specifically on URFD dataset, i.e., we were worked on fall detection. This has real-life applications in old age homes. Our main job was to convert videos to dynamic images, and to pass this through Generative Adversarial Network (GAN).

PS-I experience: It was a really good and wonderful PS-I station.

Learning outcome: It was a pretty fruitful experience. In the beginning, we were instructed to finish the five course Deep Learning specialisation on Coursera. We also learnt how to code in deep learning frameworks such as Tensorflow, Pytorch, Keras, etc. Post all the preliminary learning, we decided the architecture of the GAN we were working on, and coded it.

PS-I is an exposure oriented course: I wholeheartedly agree. We had the opportunity to interact with scientists at CEERI, and they passed on knowledge and gave us insight in Deep Learning. Also, the final presentation was a lesson in how to deliver a presentation on the work you've done over a period of time.

Name: Ishan Sang (2017A7PS0069G)

Student Write-up

Short Summary of work done: My team's project was Deep Learning based yawn detection for driver's drowsiness. We were given as input a live video feed of a driver and we had to determine in real-time whether the driver was yawning or not. We started off by doing some online courses on deep learning. When we had a good grasp on DL concepts, we read some research papers which helped us to get familiar with the state-of-art techniques which have already been employed for yawn detection. With the help of our mentor, we then finalised the architecture of the yawn detection model. We then used the OpenCV and DLIB libraries for mouth detection, created a CNN model for mouth features extraction and then implemented a bi-LSTM for the final yawn detection. We used YawDD and NTHU-DDD datasets for training and testing. We then tested our model on live videos and tweaked the hyperparameters a bit to get the maximum possible accuracy.

PS-I experience: My overall PS-I experience was a good one. I got a platform to apply my theoretical skills in the practical world. I also got to know how the research industry works.

Learning outcome: Learned the basics of Neural Networks and Deep Learning.

PS-I is an exposure oriented course: I totally agree with this statement as we were for the first time exposed to the engineering industry and had to apply our theoretical knowledge in real life at a larger scale than the standard university projects.

Name: Gunjan Arora (2017A7PS0116G)

Student Write-up

Short Summary of work done: I was assigned to build a deep learning algorithm to detect cattle images in the aerial images that were captured through drone. For this, I studied various algorithms and about various pre-trained weights on various examples. So, I used the concept of fine-tuning to achieve the desired result of the task. I decided to use resnet50 weights pre-trained on Coco dataset. First, I tested the pre-trained weights on cattle video directly and the results were quite bad. For improving this, I decided to fine-tune model using a dataset and for this, I decided to use keras-retinanet

implementation provided by fizyr. The next problem was the kind of dataset the problem required was not available. So, the only solution was to first test the fine-tuning process on similar kind of dataset which included aerial images and then use it on the dataset that we have to generate. So, we trained the model on stanford drone dataset to detect pedestrian in aerial images. It worked quite well. After that dataset was prepared by extracting images frame by frame from videos obtained from external sources and then annotating them. After that pre-trained weights were fine-tuned using the generated dataset and the desired results were seen.

PS-I experience: The experience was quite good as I got to learn about work culture and it helped me to improve my communication skills.

Learning outcome: I learned to apply deep learning in real life situations.

PS-I is an exposure oriented course: According to me the above statement is true as this experience gives us knowledge about work culture of a industry and prepares us for it in the coming future.

Name: Abhyuday Singh (2017B4A70645G)

Student Write-up

Short Summary of work done: Deep Learning based Human Action Recognition.

PS-I experience: Warm, memorable.

Learning outcome: Deep Learning.

PS-I is an exposure oriented course: True.

Name: Ganeshan Malhotra (2017A8PS0512G)

Student Write-up

Short Summary of work done: I worked on driver drowsiness detection through eye state classification using deep learning techniques. We conducted a thorough literature survey going through various relevant papers. We selected the most recent paper which used HM-LSTM as its core architecture and built on it. We used Bi-LSTM and combination of dense layers finally using a sigmoid layer instead and made a Graphical User Interface to implement our pipeline in real time.

PS-I experience: I learnt a lot from my PS-I experience. I was exposed to a lot of new and exciting technologies related to Deep Learning field. I also learnt soft skills like team management and coordination.

Learning outcome: I learnt about Deep learning particularly about computer vision technologies.

PS-I is an exposure oriented course: PS-I is an exposure oriented course -- I agree with this statement as it exposed me to a new learning and professional environment and helped me to explore the research institute culture which will help me in deciding my future.

Name: Devika Jangid (2017B5TS1222P)

Student Write-up

Short Summary of work done: My aim was to design a mode converter for 28 GHz gyrotron. This consists of three mode converters. The second part was to study the space charge effect for single beam and double beam coaxil gyrotron.

PS-I experience: My experience was good. I got to learn many things about the project as well as apart from the project. This helped me in understanding of how a project is being carried out.

Learning outcome: I learned about the gyrotron device and also some of the basics of the electronics and physics as well.

PS-I is an exposure oriented course: Yes. It is true. As it helped me in exposing myself to a very new environment with people I rarely know. I met people of all the three campus and learned from them as well.

Name: Shubham Jain (2017AAPS0283G)

Student Write-up

Short Summary of work done: The obejective was to design a digital circuit which can make the machine learning algorithms faster. In this project, I learnt about various machine learning algorithms and mathematical functions used in them. Since, matrix multiplication is higly used in traning machine learning models so I learnt about various algorithms to perform matrix multiplication operation. I designed digital circuits to perform matrix multiplication for two different algorithms - i. Conventional / Naive method ii. Strassen's algorithm. I used verilog to design the circuit and simulated them in Modelsim.

PS-I experience: It was a very nice experience. In this first week, we met the scientist to discuss about the projects being offered by them and choose among then. There are lot of projects in the fields including Machine Learning / Deep Learning, Integrated Circuits, Digital Design, FPGAs, IOT, MEMs. The scientist in CEERI are very helpful in nature. My scientist gave me study materials related to the project on a weekly basis. He also gave me feedback for my work and helped whenever I was not able to understand anything. I got to learn a lot of things in this station apart from the project. The evaluation components helped me in improving my writing, communication and presentation skills.

Learning outcome: In this project, I learnt about various machine learning algorithms and mathematical functions used in them. I learnt about various algorithms to perform matrix multiplication operation. To design the circuits, I learnt about hdl language (verilog) and how the circuits are designed and coded. I also learnt about the simulation software Modelsim used for simulating the designs.

PS-I is an exposure oriented course: I completely agree with this statement. In CEERI, I came to know about various fields in which I can build my career. Interecting with students working on projects on so many different fields gave me a brief insight about all those fields. The evaluative components of PS-I was similar to those in the interview process of placements. These helped me to prepare myself for the upcoming internship interview process.

Name: Vinayak Shukla (2017B4A70465G)

Student Write-up

Short Summary of work done: We worked on Human Action Recognition problem and used Deep Learning models to improve the current state-of-the-art.

PS-I experience: The project was good and I learnt a lot during the summer.

Learning outcome: Learnt a lot about deep learning and how to approach such problems.

PS-I is an exposure oriented course: I'd agree with this statement.

Name: Ayush Laddha (2017A8PS0717H)

Student Write-up

Short Summary of work done: Our objective was to propose a new architecture for RECTANGLE Block Cipher and do its implementation on FPGA. It was a design and research topic. It initially required us to go through various research papers on different lightweight block ciphers like PRESENT, RECTANGLE, PICCOLO etc. After the completion of this task, we had to read some research papers to get knowledge about what ciphers are and how they are designed and implemented. Following this, we also had to learn advanced Verilog coding apart from getting a strong hold on concepts of digital design. We read through various different architectures and then proposed our own design. It required the concepts of K-Maps, S-BOX, Finite State Machine, MUX, DeMUX etc. Our project was focused on RECTANGLE Block cipher which is a new type of lightweight cipher that came into the field of cryptography. Not much research had already been done on the topic. So, I and my partner were allotted this topic. We designed new architectures for encryption and decryption process of RECTANGLE block cipher along with its testing and implementation on FPGA. We successfully completed our project in the provided time and also wrote a paper that has been sent to VLSID conference for approval.

PS-I experience: It was a good experience overall. I learnt about research organisations and the researches being carried out inside. Furthermore, I also got the opportunity to work with colleagues and other scientists. I got opportunity to work on a research project. It also helped me to practically test my skills of digital design, cryptography, verilog coding, VLSI design etc.

Learning outcome: PS-I helped me to practically test my skills in the actual working environment and taught me to collaborate with other people, at the same time help me

develop my motor skills. It also helped me to practically test my skills of digital design, cryptography, verilog coding, VLSI design etc.

PS-I is an exposure oriented course: PS-I helps the students to get a basic insight of how the work is actually done in practical scenario at the same time helping the students to develop their various skills of communication, leadership, coordination etc. It also teaches the students to adapt to various living conditions. So, I believe that PS-I is a exposure oriented course which teaches the students to adapt with various real-life situations and develop their skills.

Name: Poorvi Rao (2017A3PS0921G)

Student Write-up

Short Summary of work done: I had to develop a gas sensor for sensing benzene. I researched on the various sensing materials that could be used and selected WO3 as the material. Then, I studied the affect of using noble metals platinum and gold on the sensitivity and also whether in-situ or ex-situ deposition is better. Fabricated the sensors, used various characterization methods like XRD, AFM, FESEM and Raman spectroscopy and then tested the sensor for 5 ppm of benzene at different temperatures.

PS-I experience: The experience at PS-I was really good. We were given the opportunity to select our own projects by talking to the scientists there. All the scientists and project assistants were extremely helpful and knowledgeable. The other PS-I students were also motivated and hardworking which helped. CEERI is a good place for research oriented projects.

Learning outcome: I got exposure to how research organisations work and how to go about doing research. Saw the different types of labs for device fabrication and got the opportunity to use some of them. Learnt about characterization and fabrication techniques and how they can be applied for developing sensors for daily usage.

PS-I is an exposure oriented course: I agree.

Name: Korripadu Tharak Ram (2017AAPS0464H)

Student Write-up

Short Summary of work done: Energy harvesting is a process by which we generate energy from external sources such as solar energy, thermal energy, ambient etc. RF energy harvesting is becoming increasingly popular as of late. One of the popular antenna is microstrip patch antenna because it can be directly printed on a circuit board.The disadvantages are it has narrow bandwidth and less efficiency,gain. So we tried to come up with a new design for energy harvesting. We used horn antenna the results from HFSS suggested that it has high gain and directivity compared to conventional patch antenna. To improve the gain further a parabolic reflector is used because of which the gain has been profoundly increased and even the directivity. The best part is the radiation efficiency has been increased to more then 94%. Then the AC signal which we get from the antenna has to be converted to DC using a rectifier. For that we have used Voltage doubler circuit . We have found the impedance of voltage doubler circuit and so that maximum power is transferred from antenna to IoT device impedance matching has to be done between antenna and rectifier. I have done it using Smith charts. Next we have to connect a capacitor to store the available energy. Then, give this stored energy to the IoT device.

PS-I experience: It's been a good experience.Proper learning has been done.

Learning outcome: I have learned many things about antennas and energy harvesting techniques.I have also learned how to use HFSS software.

PS-I is an exposure oriented course: I felt like i have been exposed to the outside world, how it works.

Name: Aryamick Singh (2017A3PS0389P)

Student Write-up

Short Summary of work done: Our work was related to signal processing. Matlab was used for all the signal processing tasks. The main objective was conversion of monaural audio to binaural audio for construction of 3D soundscapes. A lot of research was done to understand the human perception of sound (both the sense of direction and depth). Matlab functions were written for performing all the signal processing, python was also used for making GUIs to ease the process of generation of data for our signal processing audio functions.

PS-I experience: It was fine.

Learning outcome: Languages - 1. Matlab 2. Python
It was more about learning how to a approach a research problem.

PS-I is an exposure oriented course: It is true. You understand how work is done in the industry.

Name: Akshit Sharma (2017A7PS0104G)

Student Write-up

Short Summary of work done: My work was focussed on Deep Learning on Human Fall Detection using 360 degree videos. We built a deep learning model to detect human falls in old age homes using a 360 degree camera.The model used a new convolution layer called Spherical Convolution where the kernel convolves around the 3d paranoma . The model predicts whether the frame contains a fall or not.

PS-I experience: The experience was enriching and a learning experience and we got to work in real time research environment. Our code was written in framework restricted by NVIDIA drivers and GPU specific environment. The only issue was the logistics as our mentor had limited time and we could not replicate that environment locally on a PC and also not on Google colab. Though we learned pytorch and how to load a dataset in a pytorch model. Finally, after rigorous and painful debugging of few weeks with a limited access to the environment we did get our model to start training.

Learning outcome: We learned pytorch and how to design a deep learning model from scratch. We worked on a new convolution model. So, the implicit call to 2D functions is a piece of cake now.

PS-I is an exposure oriented course: We did get to see a research environment and how hard is to replicate that anywhere. We also learned how to live with an error in a code for days and how much happiness it gives to get rid of it finally.

Name: Manish Dash (2017AAPS0346G)

Student Write-up

Short Summary of work done: The project title of our group was "Hardware Design of Building Blocks of Machine Learning Algorithms." Most Machine Learning algorithms are made of these building blocks: Matrix Multiplication, Sum of Products and Product of Sums. We were assigned the job of designing codes for Matrix Multiplication, Sum of Products and Product of Sums for IEEE 754 Single Precision 32 bit Floating Point numbers in VHDL language, which will then be implemented on a Xilinx Zynq Ultrascale FPGA Board. After going through numerous research papers, we made combinational and pipelined designs of floating point multiplier and adder which will be used for Matrix Multiplication, Sum of Products and Product of Sums. After making the multipliers and adders and going through more research papers, we came up with our designs of performing floating point Matrix Multiplication, Sum of Products and Product of Sums, which we also made in VHDL. After writing the codes, we simulated all the modules to test if they were working properly and also the time taken by those modules to give the correct result. We also ran the synthesis design on softwares like ISE and Vivado to know the RTL Schematic, Technlogical Schematic and also the path delays of the modules designed by us. Finally, we successfully made those building blocks which could be implemented on the Zynq UltraScale FPGA.

PS-I experience: PS-I gave me a very good exposure on how research work goes on in one of India's premier research institute. I came to know about what type of research is going on in the companies and research labs. I came to know about how to practically apply whatever theory we have learnt in our college so far. It also helped me to improve my coordinating skills with team members by working in the project. The struggles faced during the project made me learn many new things. This project also brought me closer to my friends. Overall, it was a decent experience.

Learning outcome: I leanrt VHDL and gradually my expertise increased during the project. Since, we had to give presentations from time to time, my presentation skills also improved. My knowledge on Digital Design increased and I also got a broader view on how it can be applied in real life. I also came to know on how to use softwares like ISE and Vivado which are important for simulating your design. I also learnt something on FPGA.

PS-I is an exposure oriented course: Yes, I agree with this statement completely. PS-I gave me a great exposure and a great experience on how research happens. PS-I helped me to decide my career path to some extent.

Name: Nishant Gupta (2017A8PS0426P)

Student Write-up

Short Summary of work done: Detection of cancer cells in prostate gland at their initial level when they are at very low concentration is necessary for an effective treatment. Silicon nanowires due to their equivalency in size open great possibilities for high sensitivity and low settling time.
The project aims to determine appropriate parameters for detection of cancer cells in the range (0.1 ng/ml – 0.5 ng/ml) in a feasible time period. We first created a formal mechanism for obtaining surface potential created by the bio-molecular which is equivalent to the gate potential in the simulation. The analysis was done in practical settling time regime. We then created an intricate mechanism to optimize the device by analysing the variation in sensitivity characteristics of a Silicon nanowire of various shapes, at various lengths, diameters, doping concentration, oxide thickness, applied drain voltage, reference voltage, salt concentration and pH. We finally obtained the current change for the optimized device in minimum possible time.

PS-I experience: The experience here at my PS-I station was great and I feel privileged enough to be able to work under the scientists here. We got an exposure to the well equipped labs and got a chance to work there.

Learning outcome: Learned that research is completely based on incremental contribution. This field requires extensive analysis of sensitivity of the sensor under various parameters. Through the use of nanowires, one can circumvent the problems caused by extensive scaling of MOSFETs.

PS-I is an exposure oriented course: PS-I provides great exposure in terms of knowledge gained and the practical usage of the knowledge provided to us during our course work during the semesters on campus. It helps us gain more insights to the subject we are interested in. Also we get to know the environment in the professional world and how to present ourselves effectively. It also helped me develop my communication skills.

Name: Nimish Dubey (2017A8PS0745G)

Student Write-up

Short Summary of work done: The FPGA board which i was working on is relatively very new board which was released during the first half of 2019. Hence up until now no significant work was done on the board. I prepared a report explaining everything about the board which can be used by anyone who wants to work with this board have to just go through the report and presentation specifically submitted to the mentor in CEERI pilani.

PS-I experience: It was good. I learned a lot about how research is done in large institutions and it also motivated me to pursue research.

Learning outcome: During the course of this summer, I learned about the FPGA board that is manufactured by Xilinx that follows Xilinx Zynq Ultrascale+ architecture. I focused on the layout of different components present on the board as well as how these components interconnected to the main processing chip that itself comprises three powerful microprocessors. Also, I studied how communication takes place internally on the board and externally to different devices which can be connected to the board using the interfaces present on the board.
After getting a deep understanding of the board I went on implementing basic example designs on the board. But before implementing designs on the board I synthesized the design on Vivado design suite and them implemented the design on Vivado.

PS-I is an exposure oriented course: I agree as I got a chance to work on a latest FPGA board which was very expensive making it rare for students who wants to work on FPGA boards.

Name: Keerthana Srikanth (2017A7PS0066G)

Student Write-up

Short Summary of work done: Driver drowsiness detection based on eye state using deep learning. We first familiarised ourselves with deep learning by doing courses from deeplearning.ai. We then conducted a thorough literature survey before identifying our approach to the project. The project aims to take real-time footage of the driver, detect face and eyes, find if there is a blink and based on the temporal pattern of blinking, predict if the driver is alert, semi-sleepy or drowsy. We created a module that detects blinks from video. Then the blink features were normalised before being fed into our model. The model consisted of full connected layers along with bidirectional LSTM layers. The purpose of the model is to perform early drowsiness detection in real-time to prevent accidents. We built and trained a model using deep learning methods. We also created a visualisation of the metrics we calculated. We used Keras, Numpy, OpenCV, Dlib and Matplotlib.

PS-I experience: PS-I was a good experience. I was given the opportunity to explore a new field and the chance to work on a project which I was truly interested in. I was able to work collaboratively and I learnt a lot.

Learning outcome: On the technical side, I learnt deep learning. I learnt how to build and train a deep learning model, how to make predictions. I learnt how to use various libraries like Keras, OpenCV, etc. I also learnt how to perform a literature survey and how to apply theory to a practical scenario. On the non-technical side, I learnt how to work collaboratively, how to set small but significant deadlines and reach them. I understood how the research industry works and the behaviour expected from professionals.

PS-I is an exposure oriented course: I agree wholeheartedly with the statement. As students who have just completed our 2nd year in college, we do not have enough knowledge to perform the work that could be expected of a more senior student. However, through the PS-I course, we are given exposure to what is expected of us both in terms of technical capability as well as professional behaviour. I understood how a career in research would be and I was exposed the whole process that a scientist undertakes when embarking on a research project. This course has made me a more well-rounded student- someone who is capable of applying theory in practice.

Name: Sara A Haris (2017A3PS0184G)

Student Write-up

Short Summary of work done: Detection of cardiac troponin I (cTnI) at low concentrations is essential for diagnosis of acute myocardial infarction (AMI). Silicon nanowires FETs due to their high surface to volume ratios open great possibilities for high sensitivity and low settling time.
The project aims to study and compare existing Silicon nanowire FET structures with respect to variation in appropriate parameters and to analyze the sensitivity of novel structures due to their intrinsic electrical properties. First, a formal mechanism was created to obtain the surface potential created by the bio -molecules which is equivalent to the gate potential in the simulation for a practical settling time. Two novel structures have been reviewed and discussed. Simulations have been carried out on ATLAS 3D.

PS-I experience: Very good exposure to research and current literature in nano bio sesnors

Learning outcome: learned that research is completely based on incremental contribution. This field requires extensive analysis of sensitivity of the sensor under various parameters. Through the use of nanowires, one can circumvent the problems caused by extensive scaling of MOSFETs. Also learned how to use the Atlas and Athena simulators of Silvaco software.

PS-I is an exposure oriented course: Yes, it gives us an idea of how work proceeds in a given field. We may not have enough knowledge of the field yet to contribute very significantly to the institute. however ceeri being a research institute, I believe our incremental contribution in terms of simulations, data points collected and graphs analysed are valuable to the field.

Name: Omkar Gowaikar (2017A8PS0846H)

Student Write-up

Short Summary of work done: We built a deep learning model that predicted multi-person yoga-asanas in Real-time. The classes included:- Tadasana, Vrikshasana, Trikonasana, Padmasana, Bhujangasana, Shavasana and an additional state called No activity wherein the practitioner(s) isn't performing any of the six pre-stated asanas. Our model can successfully predict if one or two persons in each frame of the video are performing We generated a data-set by recording live videos and downloading videos on online platforms like YouTube. We generated the stick figures (stick figures joining 25 important key-points) using an opensource library called OpenPose. These were stored in the form of JSON files. These had lists of the x- coordinates, y- coordinates and confidence values of all the 25 key points of all the frames in that video. We pre-processed these by removing the confidence values and converting these into an array of coordinates and one more array of the corresponding labels. Python was used along with it's deep-learning assisting modules. At a time, a label was associated with 45 frames of a single video. These were split into training, validation and testing sets in the ratio of 60:20:20 respectively and then passed through a recurrent neural network (RNN) . A training accuracy of 99.7%, maximum validation accuracy of 99.3% and a test accuracy of 99.6% were obtained. In real-time, we were generating JSON files from a web-cam and trying to detect humans in each frame using YOLOv2 using a different web-cam simultaneously. Real time predictions for 1 and 2 persons were quite accurate.

PS-I experience: PS-I was quite an enthralling experience. I got to learn a lot of new things from various software to working in a team. I got a chance to be a part of an institute where cutting-edge research is performed to invent the state of the art models, devices and technologies. It was amazing to handle stuff which wasn't readily available for commercial use. The exposure and overall-development one gets here is unmatched.

Learning outcome: I learned the practical implementation of various deep-learning algorithms like CNNs and RNNs. I also learned transfer learning and making predictions if you are provided with a pre-trained neural network. I also worked with various

modules of python like Keras, OpenCV, TensorFlow, seaborn, numpy, matplotlib, etc. I also understood the importance of real-time analysis.

PS-I is an exposure oriented course: PS-I is more than just an exposure oriented course. One gets to learn and implement various things and you learn a lot of technological things. The exposure you get of the ongoing research in your nation and how you can contribute to it or industrial exposure is amazing. Also, the wonderful stories of experience the scientists here have to share make your day!

Name: Dev Gupta (2017B3A71082)

Student Write-up

Short Summary of work done: My project was 'Deep Learning Architectures for Human Fall Detection in 360-degree videos'. The first phase of the project work was learning about deep learning. We were asked to watch the deeplearning. AI specialisation in deep learning available on YouTube and Coursera. This course gave us an introduction to what deep learning is how it is implemented and what tools are available etc. The next phase of the project was a literature review. Our mentor asked us to read about the various strategies and tools based on deep learning that have been used in the academia to analyse 360-degree videos. Although, there has been extensive research on the applications of computer vision in regular videos there is not as much work done on 360-degree vision. One paper we came across was 'Saliency Detection in 360-degree videos. [http://openaccess.thecvf.com/content_ECCV_2018/papers/Ziheng_Zhang_Saliency_Detection_in_ECCV_2018_paper.pdf]. Researches had used a unique spherical convolution to implement the popular U-Net for saliency detection in 360-degree videos. We decided to base our work on this paper and there was also a link available to their code for spherical convolution. Then, we wanted to simply use this code for the spherical convolution as an I/O black box and fit it into a object detection architecture like VGG16 instead of the U-Net. However, we faced a lot of problems at this stage as we were unable to simply port the modules from this work to ours. We also faced problems because the dataset was on baidu and thus in chinese. We also worked on a literature review of fall detection techniques.

PS-I experience: I had specifically chosen this PS-I station (CEERI, Pilani) because a senior had told that they offer good projects based on deep learning. So, I had come to the PS-I station hoping to get a project on Deep Learning and learn to implement it . My experience was quite close to my expectations. I was able to get a project in Cyber Physical Systems department which was offering deep learning projects. Our mentor was extremely helpful. He told us what resources we should start learning from and

then slowly introduced us to our projects. It was good experience and exposure for a beginner in deep learning like me.

Learning outcome: The main learning outcome of my project during the PS-I is that I now have an understanding of deep learning and its functions and implementations. Apart from this knowledge I have also learnt a lot of about my specific project a lot. I know about several architectures used in the academia for computer vision and have also learnt about processing 360-degree videos using deep learning.

PS-I is an exposure oriented course: Yes, I agree that PS-I is an exposure oriented course because of the nature of the projects we get and how we are required to work alongside professionals. The experience is very different from the college setting and provides a good opportunity to learn.

PS-I station: CSIR- Central Leather Research Institute (CLRI), Chennai

Student

Name: Niranjan S (2017A1PS0747G)

Student Write-up

Short Summary of work done: Studies on anaerobic digestion of food wastes and pretreatment of cellulose using ionic liquids.

PS-I experience: PS-I was helpful in developing soft skills and work skills.

Learning outcome: Ways to generate useful substances from different types if wastes.

PS-I is an exposure oriented course: I agree to this statement.

Name: S.Saicharan (2017B1A31613H)

Student Write-up

Short Summary of work done: Polymer composites are considered to replace metallic components in many industries because compared to conventional metals fiber reinforced composites have low density, high specific strength and stiffness, higher corrosion resistance etc. This objective is to study the electrical properties of polymer based nanocomposites with polyurethane as the resin, leather buff dust as a filler and an addition of clay nanoparticles in the bulk. Tested the electrical properties like resistance, resistivity, conductance, conductivity, dielectric constant, dissipation factor and so on. After testing, plotted the graph between various parameters did graph analysis and predicted if the polymer composite is conducting or insulating. Also did a comparitive study of conductivity in presence and absence of clay nanoparticles and predicted applications where it can be used. Also did CAD designing and 3D printed a case for keeping of arduino like pcb boards.

PS-I experience: It was a very good experience. Learnt a lot from my mentors and also other students and their work.

Learning outcome: Learnt about polymer composites, writing review article in journal format, using an impedance analyzer, CAD designing (Autodesk Fusion 360).

PS-I is an exposure oriented course: No it is more than that. Helps us to do projects and learn new things and of course gives us exposure.

Name: S Ayeshwaryaa Neha (2017A1PS1586H)

Student Write-up

Short Summary of work done: Using the concept of LCA, analyses of the quantity methane produced was done through the use of LCA software, the environmental impacts of methane produced during anerobic digestion was done as compared to the energy used during the anaerobic digestion of waste. The quantity of CO_2 emitted throughout the process and the amount of methane (CH_4) recovered after the digestion was analyzed. Sankey diagrams of the whole process including the utilization of biomethane was made. Pyrolysis for dried sludge and banana peduncle to produce bio-char and bio-oil was also performed.

PS-I experience: This PS-I has given me an opportunity to face the professional environment and gain work experience. It has given me a chance to explore my interests and to have a vision of my future by giving me an option to choose the project of my interest. Attending meeting with people who are highly experienced has thrived

me to explore the depths of the field. Working in a fast-paced atmosphere has helped me learn to manage my time efficiently. Frequent evaluations of my work in the lab meetings and pressure to meet my regular deadlines has taught me the value of each minute. meeting new people with different mindsets, various thoughts and goals has encouraged me a lot. when I first met my mentor and the Ph.D scholars working under him, I was very nervous but eventually all of us developed a good bond. They have guided me a lot and had a friendly pace with me. I have developed a good connection with my peers as well. I have learnt to be punctual and to be honest to myself as there was a google doc circulated for attendance rather than marking it on a register or someone monitoring us. Overall, PS-I has given me a lively experience of the professional world.

Learning outcome: PS-I has taught me alot of things in technical and non-technical aspects as well. I have learnt the complete concept of lifecycle assesment and its software called umberto. Meanwhile, by assisting my mentor in the pyrolysis experiment, I have gained knowledge about the pyrolysis process and also about the plant that is being put up on a large scale.

PS-I is an exposure oriented course: Yes, PS-I is an exposure oriented course. It allows the students to gain practical knowledge of the concept rather than just mugging up the bookish knowledge which we usually do. We get to understand how the corporate world works and get to meet new people. It gives us an oppurtunity to understand where our interests lie. Meeting alot of new people, experienced mentors and professionals has made us alot more confident and has helped us in improving our communication skills etc.

Name: S Abhishek (2017B2A41421H)

Student Write-up

Short Summary of work done: I have worked on X-ray crystallography and bio-material preparation.
1. In X-ray crystallography, I have dealt with macro-molecular crystallization of lysozyme which is a protein found in egg white, crystal handling which involves use of liquid nitrogen to freeze the said protein crystals and X-ray diffraction which yields the diffraction pattern of the frozen crystal at various angles which is then uploaded on a software for model building which yields the protein structure.
2. My primary work was bio-material preparation in which I have used silk fibroin protein extracted from Bombyx mori silk cocoons and C.quadrangularis or veld grape extract. These were taken in different concentration to prepare a scaffold which would hopefully supplement the treatment of arthritis and other bone related diseases.

Currently, the scaffolds are under cell line studies. If this is successful, I would be publishing a paper for the same.

PS-I experience: PS-I was a wonderful experience for me which has somewhat helped me break out of a shell and protected environment of a college and face the real world with a million different people to deal with. This is a key and perfectly timed program which nurtures our development into adulthood and also makes us get used to the professional environment that lies ahead.
If my juniors get a chance to read this, don't take your PS-I lightly. In fact, take the seniors light who tell you so. There are a million things you can learn apart from having fun at a new place. If you are in a research lab like myself, try to approach your guides with some new ideas of work and be fearless in expressing your ideas. They will be the happiest ones and will teach you a whole lot more than what you might be currently doing.

Learning outcome: I have learned a great amount of things in my time at CLRI, Chennai. Right from getting used to a new city, being responsible and having fun at the same time is what I have gotten good at. I urge my juniors to explore more, not only the city but also themselves. Coming to the technical aspects, I have already mentioned them in my work's summary.

PS-I is an exposure oriented course: It does speed you up to what the industry or world is doing in terms of processes and the problems associated with it. All bookish knowledge will only help you so much. PS-I is a perfectly timed program which keeps you in touch with the outside working world. It is one of the most eye opening things one can experience in their young-adult phase. You can explore the horizons you are interested in but one should also try new things, even though it isn't related to their branch.

Name: Suraj.S.M (2017B2AA0592G)

Student Write-up

Short Summary of work done: My project was to investigate various electrical parameters and properties of a polymer composite composed of Polyurethane, Leather Buff Dust, and Nano Clay Particles. The aim of the project was an investigation study to find applications of the composite in the electronics as well as other important technical domains. I learnt about polymer composites in depth including its structure, synthesis, morphological aspects and various other properties. This also led me to study about important electrical and mechanical properties of carbon nanotubes, multi walled carbon nanotubes, graphene and metal oxides as well. I also learnt and operated on various

instrumental methods – impedance analyser (AC analysis), four probe measuring instrument (DC analysis) for measuring various electrical parameters like Impedance, Capacitance, Inductance Dissipation Factor, Admittance and Quality Factor.
With the help of the above mentioned parameters, I was able to calculate conductivity, dielectric constant and various other electrical properties for different Composition ratio's (Polyurethane, Leather Buff Dust and nano clay particles).
Critical analysis of graphs drawn between various electrical parameters, error management and elimination of processes are also some of the major learning outcomes from my project.

PS-I experience: I really had a good experience in the PS-I programme. It helped me to hone my soft skills, communication skills (both oral and written) and peer to peer interactions.

Learning outcome: Some of the major learning outcomes were article writing for scientific journals, exposure to polymer and material sciences and soft skills.

PS-I is an exposure oriented course: PS-I is definitely an exposure oriented course because I had a chance to work with Senior level Scientists on their active project in a central government research institute.You get more hands on experience in using scientific equipments and working in laboratories. The experience is something that you don't get in your class rooms or by studying books and involves more of a practical approach to solve real world problems.

Name: B Sivaraaman (2017B2A81314H)

Student Write-up

Short Summary of work done: Worked on image processing to classify leather samples using computer vision. Extracted features of leather samples using LBP and HOG and classified the images using Linear SVM and KNN classifiers. Used python, openCV and other python libraries to write the required scripts.

PS-I experience: Had a good exposure of day to day life in a research center.

Learning outcome: Learnt Python, OpenCV, soft skills and inter-personal skills.

PS-I is an exposure oriented course: Yes, It is a exposure oriented course.

Name: Gaurav Khandige (2017B5A30558G)

Student Write-up

Short Summary of work done: Worked on leather dataset collection for application in image processing for automation of classification of leather species. Literature survey of image enhancement techniques using MATLAB specifically arithmetic operations on pixel values of an image and histogram operations such as histogram stretching and histogram equalization.

PS-I experience: It was a wholesome experience. I understood interpersonal dynamics and how an organization works. The open learning environment that existed between the team members and within the organization was very encouraging.

Learning outcome: I learnt a lot of soft skills like communication in an industrial setup and developed interpersonal skills as well as presentation skills. The group discussions were instrumental in enhancing my communication skills.

PS-I is an exposure oriented course: PS-I enabled me to relate the fundamental theory learnt in the classroom with the practical aspects in the field.

Name: Kamal Khemka (2017A1PS0691P)

Student Write-up

Short Summary of work done: Worked on a project- Mathematical Modelling and Simulation of Hydrolysis of Tallow (Fat) in a batch reactor under Isothermal and adiabatic conditions. It was under process control and simulation lab in chemical engineering department. In this, we use mathematical model using mass balance, energy balance and rate of the reaction to predict the output during the hydrolysis of a fat. Know about how temperature and weight fraction of gylcerol in the extract phase changes with time in general. Also, coding on MATLAB is required. Went through a lot of literature papers.

PS-I experience: It was overall a wonderful experience for me to get an exposure of the core side of my subject. The Institute is also well equipped with different branches. It's

not only related to leather industry but also houses many fundamental and core branches like Chemical, Electrical, Chemistry, Biological Sciences etc.

Learning outcome: I learnt how to be disciplined when you get some responsibility. Got to learn much about batch reactors and its application in chemical Industries. Also, explored different biological and chemistry oriented appications during the orientation week.

PS-I is an exposure oriented course: Yeah, it's definitely an exposure oriented course. I got to know so much about chemical engineering, chemistry and biological sciences during this period of time. I found applications of what I read in 2nd year chemical engineering in many places. Learned about how to apply chemical process calculations, heat transfer, thermodynamics, fluid mechanics in the industry for large scale production and also in research work (both on small scale as well as pilot scale).

Name: Aakanksha Kesarwani (2017B4A10620P)

Student Write-up

Short Summary of work done: Our project was creating a model of supply chain of leather industry. I mostly worked on using fuzzy logic and MATLAB to determine locations for leather parks while my project partner worked on the supply chain. We were given a dataset set based on a questionnaire CLRI conducted across andhra pradesh and the project was based on data analysis.

PS-I experience: CLRI has a good working environment, it offers projects for almost every branch and has good resources as well as mentors. It depends on how you choose to utilize them.

Learning outcome: Learned Fuzzy Logic and MATLAB.

PS-I is an exposure oriented course: Yes.

Name: Amal Desai (2017A7PS1919G)

Student Write-up

Short Summary of work done: Computer Vision and Image processing to perform image stitching for images of non planar surfaces.

PS-I experience: It was a rewarding experience that helped me understand how to effectively work as part of an organisation instead of individually.

Learning outcome: Image processing and computer vision techniques using OpenCV.

PS-I is an exposure oriented course: PS-I gave me exposure to a wide variety of multidisciplinary experts.

Name: Palash Chowdhury (2017B1A80427P)

Student Write-up

Short Summary of work done: Project title- Smart AC system using Raspberry Pi. Work done on Raspberry Pi, how to control appliance from anywhere and how to control many appliance through relay, made an app to operate Raspberry Pi and webpage to store data of appliance.

PS-I experience: Experience was nice and it was worth for overall development.

Learning outcome: Python, Andriod Development,Apache, PHP.

PS-I is an exposure oriented course: Yes as you experience the professional work.

Name: Tanishq Dhanuka (2017B4A11501H)

Student Write-up

Short Summary of work done: Lot platform made for sensors to communicate, using Arduino and node mcu, it was made on an mqtt server with paho python client and

pubsubclient, mosquitto as a broker and it was hosted locally .paho was used to save data in an SQL data base.

PS-I experience: It started with an orientation program with the explanation of the vast labs the institute has, it was interesting to know the level at which the institute is working on to promote the leather industry in India.

Learning outcome: With group discussions, soft skills, interpersonal skills had improved and I learnt MySQL, python, Arduino ide, batch files.

PS-I is an exposure oriented course: Yes it is, CLRI being a research lab, got exposed to the work culture of a research lab.

Name: vignesh sathyaseelan (2017A1PS0744G)

Student Write-up

Short Summary of work done: I was allotted to the thermochemical laboratory along with Ankitha Ramachandran. We are working under Dr. M. Suriyanarayanan of the Chemical Engineering Department. Our project involves simulating and developing models for the production of an enzyme called CPDY (carboxypeptidase Y). It is a yeast vacuolar protease. A protease is an enzyme that breaks the peptide bond present in a protein. CPDY is of interest because it breaks the peptides from the c-terminus and hence it is useful for protein sequencing. It is also used for protein elongation and acts as a catalyst in transamidification reactions. It also find applications in the food processing industry to make the taste less bitter.
In the coming weeks of PS-I, we plan to use heat data to develop an online heat based model for the production of CPDY. The models currently used are very rudimentary and are not able to predict with greater accuracy. We plan to use an online model that can use the heat data that is collected by the probes present in the bioreactor and to use it to predict the various parameters if the model.
The orientation to CLRI was very educational. It has given us an idea of the research and work that goes on in a leather research lab. Working in a lab has been a very conducive environment for learning. We were exposed to various techniques and methods like plating, striking, autoclaving and microscopic imaging. Through the work, we have been exposed to reading and writing research papers. The scientists as well as the research scholars are very helpful and emphasize on us learning about everything that the lab has to offer rather than just focusing on our project.

PS-I experience: Very good.

Learning outcome: Modeling and simulation in python.

PS-I is an exposure oriented course: Yes very exposure oriented.

Name: Rajalakshmi C (2017B2A41725H)

Student Write-up

Short Summary of work done: I worked in the worked in the polymer science department of CLRI under Dr. Suguna Lakshmi. My project was on characterization of the newly synthesized flame retardant polyurethane containing phosphorous. Polyurethane is widely used in furniture industry as cushions, matressess and automobile seatings. But it is flammable and releases toxic gases during combustion. We worked on synthesising a flame retardant polymer that can substitute polyurethane. Once the polymer was synthesized we studied it's mechanical behavior, we performed various tests like density test, compression test, FTIR, TGA, DCS and SEM morphology.

PS-I experience: Initially I was not really enthusiastic about working here but today I don't regret my choice. My mentor made me search for papers and study for myself for my project. I had to do everything, run behind people for tests, collect results, study about the experiment for interpretation of the result, literally everything. This taught to think for myself, be independent and in the process I did learn a lot of things. I even learnt how to do paper works for publication which I'm very about it now. Though GDs, quizzes and seminars were little time consuming in our busy project schedule we managed to handle both. Apart from project, we enjoyed a lot hanging out with friends in the city during weekends and as a whole PS-I at CLRI was a memorable experience.

Learning outcome: I worked in polymer science department and my project was on material science. I did learn different testings done for characterization of a polymer, I got to learn COMSOL software and perform simulations in it.

PS-I is an exposure oriented course: Yes it was a great exposure for me in a research firm like CLRI, I got to work under scientists who have a number of publications under them, we worked in a relatively new are of polymer science. I'm currently working on publishing a paper which is a great leap for me in my academic career.

Name: Tanmay Agrawal (2017B1A10440P)

Student Write-up

Short Summary of work done: I worked in the biomaterials lab in CLRI. I worked under Dr. A. Gnanamani. My project topic was exploring the process of self-assembly in globular proteins. Initially, I had gone through the literature survey on this topic and started replicating the work done in the research papers with slightly manipulating the protocol. By doing this, I was able to observe many new results and tried to explain them by discussing with my mentor. Then, to support our discussion, we did more experimental and analytical analysis and predicted what actually is happening.

PS-I experience: PS-I experience in CLRI was quite good. I got to know how research is done in an research institute. My mentor used to believe in observation. She used to tell us to first do experimentation and then based on the observation try to figure out what could have happened.

Learning outcome: I learnt how research is done. I was also able to learn lot more through practical experiences about a particular topic.

PS-I is an exposure oriented course: I do think that PS-I is an exposure oriented course because it gives us an opportunity to explore our field of interest. By practically exploring our field of interest, we can decide upon whether the particular field is good or bad so that it would be helpful in making future decisions.

Name: Sanjay Sriram (2017B2A80867G)

Student Write-up

Short Summary of work done: Learn about copper nanoparticles, copper conductive ink, preparation, uses in leather industry. Preparing solutions of copper nanoparticles and incorporating in leather finishing solutions like lacquer, polyurethane and resin binders. Using Spectrophotometer to confirm presence of Copper. Using sonicator and centrifuge for stabilization and preparation of copper nanoparticles. Taking SEM images of the three surfaces and finding suitable solutions for finishing, to make leather conducting.

PS-I experience: It was a very good experience for me. It has exceeded my expectations.

Learning outcome: Learnt about nanoparticles, its application in leather industry, how nanoparticles have such a wide applicability in present world. Lacquer and resin formed a film on top, which affected conductivity of the leather surface. Polyurethane did not form a stable solution.

PS-I is an exposure oriented course: Yes. PS-I is an exposure oriented course for me, because I worked in one of the biggest Government research labs in the country. I have developed a keen interest to pursue further studies on nanoparticles.

Name: Harish S (2017A1PS1136H)

Student Write-up

Short Summary of work done: Cost estimation model for CNP and TSP projects, used Excel VBA.

PS-I experience: If low CGPA person and interested in research, join CLRI, and mainly go to sciences place it will be better. I had a great experinece here. Dr. Manoj Kannan of Pilani is a strict but great person. GD are good, it will help you get out of your cocoon. Many of my friends are writing papers.

Learning outcome: VBA.

PS-I is an exposure oriented course: Yes. Makes it more useful with projects.

Name: Sai Sri Harsha Indurti (2017A1PS0915H)

Student Write-up

Short Summary of work done: Developing designs for research on application of 3D printing technology in preparing membranes for water purification.

PS-I experience: It was a great learning experience which gave chances to learn new things and explore different areas. It gave an exposure to working environment.

Learning outcome: I have learnt designing 3D models and also about purification membranes particularly which I think will be helpful for me in the future.

PS-I is an exposure oriented course: This is very much true. It gives us exposure at an early stage and prepares us for a bigger stage.

Name: Ankitha Ramachandran (2017A1PS0524G)

Student Write-up

Short Summary of work done: Mathematical modelling of bio-processes using python.

PS-I experience: Very enjoyable experience, worked under a great mentor who provided lot of guidance and motivation.

Learning outcome: Soft skills, communication skills, technical skills.

PS-I is an exposure oriented course: Definitely. Shows us how an organization operates on such a large scale.

Name: V Abishek Balaji (2017A2PS0771P)

Student Write-up

Short Summary of work done: The project assigned to me was 'Planning and designing of Business Centre' as a part of a MoU signed between CLRI and AP government. The initial half of my work was to go through research papers, MSME policies to understand the components and working of a business centre. My post mid-sem work was a learning experience where in I had to come up with a rough floor plan for the same.

PS-I experience: PS-I was an enriching experience. I got to know the working environment in a premium research institute. I also imbibed various soft skills such as work-life balance, group behavior and effective communication, etc.

Learning outcome: I learnt a software called Revit by Autodesk.

PS-I is an exposure oriented course: I strongly agree with the above statement.

Name: Barath.T (2017B2A41515H)

Student Write-up

Short Summary of work done: I worked in the chemical engineering department under Dr. Murugan. I studied the extraction capabilities of surfactants Triton X 100 (synthetic) and Saponin (natural) on various dyes (Eosin Y, Orange G, Amido Black 10) and Cr(VI) metal ion.

PS-I experience: I had to put in sincere effort in these 2 months. I got exposed to the research culture and learnt that it requires consistent effort. The mentors and instructors were very helpful and assisted a lot. It was a good learning and personal development experience.

Learning outcome: Communication skills had improved through group discussions, seminars and formal mails to instructors. Importance of sincerity and consistency was reestablished in me. Technical skills obtained were - making presentations, report writing, operating UV Vis and pH spectrometer, laboratory work.

PS-I is an exposure oriented course: Yes, it is very true. The interdisciplinary nature of science was understood by me after working in the large institute that is CLRI. In the leather research institute, only one among our batch of 42 who went to PS-I there work directly on leather. All the others worked on the allied fields based on their core subject and interests. How research work happens was experienced here being a 2nd yearite who didn't have prior experience working in any formal projects.

Name: A.Adarsh (2017B2A40513P)

Student Write-up

Short Summary of work done: Synthesis of small organic molecules and studying their photochemical properties. Gained practical chemistry lab experience with regards to synthesis, purification, analysis. Worked with instruments like UV-vis spectrophotometer, Fluorescence spectrophotometer, Lifetime analysis, TGA, DSC, etc with assistance and under supervision.

PS-I experience: Memorable experience. The mentor and other Ph.D students in the lab were very friendly and patiently explained and cleared my doubts throughout the PS-I.

Learning outcome: Gained practical lab work experience and learnt important theory about instruments, photochemistry, analysis and understood about research as a career option.

PS-I is an exposure oriented course: True to some extent. I understood working in a research center about the environment regarding research as a career option but PS-I is largely dependent on various factors for a complete learning experience. It requires a good mentor to guide us patiently as we lack a little theoretical background and a good instructor to guide us.

Name: Joel Joseph (2017B2A10267G)

Student Write-up

Short Summary of work done: Main work was done with leather processing in mind. During pre-tranning of leather there is a process called pickling which is aimed to reduce the pH of the pelt so that it can undergo chrome tanning. The study was aimed at finding a suitable substitute so that conventional reagents can be omitted or replaced and a lower TDS or retention of solids in waste water is minimized.

PS-I experience: Great.

Learning outcome: Leather processing.

PS-I is an exposure oriented course: I'd agree but that's not all that can be gotten from PS-I. But most of it is exposure to a working environment whether it be a research institute or a factory.

Name: Vivek Mani Tripathi (2017A1PS0640P)

Student Write-up

Short Summary of work done: My project was on the topic of "Modelling of Batch Reactor for Decomposition Reaction". It included writing the matlab code for decomposition reaction of 4-chloro-3-nitrobenzotrifluoride and predicting the temperature and pressure build up in the reaction vessel with the help of kalman filter.
Kalman filter is a mathematical estimator used for predicting the values while decreasing the errors via iterations. In our model, we used Unscented Kalman filter, which is used for predicting non-linear functions.
The project was to predict the temperature of the vessel during the reaction so as to prevent the occurrence of a runaway reaction. A runaway reaction is uncontrolled batch reaction that can damage the vessel due to temperature and pressure build up inside the chambers.
We used Kalman filter to iterate the values of decomposition parameters like Damkohler number, Activation coefficient, Enthalpy to compare our mathematical model to the experimental values.

PS-I experience: PS-I gave the exposure me an exposure needed to change my point of view for looking in the future. Not only, I was able to pursue my interests in coding while considering my core sector, I was forced to come out of my comfort zone to face with the problems that I feel have affected me greatly.
The grading components set up by our instructor has made me more confident, less nervous to express myself and most importantly it gave me a glimpse of the corporate sector and taught me maintain a work-life balance.

Learning outcome: PS-I has greatly affected me academically as well as personally. It made me a bit more clear about pursuing my interest in coding. It also nurtured my sleep cycle and work-life balance, and made me understand how it affects my psychology. With the help of my instructor, Dr. Manoj Kannan sir I was able to learn cooking, which really made my life in Chennai very easy, as I was facing food problems during my initial weeks.

PS-I is an exposure oriented course: I strongly agree with this statement. PS-I is not just an internship, it is an overall development package which gives a glimpse of what will come in future and make us ready for that.

Name: Pratulya Bimal Shah (2017B1A40501P)

Student Write-up

Short Summary of work done: I worked on exploring the self assembly process in globular proteins. Self assembly is the spontaneous formation of highly ordered architectures consisting of protein molecules under specific physical and chemical conditions. The applications of self assembled protein materials have been very well explored, ranging from targeted drug delivery, early disease diagnostics, and tissue regeneration. However, there is a knowledge gap regarding the exact biochemical mechanisms behind self assembly. My work under Dr. Gnanamani in the biological materials laboratory attempted to fill this knowledge gap.
Filling this knowledge gap can help in finer control of self assembled material preparation. Desirable values of parameters like porosity, elasticity and viscosity can be achieved. Some to the reagents we used to trigger self assembly are also found in the human body and this can help us understand diseases attributed to protein aggregation, self assembly being a subtype of aggregation.
Due to a paucity of time I was unable to complete my project but I will try my best to remain in touch with my mentor and complete it during the upcoming semesters.

PS-I experience: PS-I was a highly beneficial experience for me. Having hands on exposure to the various instruments we learn about in the classroom and applying the knowledge learnt in the classroom was particularly enjoyable. Most of my 2nd year biology courses especially biophysics was applied extensively.
Staying on my own in an apartment, without the conveniences of a hostel also made me appreciate the important roles played by housewives all over the world, and also taught me to communicate and be flexible and adaptable.
The group discussions conducted by our instructor Dr. Manoj Kannan were very interactive and a definite highlight of the entire program. The selection of topics for the discussion were those that affect us both as students and the future workforce of this country. I definitely took home many life lessons from these discussions.

Learning outcome: Academic Skills:
1. Learnt the operation and analysis of instruments like FTIR, UV-Visible Spectrometer, Fluorescence Spectrometer, etc.
2. Learnt to effectively use online research databases like NCBI PubMed, Nature, RSCB, and EMBL-E.
3. Learnt to apply theoretical concepts to explain wet lab observations.
4. Writing formal reports.
5. Literature Survey and effectively reading research papers.

Soft Skills:
1. Effective public communication and clear articulation of thoughts.
2. Thinking impromptu and improvisation.
3. Time Management.

PS-I is an exposure oriented course: I agree with the above statement especially with respect to working at a research laboratory. This is because the time duration of most research projects generally range from 6 months to a few years. The best one can expect from a 2 month program is exposure to a research lab culture, learning instrumental analysis and applying the theoretical knowledge learnt in the classroom to explain wet lab observations.
I embarked upon my PS-I program with the aim of being exposed to a research lab culture, which would help me in planning the direction of my career in the future. I feel I have successfully achieved this aim and also taken back many other learnings from this program.

Name: Christeena Jogy (2017A5PS1181H)

Student Write-up

Short Summary of work done: My work was based on metallic nanoparticles. Its applications in therapeutics.
Biocompatibility evaluation of metallic nanoparticles.

PS-I experience: PS-I at CLRI was a great experience for me.It was a great opportunity for me to understand how an organisation works and to explore the importance of it .This one month helped me understand how a researcher think on a given problem. Learning basics of anew field all bi myself was a new experience for me. PS-I gave me confidence in reading and understanding research papers. Apart from academics this one month showed how skills such as listening, collaborating with others, presenting ideas, communicating with the team members are valued in workplace. Overall, PS-I at CLRI was a wonderful opportunity for me.

Learning outcome: I was able learn so many new techniques and new instruments. I can confidently answer the questions about the project work I did.

PS-I is an exposure oriented course: In this PS-I we got a hands-on experience. We got to learn so many new instruments. Rather than just reading and writing exam. We got to apply our theoretical knowledge in practice.

Name: N.Amsavalli (2017A4PS0263H)

Student Write-up

Short Summary of work done: I've worked on fracture toughness analysis of 3D printed ABS polymer. Crack embedded 3D printed ABS specimen was made with varying the parameters: resolution, print strength, print pattern. The change in the mechanical properties with these changes in properties was observed and the behavior during three-poin-bending was observed to conclude the results.

PS-I experience: PS-I provided a chance to grow in all aspects. Working in CLRI has provided me exposure to how a research lab works and has improved the work discipline and punctuality. Not only academically I've also learnt to be independent facing all the real-life situations alone.

Learning outcome: I've learnt to use ANSYS, Auto CAD 3D, Auto CAD fusion.
All quizzes and group discussions have improved communication skills.
On the whole, I have improved my technical and interpersonal skills.

PS-I is an exposure oriented course: True, not just exposure but also has made us work, adapt to the conditions of the working lifestyle.

Name: Satyam Kunal (2017A1PS0029P)

Student Write-up

Short Summary of work done: I needed to design a batch reactor mathematical model which can be used to study the ddecompositionof 4-cloro3-nitro benzotriflouride. This compound is used in agro pesticide based industries.
Also runaway conditions can be simulated and studied without actual real time reaction.

PS-I experience: Good and academically productive.

Learning outcome: 1) Mathematical modelling of hypothetical models
2) Optimisation
3) Matlab

4) Kalman Filter

PS-I is an exposure oriented course: It enabled me to gain first-hand exposure of working in the real world. It also allowed me to harness the skill, knowledge and theoretical practice I learnt in university. PS-I provides a nice learning curve for students with little experience of the professional world.

Name: Ashwin Bale (2017A1PS1138H)

Student Write-up

Short Summary of work done: My project was about designing a photocatalytic reactor, that used nano-semiconductors to treat dyes from polluted water, which are usually not treated by normal waste water treatment processes. Hence, an advanced photooxidation method called photocatalysis was used for the same.

PS-I experience: The timings were very strict. Not allowed to leave the station till the official institute timings of 5:30 were up, even though u finished your work early. Overall, CLRI is a broad org with ample of learning and project opportunities.

Learning outcome: Learnt the procedure for research oriented work, like some key factors including analysis of papers, reading and implementing the ideas and improvising the faults made to tackle relevant issues.

PS-I is an exposure oriented course: Fully agreed.

Name: Sai Soumyadarshan Bhuyan (2017B4A10720P)

Student Write-up

Short Summary of work done: I worked on a project that required using Neural Networks to predict the toxicity of a given family of compounds using their physical and quantum properties.

PS-I experience: CLRI is a very large organisation. It has projects for students from all disciplines and the Scientists working there are really helpful.
I learnt a lot during PS-I.

Learning outcome: Technical Aspect - Machine Learning, Deep Learning.
Apart from that many interpersonal skills as well like from the GD's organised.

PS-I is an exposure oriented course: Yes, probably it's more about being exposed to the working culture at a large organisation and the etiquettes one should follow while working there.

Name: Supriya Gharpure (2017B1A41025P)

Student Write-up

Short Summary of work done: I worked on learning the use of Machine Learning algorithms including convolutional Neural Networks for Surface- level analysis and classification of patterns and textures using Image Processing. I also used OpenCV for image analysis. Along with this one of the major focus of my work was also Image-specific data augmentation to enlarge my limited dataset of images. The python programming libraries I used for the same were Keras, TensorFlow, matplotlib, bumpy and openCV.
Since, I was fairly new to ML most of my work was learning oriented and helped me explore this areas.

PS-I experience: However working was fun overall. People are willing to guide you if you approach them. It was extremely disciplined due to our instructor Dr Manoj Kannan. Overall, it also helped me in improving my communication skills, interpersonal skills and taught me how to have a good work-life balance. If one is extremely fixated on doing research it is a good idea to come here.

Learning outcome: I explored an entirely new area of science. It was helpful. I learnt many interpersonal skills, how to maintain work-life balance. I wished the evaluation components were evenly spaced out. I also leanrt a lot about the real-life setbacks one faces in research.

PS-I is an exposure oriented course: This is true. Sometimes in fact there is little academic knowledge one gains but a lot of professional knowledge one gets.

Name: Sindhu M (2017B1A30712P)

Student Write-up

Short Summary of work done: Properties of collagen in non polar solvents. Preparation of mesoporous particles. Properties of mesoporous particles.

PS-I experience: Had adequate lab work and literature study.

Learning outcome: Common lab techniques. Soft skills such as report writing, group discussion etc.

PS-I is an exposure oriented course: I was exposed to research- Wet lab work, analytical studies, documentation of results etc, through hands on experience.

Name: Srujan Govindu (2017B5AA1698H)

Student Write-up

Short Summary of work done: I used NMR DOSY technique to study diffusion and predict some physical properties of Micelle using that data and studies NMR hardware.

PS-I experience: It was good.

Learning outcome: I gained exposure.

PS-I is an exposure oriented course: I think that is an accurate statement.

Name: Padma Vilochani P G (2017ABPS0353P)

Student Write-up

Short Summary of work done: I worked on a project to develop a supply chain model for the leather industry in Krishna district at the project planning and business development unit. A friend and I together decided where some facility should be located in the district. This information provided by us could be used for a consultancy project that CLRI is currently working on.

PS-I experience: PS-I has given me a touch of the formal working environment and the habit of reporting to the mentor on a regular basis. The evaluative components helped improve soft skills including communication.

Learning outcome: I learnt a lot about supply chain management and SCOR model. But most of the improvement was in soft skills and interpersonal skills.

PS-I is an exposure oriented course: It is definitely an exposure oriented course in one way or the other.

PS-I station: Centre for Science and Environment (CSE), New Delhi

Student

Name: Medha Bhat (2017A5PS1082P)

Student Write-up

Short Summary of work done: The work aimed at doing research and writing articles for a yearly publication of the institute- The Body Burden. The book is aimed at the issue of antibiotic resistance, the ways in which the pharma industry is working to tackle this threat and the alternatives which can be developed against various disease-causing microbes.

PS-I experience: PS-I experience was quite knowledgeable and gave us an idea about the working of an organization. The instructor was extremely helpful and cooperative and helped me improve my work at various levels. The topic of my project was also quite engaging and helped me get an idea about the current scenario of the pharma industry.

Learning outcome: The process of researching for the book, I got a lot of information about the current trend being followed in the Pharma companies, about the issue of AMR, the actions of various organizations against it and the role of SMEs in tackling this

issue. The process of writing the articles for the book- Body Burden improved my writing skills and gave me exposure to how such stories are drafted.

PS-I is an exposure oriented course: The experience at PS-I gave me an exposure to the working ethics of the organization. It also acquainted me with the current trends in the medical sector globally.

PS-I station: CSIR-Central Institute of Mining and Fuel Research (CIMFR), Dhanbad

Student

Name: Ashish Kumar (2017B1A70854P)

Student Write-up

Short Summary of work done: Humanity must take action on the cues given by the environment around us when it reaches the carrying capacity for the humans. One of the sustainability problems which the humankind is facing is the unavailability of a stable forms of renewable energy. There exist sources of renewable energy in the world around us as of today such as wind power, hydro electrical energy, solar power et. al. But these forms of are inherently plagued by various disadvantages such – unavailability of wind and solar power as a continuous and stable form of energy in all parts of the earth or expense and the environmental stress caused as a result of installing hydroelectric power plant.
My project was aimed towards a form of energy which is feasible and the raw material for which is easily available in any nook and corner of the country. I came across bio ethanol as a form of energy which was widely gaining popularity due to it being a clean and cheap form of energy. Moreover, it could be prepared from agricultural waste by the action of *Saccharomyces cerevisiae*, commonly known as yeast. I took on the much valuable work of producing bio ethanol from fruit waste. The project was of much value to the institute too as some end product was going to get prepared from scrap and junk. The process employed was alcoholic fermentation on the fruit waste. After fermentation of the waste, the yeast produced ethanol.

PS-I experience: My experience in brief was excellent. There was no restriction from my mentor regarding the complexities involved in attendance part. My mentor's sole purpose was to utilize the potential for work related to my project.

Also, there was not a single instance of working in a place which was unfamiliar to me before PS-I, as there were other trainees working on the same project who were more than happy to provide valuable cues for my own project work.

Learning outcome: I learnt a lot about the potential uses of sustainable fuel such as bio-ethanol. Also, I learnt about the process of preparing bio-ethanol from waste products and the various substrates and organisms involved in the process.
Apart from the academic aspects of the work, ability to work in a team and co-ordinate my efforts with others towards the same goal was also delivered in the learning package.

PS-I is an exposure oriented course: The statement is particularly appropriate for a project based on biological systems and biotechnology. On theory, one doesn't know what various practical problems one could face because the problems are not generalized and don't involve any algorithmic solution to the problem due to localized nature of such problems. One has to use his wit under the guidance of industry experts to reach towards a heuristic solution. PS-I with the exposure it provides, acts towards galvanizing theory based knowledge and the practical problem solving realm.

Name: Abhimanyu Raj Shekhar (2017A1PS0790P)

Student Write-up

Short Summary of work done: I was assigned to work on 2D transient eulerian multiphase flow simulation of a fluidized bed gaisifier installed in the pilot reactor plant of CIMFR via FVM approach. The granule theory was important in this and was performed under cold condition at atmospheric pressure. The simulation waa done with 40000 iterations and 12000 iterations and the data have been successfully submitted to the CIMFR for future studies.

PS-I experience: The exposure I got while working under different scientists was great and they readily cleared all my doubts and provided me with the tutorials and research papers required to perform the study and simulation. The visit to reactor plants and showing us the working of the FBG for coal gasification provided a great insight about the technologies Indian Govt. is working on right now. The project I worked on was indirectly supervised by NITI Aayog, India.

Learning outcome: I learnt about multiphase flow simulation i.e. gas-solid simulation in my case. I learnt about granule theory and fluidization concepts. The gasification technology and methanol economy was taught by my guide and expanded my knowledge base.

PS-I is an exposure oriented course: PS-I is indeed an exposure oriented course and it's important after 2nd year of Engineering to go for industrial exposure and apply the knowledge obtained till the 2 years to the real scale working.

Name: Shantanu Dagar (2017B3A20682P)

Student Write-up

Short Summary of work done: Exploring 3D TLS and ATLAScan software and damage assessment of building structure using 3D TLS.

PS-I experience: PS-I experience was good.

Learning outcome: Surveying through 3D TLS.

PS-I is an exposure oriented course: Yes.

Name: Shubham Sharma (2017A4PS0766H)

Student Write-up

Short Summary of work done: My work involved the Finite Element Analysis (FEA) and Vibration analysis of armoured face conveyor which is used in longwall mining process. Alongside this, I helped my guide in simulating Hydraulic Cylinder in Simulink used in roof supports in longwall mining

PS-I experience: The PS-I station is good and the scientist are helpful but are quiet busy so you have to keep pestering them. Most of the scientists are very well established in the field of mining and their respective departments, so working under them gives you an edge. The working environment is good.

Learning outcome: I learnt longwall mining process and how research is done in a government institute. ANSYS and Simulink.

PS-I is an exposure oriented course: True. It does provide exposure.

Name: Vyshnav Varma (2017B5A80868G)

Student Write-up

Short Summary of work done: Project 1: Successfully constructed and tested an Integrated Peripheral Surveillance System. The system consists of a LIDAR, microwave sensor and an IP camera.
Project 2: Used deep learning to predict/model gas emissions in a mine so as to detect them at critical levels. Works by taking live database gas sensor readings and running the DL algorithm on it.

PS-I experience: It was a pleasure working with the finest people in the fields of applied physics and electronics. There was adequate help from BITS as well as CIMFR faculty. The workplace culture was very good.

Learning outcome: Handling electronic circuits & automation and implementation in real life situations.

PS-I is an exposure oriented course: Yes.

Name: Varghese Roy (2017A3PS0366G)

Student Write-up

Short Summary of work done: I worked on an electronics embedded systems project under Dr. Dilip Kumbhakar, a faculty at CIMFR. It was a good project which had industrial applications in transportation of materials inside coal mines. The work load of the project was neither too high, nor too low, it was fair enough. I got to learn languages like arduino and also got to learn how internet of things work. The assignments like group discussions project presentations given by my PS-I instructor also helped me in improving my communication skills and critical thinking ability. Overall, it was a nice experience working at CIMFR.

PS-I experience: The working experience at CIMFR was nice. There wasn't too much stress but still, we had enough work to do. The evaluation process was fair. The evaluation components weren't too much. The support and guidance given by the faculty and staffs were good.

Learning outcome: Learned coding on arduino IDE. Learned how internet of things work. Improved my skills on communication and critical thinking.

PS-I is an exposure oriented course : Yes, PS-I was an exposure oriented course for me both in terms of work as well as life. I got a chance too see how a government research institution works and how I should professionally communicate, interact and behave at a workplace. Also, I got a chance to experience the life at northern parts of India. I had opportunities to interact with common people living in the city which gave me a better understanding of life.

Name: Nihal Singh (2017A7PS0934G)

Student Write-up

Short Summary of work done: Predicting pull and PPV using soft computing techniques.

PS-I experience: I got to learn a lot of new techniques for ML model optimisation.

Learning outcome: I improved a basic NN model.

PS-I is an exposure oriented course: Yes it is.

Name: Samarth Singh Chauhan (2017B3A40615G)

Student Write-up

Short Summary of work done: I worked on production of graphite electrode from Coal Tar. This can broadly be divided into 2 parts i.e production of needle coke and then production of graphite electrode from the needle coke produced in the first part. In this

project I learnt about a number of processes which are done to achieve these transformations i.e Delayed coking, calcination, forming kneading, graphitization etc.

PS-I experience: I learnt not only some academic lessons but also life lessons which are going to help me in the future.

Learning outcome: Good.

PS-I is an exposure oriented course: Yes it is, because we get the first hand industry experience and are exposed to the situation in which we have been never before on our own. We learn a lot of things from these problems which are going to help us in the future when we go to a real job.

Name: Shivangi Singh (2017A7PS0213P)

Student Write-up

Short Summary of work done: Building an android app to scan and identify plants of Jharkhand region.

PS-I experience: Good, no strict timing to be followed, quite flexible.

Learning outcome: Learnt object detection with Android apps.

PS-I is an exposure oriented course: Yes.

Name: Harsh Raj (2017A7PS0942G)

Student Write-up

Short Summary of work done: I had to read up a paper based on ground subsidence phenomenon in mining and then develop an algorithm to run a simulation for the same on MATLAB.

PS-I experience: The experience was quite fruitful. I got to interact with my guide and engage in fruitful discussions about the project and I also learnt MATLAB which will surely help me in the future.

Learning outcome: Learnt about the challenges of ground Subsidence and ways to counter them. I also sharpened my coding skills and learnt the use of MATLAB software.

PS-I is an exposure oriented course: This statement is true. Most of the people appearing for PS-I dont have any prior industry-oriented experience and I am sure performing well in PS-I is a good way to start.

PS-I station: CSIR-Institute of Genomics & Integrative Biology, New Delhi

Student

Name: Nallapareddy Mohan Vamsi (2017A7PS0018H)

Student Write-up

Short Summary of work done: The main task for me was to build a model to detect image forgeries in scientific journals. I was to build a Machine Learning model that would highlight areas of possible forgeries in the image.

PS-I experience: The research institute followed proper guidelines while giving the students the right amount of freedom. The given work was regularly checked upon and frequent meetings with the assigned mentor helped increase the pace of the project.

Learning outcome: My major takeaway from this experience was how to model your projects in a research environment. The steps and the order in which they should be followed to attain the required goal. Another important lesson I learnt was the need to be extremely systematic, the methods to use to organize my work.

PS-I is an exposure oriented course: I believe that being in an environment where your actions have real time repercussions imbibes the students with a sense of responsibility and helps push them further to inculcate their learning in daily lives making them better as individuals.

Name: Rohit K Bharadwaj (2017B4A70633P)

Student Write-up

Short Summary of work done: Worked on NLP related project which dealt with word2vec and GloVe algorithm, worked on both R and Python, got abstract data on vitiligo and I had to build a word galaxy network from it which showed the words which are related/similar to each other closer together and for any given input words all the semantically similar words to that were obtained and displayed as a graphical network. Did data pre-processing like stop word removal, lemmatization, applied regular expressions to clean the data and used the GloVe algorithm to get word embedding. Gephi was used in the end to create the graphical network from the GloVe word vector embedding. Got around 25000 nodes in the network and all visualized along with running statistical tests like modularity on the network results were shown to be accurate.

PS-I experience: It was a good learning experience and got a chance to apply Machine Learning/AI tasks on field of biology.

Learning outcome: Python, R, Regular Expressions in Python, Word Vectors, Word2Vec model, GloVe model, Neural Network, TSNE algorithm, Lemmatization, Stemming, POS tagging, Bi gram for phrases in word2vec, Gensim Python Library, Stop word removal, Gephi, Modularity statistical test, Layout algorithm in gephi like Force Atlas 2.

PS-I is an exposure oriented course: I agree with this statement, it is definitely a exposure oriented course. You get a good exposure in PS-I, I got to know how the research institute functions and what kind of work is undertaken mostly in govt research labs like CSIR, I got to know how algorithms from computer science can be applied and is being applied effectively to solve problems in biology/pharmacy, and I believe there can be a lot of inter disciplinary work/research which can be done.

Name: Kartik Bhatia (2017A7PS0051G)

Student Write-up

Short Summary of work done: Developed ML algorithms to visualize individual-level signature based on multiple phenotypes and associate phenotype with gene expression.

PS-I experience: Since the PS-I station is purely research based, our mentor focused more on teaching us how to approach research and that the knowledge is far more important than the results obtained.

Learning outcome: Learned about how research actually works and this would come in useful in future career decision making.

PS-I is an exposure oriented course: I agree as I gained a lot of exposure and made contacts with Ph.D students as well as reputed scientists of India.

Name: Avishree Khare (2017A7PS0112G)

Student Write-up

Short Summary of work done: Our team worked on the detection of intracranial hemorrhage using Machine Learning, falling under the domain of computer vision. We conducted a literature survey of the various papers published on this topic and built a comprehensive comparative analysis table which can be referred by any researcher working on the same. We then worked on pre-processing of DICOM images into formats that can be fed to machine learning models. Following this was a 2D classification model on the head CT-hemorrhage dataset. We also worked for extending transfer learning from 2D pretrained networks to 3D networks for better performance. Overall, the work assisted in optimizing various parts of the Machine Learning pipeline for medical image analysis.

PS-I experience: CSIR-IGIB is a premier institute of the country working on optimizing biological research, mainly genomics and bioinformatics. Being here, in itself, was a privilege as we saw how actual research functions and met scientists that have worked on several breathtaking projects, including the Indian genome project. Being a student of computer science, this place gave opportunity to automate the work done here and was deeply related to Artificial Intelligence. We learnt about Computer Vision, focussing on medical image analysis. We saw real datasets that people work on and the challenges that come up, with some finding unique solutions. The work focussed more on learning and understanding the concepts and helped in stimulating interest to continue exploring these fields. It was a fun experience overall where we learnt things, implemented some dummy models on those and then assisted in improvising the approaches currently available.

Learning outcome: The most important learning outcome was the understanding of how the research process works and how different challenges are overcome.

PS-I is an exposure oriented course: It definitely was exposure oriented as we saw how research works and how real life projects are worked on.

Name: Harnoor Dhingra (2017A7PS0081G)

Student Write-up

Short Summary of work done: My project was based on text mining. It was a really fun experience as we had to do work in a group and our mentor used to guide us really nicely. It was related to biomedical discovery using text mining.

PS-I experience: My project was based on text mining. It was a really fun experience as we had to do work in a group and our mentor used to guide us really nicely.

Learning outcome: Learnt about text mining.

PS-I is an exposure oriented course: Yes, PS - I is an exposure oriented course. We got to experience work in a really nice research institute.

Name: Shashwat Badoni (2017A7PS0115G)

Student Write-up

Short Summary of work done: Trying to find the relations between two entities in pubmed text.

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

Learning outcome: I learnt a little bit about text mining.

PS-I is an exposure oriented course: This is a true statement. I got the opportunity to see cutting edge reasearch.

Name: Asadali Hazariwala (2017B3A70774G)

Student Write-up

Short Summary of work done: This project aims to provide restaurants with the taste preference of their customers through genome sequencing and mapping. It will help the restaurants serve better food to their customers as the chefs will now know how much salty or spicy food their customers like. This will ensure high level of customer satisfaction and help retain customer loyalty. My main aim is to identify olfactory receptors responsible for preference of tastes. I also plan to make a database with all the genes which affect the taste preferences which could be used by other people to develop algorithms which can predict taste preferences with a higher accuracy by incorporating past food experiences to help serve better.
To this effect, I made a database which will enable the scientific community to help extract gene info which will affect taste preferences of individuals and thus enable them to predict the taste preference.
Hence, I aim to extract and organize data through text mining approaches for using it to predict taste preferences.

PS-I experience: It was good

Learning outcome: Database management.

PS-I is an exposure oriented course: Got to meet a lot of people which increased exposure.

Name: Sri Pardha Chidella (2017A7PS0953G)

Student Write-up

Short Summary of work done: Text mining in biomedical texts. We were required to identify hidden patterns in large number of biomedical abstracts given to us and identify possible new relations.

PS-I experience: It was a very good experience. I learned about genomics, a field which I didn't know was so closely associated with computer science. I learnt about the importance of working in a team. The mentors were very helpful and guided us throughout the duration of PS-I.

Learning outcome: Learnt about text mining and its application in modern day research. Got familiar with R language and many of its functions which make many tasks easy. I could also improve my presentation and report writing skills. It was a very good learning opportunity to work in one of the best research institutes in India.

PS-I is an exposure oriented course: I was exposed to the research culture in one of the best research institutes in India.

Name: Suryateja Ratakumtla (2017A7PS0113G)

Student Write-up

Short Summary of work done: Making sense of drug effects on human transcriptome (Data Analytics), identifying possible connections between drugs and disease using transcriptomes data.

PS-I experience: New and challenging. We are required to build bridge between different disciplines.

Learning outcome: How to read research papers and give shape to new ideas from them.

PS-I is an exposure oriented course: We were asked to join a team in a semi-official way and report learning outcomes to guides almost every week. Its a fine exposure there.

Name: Shejal Gupta (2017A7PS0122G)

Student Write-up

Short Summary of work done: Relevancy analysis and prioritization of biomedical literature data.

PS-I experience: It was an amazing experience.

Learning outcome: I learnt about text mining.

PS-I is an exposure oriented course: Yes.

Name: Rohit Jain (2017A7PS0122P)

Student Write-up

Short Summary of work done: Data visualization and Machine Learning in ayurgenomics. The idea was if we could integrate the concepts mentioned in Ayurveda with genomics and use those stratification models to work towards precision medicine. What we did:
1. Read research papers
2. Learnt some higher mathematics (topological spaces and related topics)
3. Used data visualization for cool representations
4. Used mathematical concepts and information theory for prediction models
Overall we learned / used: Python, Jupyter, Git, Pandas, Matplotlib, Seaborn, d3.js

PS-I experience: I am glad that I chose my PS-I stations over others. I have learned much more than I knew and grown as a person. While my project helped me learn some technical skills and work on a real big data, what I found more interesting is the way people work here. I understood what actually the research means and the approach that one should have towards problem solving. The station did teach me on how to look at a problem from a different perspective.

Learning outcome: Python, Jupyter, Git, Pandas, Matplotlib, Seaborn, d3.js

PS-I is an exposure oriented course: For me the statement holds true. The program gave me an early and exciting exposure in a research culture. I was working with the scientists from the best institute in India for genomics. So yes, it was a good experience for me.

Name: Syed Ahsan Abbas (2017B3A70507P)

Student Write-up

Short Summary of work done: We used the concepts of entropy based distance metric and information theory in order to visualize data. The first attempt was to integrate ordinal and nominal data on a common metric. The entropy based distance metric provides a good metric to analyze a questionnaire data. The metric could be used to integrate the different types of categorical data for further analysis. An attempt was made to identify different attributes contributing towards each of the prakriti type using the fundamental concepts of information theory and mathematics. We intend to extend the idea of divergence classification on our model to create a prediction model to identify the prakriti type of a new individual and hence stratify individuals into different groups. The stratification model could then be used to work towards precision medicine and help towards drug efficacy rates.

PS-I experience: I got a perspective in forming problem statements in research, deciding workflows in a team and exposure in the applications of computer science in genomics.

Learning outcome: Developed an intuition going about research projects and it's stages: Discovery - Ideation - Design - Implementation.
Learned how to work in a team and that writing re-usable code is very important.
Developed proficiency in python and reading research papers.

PS-I is an exposure oriented course: In my case, this statement is true, I gained a lot of exposure in the inner workings of one of the premier research institutes of India.

Name: Kartikey Harivansh Pandey (2017B3A71007G)

Student Write-up

Short Summary of work done: Worked on a reporting engine for the predisposition of athletes towards dietary and physical events. This works by comparing the sequenced

genome of the individual with a database that was compiled using ClinVar. It tells the user about the various complications which they are genetically predisposed to. This project was done under Dr Vinod Scaria, who is one of the eminent computational biologists in the country.

PS-I experience: My PS-I experience was very positive and required me to continuously interact with some of the best computational biologists in the country. It helped me to understand how research is done in institutions like CSIR and the facilities available here.

Learning outcome: Learned a lot on how genomic data is structured for computation and the software that is used to mine and analyze such data. Furthermore, discussions with eminent members of the scientific community also helped me understand the pace and challenges of research in the field of biology.

PS-I is an exposure oriented course: This statement can be more true. PS-I rather than being a performance based course is more of an opportunity that provides you with substantial exposure in either industry or research.

Name: Aditya Agarwal (2017B1A71075H)

Student Write-up

Short Summary of work done: CSIR-IGIB is a prime research institute and to start working with the scientists, we needed to read a lot of literature. I read a lot of research papers and tutorials in the beginning to understand their work. Once done with the research part, we thought of a problem statement that I could pursue. I worked on building a prediction model for gene expression from composite variation. To begin with, I developed a web automation application that is capable of extracting data from two APIs and scraping data from another. Later, I moved on to study about different ML algorithms that can applied to our scenario. I built a basic Hidden Markov model for any DNA motif based on Viterbi algorithm. The model will take time to be completed and optimized but I will keep in touch with my mentors and keep working on it.

PS-I experience: It was great. Extremely stressful but fun as well. Really liked the work culture here, my mentors taught me a lot of things and their guidance has been key. I've learnt a lot of things during my stay here, things I didn't know could be done. Living in Delhi has been great except for the weather.

Learning outcome: Everything below in Python-
Machine learning algorithms as well as data pre-processing, processing and analysis.

Web automation using selenium.
Web scraping using beautiful soup.
Building an application using tkinter for windows.

PS-I is an exposure oriented course: It's definitely exposure oriented and you can learn as much as you desire in these 2 months. The period is very short to work on something big but you can have small takeaways.

Name: Harnoor Dhingra (2017A7PS0081G)

Student Write-up

Short Summary of work done: This PS-I station was the perfect amalgamation of biological sciences and compter science. My major area of work was on Machine Learning's application-Text Mining. We used Text Mining techniques to develop an algorithm to use it for biomedical discovery. The testing of programs was done on dataset of vitiligo disease. Some novel connections could be developed by our algorithm.

PS-I experience: IGIB is a reasearch institute with some top-notch scientists of India. The atmosphere of this place was really amazing. The scientists were great. They not only helped us make our PS-I experience enjoyable and comfortable, they acted as our guides and gave us some really important lessons one need in his/her life. We could apply basic knowledge of statistics in our program that we developed. Overall, it was a fun experience and we could learn some real life applications of the computer science stuff.

Learning outcome: Firstly, the application of the subjects taught in our college. IGIB was a research institute. So, the atmosphere of people actually finding answers to the problems they themselves create was amazing. As one of the mentors at IGIB said, "It is the problem statement formation that is more important in research. Everyone in India can give answers to questions asked. But, only a few can actually ask the questions that people seek an answer for." This was indeed a life lesson that I learnt from my time at IGIB.

PS-I is an exposure oriented course: PS-I is indeed an exposure oriented course. The students can actually apply the concepts that they learn in their courses in college. Overall, it gives a sense of what an actual working place looks like and how important is any individual's contribution to any firm.

Name: Ayush Yadav (f2017B1A20388P)

Student Write-up

Short Summary of work done: Worked on the benefits of iPSC technology for regenerative medicine specifically for severely hemophilic patients. I isolated and reprogrammed PBMC's into iPSC's, maintained, passaged and transfected HEK293T cells with plasmid containing gfp constructs.

PS-I experience: Worked mostly in the wet lab, learned new cell culture techniques and other similar techniques.

Learning outcome: Learnt about the cutting edge science happening in regenerative medicine and other important lab techniques

PS-I is an exposure oriented course: I definitely got a lot of exposure and learnt many new things.

PS-I station: DRDO – Centre for Advanced Systems (CAS), Hyderabad

Student

Name: Tulika Jha (2017AAPS0364H)

Student Write-up

Short Summary of work done: The project revolved around the simulation of a two-stage missile using MATLAB and SIMULINK. The control system which controlled the coordinates of the missile was designed in the Simulink start page. Its outputs were fed to a VR Sink block in which the 3D model was designed. The missile, which was composed of three components - payload, booster 1 and booster 2, were modelled as separate transforms in the V Realm builder. Finally, a user interface was designed for this project using guide in MATLAB which not only accepted as inputs various model parameters like thrust, mass, simulation time, but also plotted data logged from the simulation onto the GUI.

PS-I experience: The experience was pretty good. PS-I helped me gain valuable interpersonal skills. The staff of the PS station allotted to me were very helpful and supportive. The office atmosphere was also commendable. Our instructor-in-charge was also very encouraging throughout the duration of PS-I.

Learning outcome: It deepened my knowledge of MATLAB and I was introduced to important applications like Simulink. I also gained valuable knowledge on how to make a graphical user interface in MATLAB.

PS-I is an exposure oriented course: Yes, it is. Not only does it make you learn new things in your field, it gives you many essential life lessons like how to work in a team, how to get your ideas across clearly, and many more, hence giving students the much-needed exposure to the corporate world.

Name: Karupakula Dhanush (2017B3A71011H)

Student Write-up

Short Summary of work done:

PS-I experience: My PS-I experience was extremely positive. The project was engaging and as only 3 people were allotted our PS-I station a lot of personal attention was given too us. Our instructor on site was a senior scientist who was extremely helpful and nice. He helped us when needed but also allowed us to explore the software as well as the scope of the project. I loved the fact that he allowed us to organically build up on our project. We started with an extremely basic model and as we completed parts of it he helped us realize how we could make it even more advanced.

Learning outcome: I understood a lot about the aerodynamics and physics behind the working of missiles. I also learnt about coding in MATLAB as well as learning how to work in Simulink and other apps like VR Realm builder and guide. Most importantly though I learned how to undertake a team project, how to work with my peers and most importantly how to learn something completely from scratch and implement it in an environment.

PS-I is an exposure oriented course: The basics of both missile physics as well as MATLAB and Simulink were taught to us to a beginner level in college courses. The PS-I experience allowed me to utilize those basic techniques and build on them as i worked on the project to ultimately create a working simulation of a missile which was much more advanced than I could have ever hoped to make at the beginning of the PS-I. It

helped me learn both physics and the software in an interactive way as as whatever I learnt I was immediately able to to implement in my model.

Name: Archit Agarwal (2017AAPS0264G)

Student Write-up

Short Summary of work done: This project is aimed at understanding the physical laws that govern the motion of a 2-stage missile and applying them to design and simulate its projectile motion in Simulink. To design the control system on Simulink, MATLAB function blocks were used which greatly simplified an otherwise complicated mesh of Simulink blocks. The model designed is a 6 DOF model. It can freely and independently change translational motion in the X, Y and Z axes and also change its orientation by rotating in these three perpendicular axes. To give the missile pitch and yaw, two variables called phi and theta were defined and were accepted as inputs from the user through a GUI. The GUI was made using the Guide GUI builder in MATLAB. This GUI also accepts other inputs like masses of the various missile components and fuels and thrusts given by boosters 1 and 2 and the payload. Upon pressing the launch button, the Simulink start page opens up and the model is run. The missile body which was designed using V Realm builder gets positional, rotational and various other inputs through the VR Sink block and starts animating. Once the simulation is complete, the GUI plots the trajectories of the payload and the two boosters. Acceleration and velocity components along all 3 axes for the payload can also be plotted after the model is run.

PS-I experience: My PS-I experience was extremely positive. The project was engaging and as only 3 people were allotted our PS station a lot of personal attention was given too us. Our instructor on site was a senior scientist who was extremely helpful and nice. He helped us when needed but also allowed us to explore the software as well as the scope of the project. I loved the fact that he allowed us to organically build up on our project. We started with an extremely basic model and as we completed parts of it he helped us realise how we could make it even more advanced.

Learning outcome: I understood a lot about the aerodynamics and physics behind the working of missiles. I also learnt about coding in MATLAB as well as learning how to work in Simulink and other apps like VR Realm Builder and Guide. Most importantly though i learned how to undertake a team project, how to work with my peers and most importantly how to learn something completely from scratch and implement it in an enevironment.

PS-I is an exposure oriented course: The basics of both missile physics as well as MATLAB and Simulink were taught to us to a beginner level in college courses. The PS-

I experience allowed me to utilize those basic techniques and build on them as i worked on the project to ultimately create a working simulation of a missile which was much more advanced than I could have ever hoped to make at the beginning of the PS-I. It helped me learn both physics and the software in an interactive way as as whatever I learnt I was immediately able to to implement in my model.

PS-I station: DRDO - Research Centre Imarat (RCI), Hyderabad

Student

Name: Kunthal Oswal (2017A4PS0759H)

Student Write-up

Short Summary of work done: Me and my partner worked on a mechanism that would protect the seeker of a missile.Most of the mechanism which are used are confidential so we had to com up with our own idea, which was a great experience for us.We applied what we learnt for the first time in real life.

PS-I experience: It was a different and a wonderful experience.

Learning outcome: Learnt how a research/designing work progresses from scratch. Even understood the difficulties which were faced and learnt how to tackle them. Learnt a new software Fusion 360 which is used for 3-D modeling.

PS-I is an exposure oriented course: Yes, it is definitely an exposure oriented course where you will have mentors to help which will not be the case after engineering. So, its a very useful experience to have.

Name: N Mahen (2017AAPS0376H)

Student Write-up

Short Summary of work done: I, along with my team-mates, worked on designing a multiplier for minimum latency. We first acquainted ourselves with the various types of multipliers used/designed for various applications based on their characteristics. We looked at Braun Multiplier, Combinational Multiplier, Booth Encoded multiplier and Wallace tree. We went through variations on the common multiplier like Dadda modification, Baugh-Wooley modification and so on. Since the problem with fast multiplication is the addition of many partial products, we went through adders like carry skip, carry save and carry look-ahead adders. In the end, we decided to use a Wallace tree with compressors (adders implemented differently) ranging from 2-2 to 7-3. We replaced the carry propagating adder of the last stage with Sklansky tree (a Parallel Prefix Adder). We wrote code for an 8 bit version and implemented it.

PS-I experience: I had a very good research experience at this station, with our mentor giving hints to guide our research. The security restrictions are tight at this station, so a lot of time was lost as we could not access many websites at the station. Overall, it is a very challenging but fulfilling station to work in.

Learning outcome: I learnt how to conduct research on various topics and also learnt about the design process for any circuit. I learnt about the various technicalities, challenges and aims of the process. I also learnt to use various tools in helping me perfect my design, like Vivado, Kintex FPGA, etc.

PS-I is an exposure oriented course: This PS-I station offers exposure to technical research environment and is radically different from the business environments offered elsewhere.

Name: Bhupesh Nihal (2017A3PS0597H)

Student Write-up

Short Summary of work done: The project title for my group (EEE students) was Mathematical modelling and simulation of an electrical actuator for aerospace vehicle. It was primarily based upon the second year course 'Control Systems' and was also related to the areas like electrical machines and power electronics. We used a tool called Simulink in MATLAB to prepare the model of an actuator using the mathematical equations that govern its working, simulated it to observe its performances and made changes to different control parameters to improve its performance. The actuator comprised of several components like BLDC motor, power inverter, transmission mechanism and loops like position loop, current loop, speed loop etc, many of these concepts we were not already familar with, so we had to study a number of scientific journals and research papers to understand the working of actuator and how to fine

tune its performance. We also hadn't used Simulink before so we first learnt its basics, implemented a few basic models and then slowly developed the open loop model for the actuator, observed the shortcomings in its performance and then went on to develop the closed loop model to remove these shortcomings. Finally we were able to develop a working Simulink model for the actuator within stipulated time.

PS-I experience: PS-I was overall a good learning experience for me. Academically, I got to enhance my understanding of courses taught in the second year by their practical implementation. DRDO RCI is a very good PS station in terms of the projects that they provide you with, just that communication is an issue sometimes. Since we got to go through a lot of research papers and journals, and then had to document our work in form of project reports, we got a flavour of research as well. Also, our project mentor and PS instructor were very supportive throughout and this summed up a good PS-I experience for me.

Learning outcome: I got to learn a new software tool called Simulink library that comes as a part of MATLAB. This part improved my skillset. I also learnt about an Electrical machine called the brushless DC motor, which wasn't there in our curriculum. In addition, I got slight introduction to the area of power electronics while trying to understand the working of a power inverter. The project improved my understanding of control systems as I got hands-on experience on working with state space equations, loops, tuning the performance of a given system. Regular evaluative components like seminar and group discussion helped me find my strengths and weak spots in terms of communicating my ideas to others which I will try to work upon.

PS-I is an exposure oriented course: First thing that comes to mind is that, in PS-I, you get to meet and work with students from various disciplines across the three campuses. While working at DRDO RCI, I got the opportunity of working with some very hard working and meritorious students from Pilani, Goa and Hyderabad along with experts from the industry as well which in turn helped me understand my strengths as well as a few weak spots in my own processes which I'll try to work on. While working on my project, I had to go through a number of research papers available online and then had to come up with an efficient model and in this manner I got a flavour of research as well. Also, the various evaluative components helped me understand a few vital things that will be required while working in the industry. For example components like seminar help you understand how important it is to convey your ideas to others in an efficient manner, other components like the project report help you learn how to document your work so that it can be studied, appreciated, reviewed and further built upon by others. Another thing is, I got to learn how the concepts learned in theory and the actual implementation sometimes can have huge gaps in between and how we can try to overcome them. In this manner, PS-I did prove to be an exposure-oriented course for me.

Name: Arjit Verma (2017AAPS0392G)

Student Write-up

Short Summary of work done: We were asked to research multipliers by our scientist and try to devise a way to speed up the multiplication process. So, the first month involved getting an understanding of multiplier circuits and being able to appreciate the advantages and disadvantages of each architecture. Armed with this understanding we were able to optimize factors such as latency and throughput by introducing new components in existing tree architecture.

PS-I experience: Living independently in a new city certainly was great. Also, I appreciated the opportunity to work with venerable scientists of DRDO. The travel and language barrier was troublesome, but we all managed.

Learning outcome: Understanding multipliers and getting comfortable with Xilinx Vivado Design Suite. Also, the skills required to get accommodated in a new city and work on a comprehensive project with a team.

PS-I is an exposure oriented course: Yes, it teaches you to make new friends quickly and develop a team that can get work done. Also, it exposes you to work environments which is something that courses on campus cannot possibly do.

Name: Arjit Verma (2017AAPS0392G)

Student Write-up

Short Summary of work done: We worked with a scientist at the DNEC (Directorate of Navigation and Embedded Computer Systems). We were given the task of researching existing multiplier technologies and coming up with our own efficient multiplier. We spent the majority of the time understanding the existing architectures. Then we used insights from them to create our own design. We then implemented it in Verilog using Xilinx Vivado.

PS-I experience: You get to learn to live alone and travel to unknown places in a new city. The independence I gained was beneficial. So was the learning experience at DRDO. It ran in parallel with my interests in core digital electronics.

Learning outcome: Learnt to implement multiplier in Verilog. Learnt multiplier architectures.

PS-I is an exposure oriented course: Yes, indeed.

Name: Gumma Varun (2017A7PS0165H)

Student Write-up

Short Summary of work done: We were asked to design a neural network which could detect cars in any image. We also had to construct the network in a offline environment, at the same time, bring the predictions to an optimal value.

PS-I experience: The project given to us was really good, but constructing the net in an offline environment was a really tough task. Our mentors gave us suggestions from time to time, which gave us a lot of insight about the project.

Learning outcome: We learnt the state of the art techniques in machine learning, deep learning and visual recognition. We also learnt how to work together as a team, and coordinate the work amongst the three of us efficiently. We also presentation and report writing skills.

PS-I is an exposure oriented course: Yes, this project gave us a lot of insight about the state of the art topics. It also let us have a peek at the working and projects at DRDO. We also got to interact and share our ideas with the senior officers at DRDO, which gave us a true work experience.

Name: Nayan Nilesh (2017A3PS0190P)

Student Write-up

Short Summary of work done: My allotted PS-I station was DRDO-RCI, Hyderabad. We were in a group of two from EEE dept. Our mentor was scientist B.V. Ravi Kumar, Grade-F (Senior scientist) in the Control Systems Laboratory (CSL) division of RCI. After the discussion about our subject knowledge in the EEE engineering courses, he gave us our project title- “Mathematical modelling and simulation of an electrical actuator for aerospace vehicles i.e. missiles in the context of DRDO-RCI.”

Basic objective of our project was to develop a model of Electro-Mechanical Actuator (EMA) for the tail fin of a missile (attached at the tail unit) using MATLAB Simulink. Also, to tune its parameters for the optimization of performance i.e. various control system criteria like steady-state error, peak overshoot, settling time etc. The first half till midsemester was largely focused on Brushless DC (BLDC) Motor. This included its theory of operation and Simulink model. BLDC motor was the most crucial component of our actuator system and therefore we had to lay emphasis as to why BLDC motor was chosen over conventional types of motor. All these things are clearly mentioned in our report in great details. We observed that open loop configuration doesn't satisfy our needs (analyzed using MATLAB) therefore moved onto the closed loop system. That included 3 major loops; current, speed and position. After modelling the entire closed loop control system, we could easily verify that the performance had improved significantly from the open loop system. Our final report covers the entire system modeling.

PS-I experience: My PS-I experience was quite enriching. Got to meet a lot of senior scientists working on the development areas which are being directly implemented in the missiles used by Indian Army! (for example- Agni series of missiles). The project allotted to us and all others in our PS station (i.e. DRDO-RCI) was excellent and concurrent with our existing knowledge of CDCs. I learned many things relating to concepts used in engineering design and use of software for simulation and testing.
The only difficulty one may face is to strictly adhere to the rules and regulations of the RCI campus. No semiconductor devices (e.g. mobiles, earphones, laptops, etc.) are allowed in the main campus area and these are strictly monitored via Indian army itself!

Learning outcome: A working Simulink model of EMA was successfully developed. The EMA sets the angle of elevation or declination of the tail fin in a missile according to the position command received from the remote-control centre or the Infra-Red (IR) seeker for heat-seeking automatic missiles. This sets the direction and trajectory followed by the missile in the air. I gained first-hand experience in the field of Control Systems designing. Also, was able to learn various new concepts related to electrical and electronics (EEE core) and expand our existing knowledge of the subjects taught to us as CDCs.

PS-I is an exposure oriented course: Yes definitely. I got to know about how stuff works in the real world. This not just includes engineering process but all the official work involved behind the operation of such huge organizations. PS-I gives us an opportunity to work beyond our textbooks and get familiarized with the real-world industry.

Name: Dosapati Sri Harshith (2017AAPS0434H)

Student Write-up

Short Summary of work done: Research on already existing binary multipliers and coming up with a design for fast wallace tree multiplier. Then comes the implementation part with coding in Verilog on Xilinx ISE / Vivado and finally implementation on FPGA.

PS-I experience: The whole work was productive with gaining knowledge in several topics. Having a hands-on experience with verilog coding for the implementation of the design. The mentors are very helpful and I enjoyed working here.

Learning outcome: Understanding different types of multipliers and their relevance in the industry. Using verilog for coding the required design.

PS-I is an exposure oriented course: Yes definitely. Because, it gives us the much required exposure to the industry working conditions and requirements which is the need of the hour.

Name: Vashist (2017B3A70381H)

Student Write-up

Short Summary of work done: Neural networks for object detection. Used a 53 layered neural network implemented using the YOLO algorithm.

PS-I experience: An exposure to defence research in India. Much restricted access. Advanced research projects were given.

Learning outcome: Neural Networks and their implementation.

PS-I is an exposure oriented course: True, because we had a first hand experience of defence research in India.

PS-I station: Indian Institute of Remote Sensing (IIRS), Dehradun

Student

Name: Vishal Mittal (2017A7PS0080P)

Student Write-up

Short Summary of work done: To build a spatial web-based decision support system (DSS) using multi-criteria technique Analytical Hierarchy Process (AHP).

PS-I experience: Learnt a lot of things and the overall experience was good.

Learning outcome: I learnt web development and python from scratch and built a web application using django and GeoDjango.

PS-I is an exposure oriented course: Yes, I got a first hand exposure to how what we study can be applied in real life work scenario and what are the complexities associated with it.

Name: Kumar Mallikarjuna (2017B4A70707P)

Student Write-up

Short Summary of work done: Pixel-wise labeling of buildings in unmanned aerial vehicle images and making a tool for extracting temperatures from JPEG images taken from FLIR Vue Pro 640 and integrating it in WebODM.

PS-I experience: The work was sufficient and a lot of learning was involved. We got an opportunity to work with systems that work on large scales and are not available to everyday users. Working with high performance computing systems running RHEL and windows server was a very good experience. The work experience was also crucial in reinforcing concepts somewhat unfamiliar to me.

Learning outcome: Image Processing, Semantic Segmentation through Deep Learning, Red Hat Enterprise Linux

PS-I is an exposure oriented course: PS-I is indeed an exposure oriented course, through the same I was able to get a practical experience of Deep Learning better than before. Making production level packages integrating them in an existing software was also something very crucial that we don't otherwise get the opportunity to do.

Name: Akshit Khanna (2017A7PS0023P)

Student Write-up

Short Summary of work done: I worked on two projects during my PS-I. I was a part of group of five members. The first project was to improve an existing desktop application called DHAROHAR. It is custom Li-DAR processing application for point cloud data of heritage sites. My contribution in this project were as follows - Adding texture analysis features for raster images using GLCM matrix to the application, Creating a proof of concept for 3D texture analysis for point cloud data, Plane fitting on a point cloud for using it in crack detection in the heritage sites.
The second project that I worked on was Deep Learning workflow for Segmentation of Satellite Images using Transfer Learning. We had followed two approaches to the project. The first approach of using a Dynamic U-net Architecture with ResNet-34 encoder was coded and tested by me. I prepared the data according to model requirements and using just a single Satellite image which was broken into 73 tiles ,I was able to achieve accuracy of 75 percent and IoU of 0.56 which is very good considering the quantity and the quality of training data provided.

PS-I experience: My PS-I experience was good as I was able to work on variety of different fields and learnt quite a lot in two months with guidance of my project guides.

Learning outcome: I learnt to interact in a professional environment in research institution with project guides and how to use their help to maximize my learning. My presentation and report writing skills also improved. Working with a team of five I was able to learn how to communicate and work efficiently in a group.

PS-I is an exposure oriented course: Yes, I had pretty good exposure of a research institution and was able to meet with like minded individuals during the course of my internship. PS-1 has shown me how to work in professional environment and what is expected me when I join a job or a research position.

Name: Raghav Bansal (2017A3PS0196P)

Student Write-up

Short Summary of work done: Worked on improvisation of software DHAROHAR (Government of India initiative) which included texture analysis and database management on point cloud data. Worked on satellite image segmentation using transfer learning on UNet Deep Learning architectures. We had to segment the satellite images into urban features.

PS-I experience: It was a great learning experience overall. The working environment was nice and the mentors were co-operative. It gave me an insight into how an organisation works and carries out its research activities. I got an opportunity to apply academic knowledge to real life problems and generate innovative solutions suited to the industry. I learnt time-management and how to maintain good work-life balance. Timings here were flexible.

Learning outcome: The internship was a great learning both on technical as well as on interpersonal basis. I got to learn various new technologies both for implementing deep learning and software development like databases and point cloud processing. Also, I could get to work on my soft skills as well.

PS-I is an exposure oriented course: There is no denying that PS-I is an exposure oriented course. One altogether gets a totally different experience with respect to the university courses. You get to apply your knowledge on real world problems and provide solutions for them as being knowledgeable without being able to apply is completely useless. You get to know about an industry or research institute's work ethics. For the students who want to learn, this is the opportunity for them.

Name: Nihal Jain (2017A7PS0325H)

Student Write-up

Short Summary of work done: Land cover classification of temporal SAR data using convolutional neural networks.

PS-I experience: It was good.

Learning outcome: Machine learning, deep learning, remote sensing.

PS-I is an exposure oriented course: True.

Name: B Raghunathan (2017A7PS0703H)

Student Write-up

Short Summary of work done: Change detection in multitemporal satellite images for natural hazard classification and generating output layers for identifying affected regions.

PS-I experience: Great learning experience overall. Learnt a lot about remote sensing and image analysis, also got to attend workshops conducted by IIRS.

Learning outcome: Image processing and basic machine learning.

PS-I is an exposure oriented course: Strongly agree.

Name: Iti Singh (2017B3A70545P)

Student Write-up

Short Summary of work done: The objective of our project was to improve and add new features to an existing software DHAROHAR (Digital Health Assessment using Ranging and Optical data for Heritage and Archaeological Restoration). The software analyses, detects and reports the damages occurring in heritage sites over a period of time with the help of point cloud data. Since the point cloud data is very large, the objective of our project was to find an efficient way to store and retrieve this in a database and to create a feature with the help of which user can analyse only a portion of data with the help of inputs provided by him/her. Apart from this, we had to correct the existing 2D texture analysis algorithm , create another for 3D texture analysis and add a feature of crack detection using 3D plane fitting. We were also given an assignment on image segmentation for multi spectral high resolution satellite images. In this we had to detect few classes like buildings, roads etc in satellite images with the help of convolution neural networks and transfer learning.

PS-I experience: PS-I is about applying one's pre-existing knowledge to real life problems. The topics taught in the classes cover very broad and general ideas. At PS-I, we are given very specific problems and we have to find a way to solve them. One also

has to take care of feasibility while solving the problem. For example - an algorithm might be very neat in theory but may take a lot of time to execute. If the time taken by it is very long, one might need to look for other alternatives even if the algorithm is correct. One also gets a fair idea about unexpected problems which can occur during problem solving process like bugs and software incompatibility. PS-1 also gives one an overview of organization structure and professional experience.

Learning outcome: The outcomes were as follows,
1. The process of developing a software and how to integrate a software with various dependencies.
2. How to use various python libraries for image processing.
3. How to create custom data types for storing point cloud data.
4. How to compress large data and store it in a database.
5. How to retrieve the compressed data and convert into a form which can be easily read.
6. How to make the features more interactive and user friendly using GUI.
7. Application of neural networks.

PS-I is an exposure oriented course: PS-I allows students to become familiar with professional world and the industry they are interested in. It gives an idea about the recent developments taking place in that sector and how to apply existing knowledge in those developments. It also gives one the confidence to solve difficult or unfamiliar problems in future. Thus, PS-I provides exposure to students.

Name: Rashi Jain (2017A7PS0082H)

Student Write-up

Short Summary of work done: My Project area was Image Processing. My project was to develop a very generic program that creates a training set, trains a classification model, classifies the test image and calculate various image parameters. Those parameters can be used in any research field.

PS-I experience: During my internship, I met many scientists. The experience of working with my mentor was very enriching, both professionally and personally. I learnt a lot of technical as well as communication skills. I learnt how to organize my work. I got introduced to a new dimension of computer science.
At first, it was a little overwhelming, but after 1-2 weeks, I started making good progress in my project.
Overall, it was a very enriching experience for me.

Learning outcome: Technical Skills I learnt are Machine Learning, Image Processing and Deep Learning. Softwares I learnt are MATLAB and Fragstats.

PS-I is an exposure oriented course: I strongly agree that it is an exposure oriented course. I was exposed to a new field of computer science. I learnt many new things about working of an organization. Working with scientists, I developed my research skills. I got deep insights of every topic I studied.
Until 2nd year, we have no professional experience of any kind. Thus, PS-I helps in providing the required exposure.

Name: Aryan Mehra (2017A7PS0077P)

Student Write-up

Short Summary of work done: I worked on Deep Learning networks for land cover classification with semantic segmentation on microwave data SAR imagery. I synthesized my own dataset and used six network architectures to compare their performance on the task.

PS-I experience: Good experience. You need to be persuasive to help make your project in your field of interest. I had to do that too. But once the vision of my guide matched mine things went great. I was able to publish an article in an international journal.

Learning outcome: My learning curve was more applications based as I already knew the machine learning and deep learning part before hand. Hence, I learnt to apply it to the problem statement.

PS-I is an exposure oriented course: You will get exposure for sure. I am sure that will be the case with all PS stations. Whether you use it to your advantage will be in your hands. The more work you do the more you get to do further and the more you learn and add to your cart.

Name: Laksh Singla (2017A7PS0082P)

Student Write-up

Short Summary of work done: I created a webapp which was aimed at twitter data extraction and analysis. The tweets were fetched using python libraries and sent to the front end, which displayed them, after geocoding, on a map. Moreover, sentiment analysis was applied on them to see the general nature of the tweets. Since the geocoding APIs which could geocode the tweets in their entirety were paid (for eg, Google GeoCoding API) and not open source, NER was applied on the tweets, places and location were extracted and it was passed in an open source geocoder (Nominatim).

PS-I experience: It was my first time working in on a real project with working professionals. I initially loathed it for taking away my vacations, but started enjoying it later on since it was my first work experience. It was an informative and a learning experience for me. It also helped me in understanding how knowledge of different domains can be applied together, to create something of use.

Learning outcome: I learned front end and back end development (in django) simultaneously by working on a medium sized project. I also learned about using integrating different APIs together. I learned about NLP and data analysis techniques which can be used to study trends in unstructured data such as tweets.

PS-I is an exposure oriented course: I believe that PS-I is an exposure oriented course as I had to constantly interact with my professor, understand the requirements of the project and build something entirely from scratch. Moreover, since the domain of the project is new to me, I had to learn the necessary per-requisites in the stipulated time frame by constantly interacting with other people around me.

Name: Nishant Aggarwal (2017AAPS0334H)

Student Write-up

Short Summary of work done: Calculate the leaf area index (leaf area exposed to sun) from the point cloud data of the forest field. The problem comprises of supervised classification of the point cloud data (which falls under the category of big data) into wood and leaf and further analysis to calculate the same.

PS-I experience: The timings are flexible. The project is good and the guide along with research fellows help as much as they can. The canteen food is quite good.

Learning outcome: Talking of technical skills, I learnt about big data analysis and supervised machine learning. I also got to learn how to read the research articles efficiently and how to evaluate and analyse them.

PS-I is an exposure oriented course: Surely, one gets decent industrial exposure. One learns how to work as a team and how to be punctual with your tasks assigned. One learns to work with real data which is a lot different than the theoritical data which contains the idealities that are generally assumed in theory.

Name: Bharat Bhargava (2017A7PS0025P)

Student Write-up

Short Summary of work done: I was asked to build a deep learning based framework for tree detection and counting for remote sensing images. Since, I was unaware of the concepts, I spent the first two weeks to be acquainted with the literature. Usually, deep learning practitioners use pre-trained models to perform their tasks. In my case, though, I had to build the convolutional neural network from scratch and train it by generating the dataset on my own. After training the model and obtaining a decent enough accuracy, I went on to apply the sliding window technique to count trees in the first image provided, which contained four channels. I further analyzed my result with the help of another image provided to me, but this time, the image contained three channels. Henceforth, I was compelled, and had enough time, to train a fresh model using images cropped from this image and then repeat the same procedure so as to obtain the tree count. I further explored fusion techniques and mathematical morphology so as to further improve my model.

PS-I experience: It was nice to work in a highly professional environment. The scientists at IIRS are very supportive and are always ready to help. One thing which I felt quite striking was the attitudinal differences among various scientists, in terms of the expectations from the students whom they guided. Not delving deeper into these psychological differences, this institute provides an opportunity, even to a summer trainee, to explore new avenues through proper guidance.

Learning outcome: First of all, I learnt basic etiquettes which need to be followed while working in an organisation. This is something which no book and no course can teach; it has to be gained through exposure and experience. Next, through this project, I got an opportunity to explore the field of computer vision and find out how it actually works, albeit in a minor sense. Applying the knowledge gained throughout my stay here, irrespective of whether I obtained correct results or not, added value to my learning.

PS-I is an exposure oriented course: I personally believe it is an exposure oriented course, but how much a student can gain from it, this solely depends on his/her attitude. From my experience here, I can say that, it is never easy to learn a new thing while meeting the expectations of the organisation you're working in. It is at that time that the character of a person is judged; whether the person tries to run away or faces it bravely while simultaneously showing composure and calmness. This is the exposure which a student gets through PS-I, well before he/she is hired to work as a professional and is paid for it, for nobody can predict in advance whether he/she will be recruited in a MNC to perform only that kind of work which he/she has mastered upon through his/her efforts during college life, or not. Another thing worth mentioning here is that any student who opts for any institute through PS-I goes there to learn and gain industrial experience.

Name: Anand Theertha Nakhate (2017B370660G)

Student Write-up

Short Summary of work done: 1. 3D DIGITAL DOCUMENTATION SOFTWARE DEVELOPMENT FOR DIGITAL HERITAGE ASSESSMENT USING RANGING AND OPTICAL DATA
The Project is an open-source tool for the digital documentation of heritage sites. It allows the user to perform various tasks by signing in to the software with the help of credentials provided by the administrator. After authentication, the user can access functionalities like Point cloud processing, Image processing, getting the views of the heritage site and Database querying, which are organized in a simple tool. For this, the user should be equipped with an elementary knowledge of computing and point cloud handling.
Point cloud processing and Image processing provides several features like Edge Detection, Corner Detection, RGB to HIS, HIS to RGB, Texture Analysis and Change Detection and Crack Detection. The software can also convert the 3D point cloud to a 2D image whose point and image attributes can be stored in the PostgreSQL database and visualized by the user through the interface. Moreover, 3D point cloud data can be stored in compressed patches in a database with the help of database querying. This 3D data can be visualized in a segment or as a whole in both high and low resolution. The project uses Python and C++ as programming languages. For database querying, PostgreSQL has been used.
SATELLITE IMAGE SEGMENTATION USING TRANSFER LEARNING ON UNET DEEP LEARNING ARCHITECTURE
Automatically detecting urban features from satellite images has a lot of potential applications, from monitoring movements of populations in remote areas, road construction to evaluating the available surface to implant solar panels on roofs. We use

Transfer learning on a Convolution Neural Network for the extraction of buildings, roads, Grassland, Tress and Unclassified area from satellite images, adapted from a U-net originally developed for biomedical image segmentation. We train our model on satellite images and ground-truth labels. The amount of data used for transfer learning is very less. We train on fairly fewer data. We show that our model achieves a reasonable level of accuracy, though slightly lower than state-of-the-art, and outline some ideas for further improvements.

PS-I experience: My PS-I experience was good. The projects that we worked on, though were of specific application, they were doable. The organization provided enough support to adjust in the professional work environment. The organization being an institute, the projects were more of a research oriented where the literature is limited, but the work environment encourages one to work with a competitive attitude.

Learning outcome: My learning outcomes were to Understand the working in an organization, Working effectively in groups, Understanding the work field - Remote Sensing, its applications in photogrammetry and Geoinformatics, learning how to work on big data, programming language Python and using its libraries, use the database for simplifications, using convolution neural networks and image.

PS-I is an exposure oriented course: PS-I is certainly an exposure oriented course. The course was introduced perfectly for one to link the classroom knowledge to the real world work so as to do better and figuring out a way to change their perception while learning.

Name: Kushagra Agrawal (2017A7PS0107P)

Student Write-up

Short Summary of work done: I was expected to make a machine learning model to detect buildings from UAV images. We were also expected to make a tool for mosaicing thermal images and extracting temperature data from it. Also, we were supposed to set up WebODM, a software for open deone mapping on HPC.

PS-I experience: It was a good learning experience. PS-I allowed me to gain a first hand experience of how research is done.

Learning outcome: It helped me learn about Machine Learning, web development and high performance computing. It gave a first hand experience of solving real world and problems.

PS-I is an exposure oriented course: Yes. PS-I is an exposure oriented course definitely.

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

Student

Name: Nagesh Samane (2017A8PS0612P)

Student Write-up

Short Summary of work done: The project aims at designing online lubricant oil viscosity monitoring system. It is necessary to continuously monitor lubricant oil's condition as it provides plentiful information about healthy status of rotating machinery. We have chosen two important properties of oil temperature and viscosity to monitor oil condition. A two-channel embedded system was developed with PIC24FJ64GA002 microcontroller along with peripheral circuits to accomplish the task. Project makes use of a new class of sensors called quasi-digital sensors whose output is directly in digital domain as a train of pulses of particular frequency. Such sensor reduces major blocks (ADC, pre-amplifier, post-amplifier) used in traditional signal conditioning. We have successfully implemented proposed system on board and conducted series of experiments to calibrate the sensor output with viscosity of oil.

PS-I experience: My two months stay at IGCAR was very informative and practical oriented. Scientists at IGCAR are very supportive and helpful in explaining doubts raised by us while research. Knowledge gained from courses at BITS was applied in the research work along with practical considerations. I found every person at IGCAR self motivated and was eager to work hard. Field trips arranged by IGCAR to fast breeder reactors, Madras atomic power station were informative and explained the progress of Indian atomic energy program.

Learning outcome: 1. learnt how to approach problem statement of embedded system design.
2. Real world application of courses learnt at BITS.
3. Hands on experience in circuit designing on board (soldering each ICs and microcontroller).
4. Handling practical difficulties in experimenting with electronic hardware.

PS-I is an exposure oriented course: Definitely, PS-I is an exposure oriented course. IGACR has provided plenty opportunities in various fields of engineering and sciences

through projects offered. All the projects were interdisciplinary involving good exposure to other fields as well.

Name: Kanishk Singh Raghav (2017A3PS0366P)

Student Write-up

Short Summary of work done: Design and development of a time domain reflectometer. A time-domain reflectometer is an electronic instrument that uses time-domain reflectometry to characterize and locate faults in metallic cables. It can also be used to locate discontinuities in a connector, printed circuit board or any other electrical path.

PS-I experience: PS-I is a great place to apply what you have already learnt and will be learning in the next few semesters.

Learning outcome: Using digital design to create a circuit that can perform the desired tasks.

PS-I is an exposure oriented course: PS-I enables the students to learn the way the theory taught in the various courses can actually be applied in real life applications.

Name: Yatharth Sreedharan (2017B2A30517P)

Student Write-up

Short Summary of work done: Instrumentation for detection of gases using electronic nose. Required me to develop software for pattern recognition techniques for quantification and discrimination of undesired gases produced inside reactor.

PS-I experience: Good.

Learning outcome: Machine learning.

PS-I is an exposure oriented course: Agreed.

Name: Chanda Sai Kartheek (2017A1PS1010H)

Student Write-up

Short Summary of work done: I have modeled an air heat exchanger and ran simulations in fluent. My project needed knowledge of user defined functions in fluent. The air heat exchange which was modelled is a part of safety grade decay heat removal system used for heat removal in nuclear reactors in case of offsite power loss.

PS-I experience: First hand experience of research work. Working with new people. Learning about new topics.

Learning outcome: Learned fluent and it's prepocessor Gambit in detail. Learnt how to write reports. Learned how to present our project. Also, how to work under people.

PS-I is an exposure oriented course: Yes, this course gives industrial exposure.

Name: Heet Mahendra Gala (2017B2A30576P)

Student Write-up

Short Summary of work done: Learnt to synthesize gold and silver nano particles using different reducing agents and capping agents. Using these nanoparticles for SERS - surface enhanced raman spectroscopy and biological survey. Synthesis of gold coated silver nanoparticles for enhancement of raman signals for detection of chemical at lower concentration. Aynthesizing these bimetallic with Ag@Au core-shell type structure without any capping agent for at least 2 weeks.

PS-I experience: It was a nice experience where got an exposure to different instruments. it was a nice research opportunity where you can explore your interested field and get to know how we can implement on an industrial level with various applications.

Learning outcome: Got to know various methods of preparation of nanoparticles and bimetallic nanoparticles. Got to know about various concepts regarding the nano optics and nano chemistry and its wide range of applications.

PS-I is an exposure oriented course: Yes, its actually true that such type of opportunities are exposure oriented where we get to experience using various sophisticated instruments while doing the projects which is not possible in our campus and also using such synthesis approach and applying on industrial level.

Name: Shantanu Nigam (2017A8PS0399P)

Student Write-up

Short Summary of work done: Develop a FPGA based data acquisition board which will send vibration data to computer via ethernet using TCP / IP.

PS-I experience: Good project, one to one mentorship, hectic work hours sometimes, limited food options but doesn't matter that much, overall good and do recommend to others.

Learning outcome: VHDL, C, Python, FPGA, TCP/IP , GUI Development.

PS-I is an exposure oriented course: Fine experience to research life.

Name: Ayush Jain (2017A7PS0093P)

Student Write-up

Short Summary of work done: My work is basically how I can make my machine understand nuclear text, analyze and answer questions asked on it. I had to preprocess data from 7000 research papers, build my custom dictionary, made BERT model to train on my dataset and then finetune it to build the question answering system.

PS-I experience: My experience was very good. People were very friendly and supportive. The work was also very good, though everything I had to myself only without

any guidance. BITS faculty, Dr. Satyapaul singh was exceptional in his conduct. He helped us in every possible way, providing meaningful insights and suggestions.

Learning outcome: I learnt a lot about NLP concepts. Practical experience working on raw data.

PS-I is an exposure oriented course: Completely agree.

Name: Yagna Murthy Satya Lakshmi Sarath Raja (2017A2PS1540H)

Student Write-up

Short Summary of work done: My project title was 'analysis of 2D frame by matrix methods and appraisal of the conventional methods' .This project deals with the development of a computer program and analysis of 2D frames, using matrix methods. Matrix analysis is one of the most practical and powerful tools used in structural analysis, due to its high compatibility with programming and also due to the fact that it makes the task of separating members from the structure simple. The forces developed in each member is calculated from the loads applied on the entire structure. With this, It is possible to determine whether the designed member can withstand the loads or not. A case study, of a six storied building, is also performed by taking into consideration the earthquake loads, which can be developed on them, depending upon the location on which they are present, with reference to the IS-1893 which is the Indian Standard for earthquake resistant design. At the end, the results obtained regarding the forces developed in each of the members are compared with the results obtained from other sources (hand calculations and STAAD-Pro). And hence conclusions are drawn.This was all the work done by me during the course of my PS-I.

PS-I experience: It was great, the climate was difficult to adjust at first but after around 2 weeks it became pleasant. As for the food, breakfast and dinner served in mess inside senior hostel where we stay is decent and there are also many food outlets close-by with lots of places to roam. After 6 pm, the DAE township becomes very speaking for a stroll with a great view of the back water. Regarding the guides at IGCAR, they are very helpful and great people. It is a great place.

Learning outcome: I was able to learn the matrix methods used for the analysis of structures. This is important because it is the starting line for the broader area of structural dynamics. I was also able to learn the Indian standards of earthquake analysis. I learnt about how to use staadpro. I was also able to learn the conventional methods of analysing structures.

PS-I is an exposure oriented course: This is 100 percent true if you are willing to work. They offer projects related to their current research work and you can gain actual insight about the work being done in this day and age. Basically it all comes down to how much enthusiasm you show.

Name: Divyam Sharma (2017A3PS0102P)

Student Write-up

Short Summary of work done: My work was to voids present in a liquid sodium filled environment in a region of probe of 0.3 mm using ultrasonic technique.

PS-I experience: The experience has been immensely enriching, encouraging and inspirational. The mentors as well as other staff people were very supportive, even people from other departments were very helpful. The place, Kalpakkam, DAE township is a beautiful and organised town.

Learning outcome: I learnt a lot of technical skills like analysing ultrasonic techniques, radiography, MATLAB as well as learnt a plethora of soft skills while maintaining cordial bonds with my guides abd their colleagues as well as while seeking other departments' help.

PS-I is an exposure oriented course: Definitely, we learnt how problems are saved in Industrial research platforms like IGCAR. It really helped us learn by application and not by books and theory. It has been a wonderful experience to learn from own mistakes while pursuing the projects.

Name: Patel Omeet Nileshbhai (2017A1PS1382H)

Student Write-up

Short Summary of work done: CFD Simulations of rotating cylinderical bowl geometry.

PS-I experience: It was good. Learnt many new things.

Learning outcome: Ansys Software, FLUENT 17, CFD

PS-I is an exposure oriented course: Yes.

Name: Shashank Sistla (2017A1PS0834H)

Student Write-up

Short Summary of work done: VLE modelling of n-dodecane and trip butyl phosphate.

PS-I experience: Nice. A rollercoaster with ups and downs.

Learning outcome: Thermodynamics and MATLAB.

PS-I is an exposure oriented course: I agree.

Name: Saurav Virmani (2017A7PS0090P)

Student Write-up

Short Summary of work done: 1. Blockchain based document integrity portal.
2. Crypt-analysis.

PS-I experience: The mentors in here are very supportive and the project system is very flexible. You can choose your own project and can even work on more than one project. My branch was CS and the research is more oriented towards circuit branches, basic sciences and material science thus the amount of projects were less but still you can work it out by proposing your own projects or upgrading your projects.

Learning outcome: 1. Cuda programming.
2. Concepts of block-chain.
3. Bash scripting.
4. Basics of cryptography.

PS-I is an exposure oriented course: Yes. Really it is an amazing exposure oriented course.

Name: Varleychan Jacob (2017B5A70828P)

Student Write-up

Short Summary of work done: My work was about finding the partcle size distribution from magnetisation values of superparamagnetic nanoparticles.

PS-I experience: The PS-I gave me a brief introduction to how a job will be. It also taught me how exactly organizations function.

Learning outcome: Life outside college is different.

PS-I is an exposure oriented course: I completely support the statement.

Name: Rithik Dilip Rathi (2017A3PS0266P)

Student Write-up

Short Summary of work done: My work was based on synthesis of different waveforms digitally and then use a DAC to convert it to its analog form and also implement the atan2 function using a FPGA. The project focussed on the CORDIC algorthim and its implementation in C and verilog followed by running various simulations and finally implementing on the hardware.

PS-I experience: Kalpakkam as a city was a very peaceful place and dont expect city life here but if you have a good project and some friends along with you, it can be managed pretty well.

Learning outcome: C language, Verilog, Simulation softwares, Hardware implementation.

PS-I is an exposure oriented course: Yeah, it indeed is and makes us realize that only theortical knowledge is of no use and also gives us a proper work-life experience.

Name: Navaneeth Kumar (2017A8PS0977G)

Student Write-up

Short Summary of work done: My project was prognostics and health management of alpha air monitoring system. I analyzed the circuitry and assessed the different vulnerabilities possible. Based on these, I identified the precursor parametrs to be monitored and suggested a circuit for the same. The collected data can be used to predict the remaining useful life of the system and improve the maintainence procedures and reduce down time for the system.

PS-I experience: It was one the most intense learning experiences in my life. I learnt so many new things that would never have been possible if not for this PS-I station. It took a bit of time to adjust to the new surroundings but it was worth it because I got to interact with so many knowledgable scientists in their respective fields. It is the best PS-I station for someone looking to expand their horizon in the scientific domain and do actual work.

Learning outcome: After this PS-I, I have a much more deeper understanding of the designing of an electronic system and the different challenges faced in this process. I also got an insight into the vulnerabilities of different electronic components and how these affect the working of the system. I also realised the importance of nuclear energy in our country and different aspects of managing this dangerous operation for the best results.

PS-I is an exposure oriented course: PS-I for me was a highly exposure oriented course. I was allowed to be a part of the working of really high level research going on in a nuclear research facility. I don't think I would have got this kind of hands on learning experience anywhere else.

Name: Ateeksha Mittal (2017A8PS0431P)

Student Write-up

Short Summary of work done: My work was primarily based on embedded system design. It was divided in three sections including sensor design for spirometer, firmware

design for frequency counting set up using CCS C compiler and hardware design for interfacing. Requires knowledge of C programming.

PS-I experience: It was great here in south indian. The expenses were highly low as compared to other ps stations. Also the nearby places are awesome. The experience at workplace is comendable as scientists have an in depth knowledge. Moreover, there is a defined sysytem for everything you do.

Learning outcome: I learnt about the technical aspects and most importantly how to go about the works of research and development.

PS-I is an exposure oriented course: Surely, it provides you exposure with everything. Be it at work, or with other people at organisation.

Name: Shubham Premprakash shukla (2017A2PS0821P)

Student Write-up

Short Summary of work done: Development of a C program to give predictions about the service life of a massive concrete structure.

PS-I experience: Exploring many new things in all arenas of life.

Learning outcome: Programming, time-management.

PS-I is an exposure oriented course: Yes. I agreed.

Name: Surya Pratap Singh (2017A4PS1511H)

Student Write-up

Short Summary of work done: Project title- Enhancing inspection system accuracy through modelling actuator backlash in the kinematic equations. Basically my task was to develop a Python code so that the end effector of a two axis robotic arm could reach

over the desired steam generator tube for sending a probe inside the tube for inspection. The only challenge was that there was some lost motion due to gear backlash so I had to iteratively incorporate the backlash correction factor whenever the gear changes it's direction so that the end effector reaches over the correct steam generator tube.

PS-I experience: As a whole, it was a very good experience especially because the mentors here (under whom projects are to be taken) are very knowledgeable. Hence, I was able to receive a lot of guidance and help from my mentor about my field of project as well as about research works which I can opt for in the future. Looking at the number of evaluation components it seemed to be a bit more but still manageable.

Learning outcome: Got a major insight into the field of Robotics. Also, learnt coding in Python. Adding to that I was able to improve my presentation skills as well.

PS-I is an exposure oriented course: I do agree with the statement that it provides us the exposure to the real life world by telling "what, how and where" to use what we have learnt as part of our academics and bridge the existing gap between academics and the industry/research institute demands. Apart from just being a course it is also a great platform to gain knowledge as well as to develop social skills.

Name: Varsha Singhania (2017A8PS0563P)

Student Write-up

Short Summary of work done: I worked on the design, simulation and prototyping of an adaptive self tuning filter. The project was majorly based on analog electronics, a course that had not been covered with small contributions from microelectronic circuits and control systems. I had a study period of one week and then intense simulations on SPICE, MultiSIM and TinaTI that went on for hours. Designs generally involve a lot of non-idealities when brought to real life, simulating for them was a different experience altogether. I did a small project on VHDL as well to design a circuit to reduce the chances of metastability for asynchronous inputs in a synchronous circuits.

PS-I experience: Monotonous food, good beach experiences, small places to visit nearby, language problems faced if not a tamilian. The professors are generally good and helpful unless they are extremely busy. Life does become monotonous after a while, but the learning opportunity here is massive.

Learning outcome: Courses on Electronic devices Microelectronics and control systems made a different kind of sense to me after my project at PS. We are given a

very theoretical approach in courses. Being able to apply them to real life problems is more important and should be focused on more while learning a course at college.

PS-I is an exposure oriented course: For me, it definitely was. I realised my approach to learning a course was useless because I never saw its application in real life. PS-I was also an exposure in terms of being thrown in a completely different environmet and left to adjust.

Name: Aatman Borda (2017A3PS0278P)

Student Write-up

Short Summary of work done: My work was very much related to the coding part of microprocessors and Interfacing course. Only difference was that I had to use Embedded C instead of Assembly. I had to write a boot loader program for SAMD20 microcontroller. This bootloader implemented Serial Peripheral Interface (SPI) driver, Near Field Communication (NFC) driver and some internal peripheral drivers. Coding part was not tough but understanding the microcontroller architecture and NFC protocols was a bit difficult.

PS-I experience: Mentor: I had got a very friendly mentor. Many student's mentors were to busy to give them time and so they couldn't do much. I didn't have this problem. Lucky in this way.
Place: Kalpakkam is a very peaceful place if you don't mind the food. There will be some problem with food but very manageable as there are some juice shops, ok-ok North Indian restaurants. Lot of places nearby to go to on weekends.
Stay: We were allotted rooms in a hostel in the DAE Township itself so didn't have any problem regarding this. Rooms are not as good as BITS hostel rooms.
PS: The director of IGCAR takes a special interest in PS-I.

Learning outcome: NFC protocols, Reading a microcontroller datasheet, Boot loader programming

PS-I is an exposure oriented course: There were visits arranged to different places in the DAE campus. Some of the visits were really good. We visited places of the kind we probably never visit again. The people at different were very helpful. Explained their work in very detail. We were shown some really high-tech laboratories.

Name: Sujeet Srivastava (2017A4PS0503P)

Student Write-up

Short Summary of work done: Computational analysis of fatigue crack growth behaviour in fast reactor components is done.

PS-I experience: PS-I helped in improvement of soft skills along with a good learning experience.

Learning outcome: Learnt use of abaqus and zencreck software.

PS-I is an exposure oriented course: It gave an exposure to work environment in a research institute.

Name: Trivikram Choudhury (2017A8PS0568P)

Student Write-up

Short Summary of work done: I had to use verilog to design an FPGA circuit to control two motors using a motor driver. I also had to process the feedback to check for faults or defects in the operation, and take further steps accordingly.

PS-I experience: Was a good work experience in the industry.

Learning outcome: Verilog programming, use of FPGAs, industry work environment

PS-I is an exposure oriented course: It is true that exposure is provided.

Name: Shanmukh Sripada (2017A4PS0172P)

Student Write-up

Short Summary of work done: My project was design optimization for an annulus wall climbing robot. The work was to optimize the existing design of the robot by making changes in the CAD file on SolidWorks. Then import it to ADAMS software to perform static and dynamic simulations.

PS-I experience: It was really a learning experience. Interning at a government research organization gave me a perspective on how massive projects are handled and completed. The scientists at IGCAR are extremely helpful and kind. I also got to meet so many new people and scientists.

Learning outcome: I learned MSC ADAMS software, which was new for me. Apart from that, I gained valuable experience working on an interesting project. It was a good exposure for me to work at a government research organization.

PS-I is an exposure oriented course: I definitely got valuable exposure in working at a government research organization and I feel PS-I is an exposure oriented course for internship at IGCAR.

Name: Chivukula Kaushik (2017A1PS0963H)

Student Write-up

Short Summary of work done: The objective of my project is to estimate the heat removal capacity of a Decay Heat exchanger and comparing it with the rated heat removal capacity of a Decay Heat exchanger, which is 8MW. A parametric study was carried out by varying the inlet window heights and total heat transfer lengths in the geometry, and the variation in total heat transfer rates was analysed.
A Decay Heat Exchanger (DHX), which is a vertical, counter-slow, shell and tube heat exchanger, plays a crucial role in the Safety Grade Decay Heat Removal (SGDHR) mechanism, transferring heat away from the core of a nuclear reactor.
After the reactor is shut down, the residual heat generated in the reactor core due to the decay of radioactive fuel, is removed through the ideal heat transport path, which consists of primary sodium, secondary sodium, and water-steam circuits. This mode of heat transfer is used when at least one secondary sodium (flows through the tubes of the HX) loop, water-steam circuits and offsite power supply are available. In the unlikely scenario of failure of anyone of the aforementioned circuits or loss of offsite power, the SGDHR system is used for Decay Heat Removal (DHR).
The geometry of the DHX was created using a pre-processor (GAMBIT) and the flow was developed in ANSYS Fluent. The heat transfer rates were analyzed for the aforementioned parameters.

PS-I experience: I had a wonderful experience at IGCAR. It was a perfect balance between work and fun. The mentors were very supportive and guided us throughout our projects. The serene beach provided a much needed break after a hectic day's work. Weekend trips to Chennai and Pondicherry will be the ones we will cherish forever.

Learning outcome: I learnt two new softwares as a part of my project; ANSYS Fluent and GAMBIT. Apart from that, I now have a sound knowledge of shell and tube heat exchangers and heat transfer by forced convection. Visits to the departments and reactors of IGCAR also proved to be very informative.

PS-I is an exposure oriented course: Yes, I agree. It bridges the gap between academics and industry. You will have first-hand experience of the operations carried out in the industry. This lets you understand your academic concepts in a better way.

Name: S.D.Dheeraj Gupta (2017B5A70670H)

Student Write-up

Short Summary of work done: Magnetic nanofluids have several applications in mechanical, optical engineering and biotechnology such as optical switches, optical barriers, magnetic resonance imaging base drug testing etc. A thorough understanding of the optical properties of these magnetic nanofluids arising from field induced micro-nanostructures is essential for practical applications. The main objective of the project is to study the extinction efficiency of light from a dispersion containing field induced micro-nano cylinders that are oriented at different angles with respect to incident light direction. The effects of aspect ratio of cylinders and number density of the structures were also probed both experimentally and theoretically. The structural transitions in the ferro emulsion upon an increasing magnetic field and the scattered pattern at varying external magnetic field are studied. Extinction efficiency for different shapes of particles like spheres and cylinders are modeled by considering the extinction efficiencies with varying imaginary part of the refractive index of the material and varying particle radius.

PS-I experience: I had a wonderful experience at IGCAR. Working with experienced mentors aided the smooth completion of my project here. It was a perfect balance between work and fun. The serene beach at Kalpakkam calmed our minds after a stressful day.Weekend trips to Pondicherry, Chennai and Mahabalipuram are unforgettable. Wonderful company of friends made my PS-I an everlasting memory.

Learning outcome: Throughout my PS-I, I have been working with research people. This helped me to gain insights into how things would be for me if I undertake academics. I understood how R&D works. Meeting people from different places and conversing with them helped me improve my soft skills. All the evaluation components helped me improve my presentation skills. I had to learn MATLAB for the project. Of course MATLAB will be helpful for other purposes in my future course in BITS. Various visits at IGCAR gave insight on how important nuclear energy is.

PS-I is an exposure oriented course: Yes I agree that PS-I is an exposure oriented course. It helped me understand the gap between industry and academics. You will have first hand experience of the operations carried out in the industry. This helps you understand the academic concepts.

Name: M Yogi Aditya (2017A4PS0304P)

Student Write-up

Short Summary of work done: Worked on finite element analysis using Abaqus software. Studied few research papers and design codes related to design of heat exchangers.

PS-I experience: It was wonderful. My mentor and everyone here are really sweet people. Got used to having sweet people around me. Made new friends. They're all great.

Learning outcome: Abaqus software, exposure to real life design problems.

PS-I is an exposure oriented course: Indeed. Met so many great scientists here. My love for core mechanical engineering became stronger.

Name: Utkarsh Kumar (2017B2A71008P)

Student Write-up

Short Summary of work done: At Innovative sensors section of IGCAR, a new pulsating detector was designed and developed. This detectors directly send signals in digital domain in form of 5V signals. Using this detector, a prototype Ion Chromatograph was developed. At first, it was operated using a DOS-based GUI, which made experimental analysis less user friendly. The project's main aim in the second phase was to develop a windows-based GUI for easy conduction of experiments and a more user-friendly experience with later analysis of the data acquired. The GUI developed can record and display real-time data acquisition from the prototype. along with conducting experiments, user can also do analysis of the data. For this features like graphical overlay, linear regressions for curve fitting of analytes, peak area calculations etc. were incorporated in the GUI.

PS-I experience: The station allotted to me was very good. I learned various things. The biggest being that Nuclear energy is a green and clean energy. My various stigmas and stereotypes are gone after working just meters away from a reactor, interacting with various people working in and around and observing things closely.

Learning outcome: I learned software development. A little about instrumentation and how the various departments of a huge organization work.

PS-I is an exposure oriented course: Yes, strongly agree. we actually get work with the Industry standard skill.

Name: Rahul Saxena (2017B5A71032G)

Student Write-up

Short Summary of work done: My project was, "Growth of beta Ga2O3 single crystal by Optical floating Zone technique".beta-Ga2O3 is metal oxide semiconductor. This semiconductor has a band gap of 4.8eV due to which it can absorb and emit photons of hibgh energy lying in the UV region, and thus is a very good material to use in solar blind UV detectors. Further this semiconductor not only has a wide band gap but also it has a direct band gap which is characteristic property of most of the metal oxide semiconductors. These two property of this beta-Ga2O3 makes it an excellent material for power electronics industry and is predicted to outclass the performance of existing technology of SiC and GaN. So this report is based on how to grow single crystals of Ga2O3 since it is very important material from research point of view, and scientists are trying their best to bring this material into practical use. This project covers all the fundamentals of crystal growth.
It not only covers the mechanism of crystal growth but also the thermodynamics behind it. Sound knowledge of both crystal growth mechanism and phase diagrams is required

to understand various crystal growth technique in depth. So this project covers all the fundamentals of crystal growth and also basics of crystal growth techniques involiving crystal growth from its melt. We not only prepared the samples of beta Ga_2O_3, but also characterized it using X-Ray diffraction, Raman Spectroscopy, UV-Visible absorption spectroscopy, and Photoluminescence spectroscopy. X-ray diffraction showed no difference in the diffraction pattern upon doping the sample with Cr, which mans that the structure of the crystals remain same. Raman spectroscopy revealed that, the Cr ions are going into the interstitial site, of tetrahedral voids of Oxygen sub-lattice.
Further, we calculated the band gap of Ga_2O_3 single crystal samples, using UV-Visible absorption spectroscopy, and we found that band gap decreases with the increase in the dopant concentration. We also unveiled the presence of additional energy level in the forbidden gap.

PS-I experience: It was very pleasant and fruitful, as it helped to develop a scientific temperament. I got opportunity to interact with one of the amazing scientists, Dr.Ganesamoorthy and Dr.K.Ganesan, who guided me throughout the project. I also got to saw amazing facilities like 1.7MeV tandetron, FBTR, Bhavini etc.

Learning outcome: I learned a lot about crystal growth, solid state physics and material science.

PS-I is an exposure oriented course: Definitely yes. It is course where we get exposed to real life challenges.

Name: Rynaa Grover (2017A7PS0258H)

Student Write-up

Short Summary of work done: My project title was Data Analytics on ATOMS using data mining techniques. ATOMS is a site developed by IGCAR to automate the works of Administration, Account and Stores. The site develop a lot of data which needs to be analysed in order to draw meaningful conclusions. As a part of my project I developed 2 models, Naive Bayes and Decision Tree to predict data. The models were built in Python and were coded from scratch without the use of any libraries.

PS-I experience: My PS-I one experience was great. I got to learn a lot of new thing. IGCAR gave me a chance to learn a lot of things beyond my discipline. It promotes the integrity of science and technology. Apart from great project work and industrial experience, Kalpakkam is a beautiful town with a lot of beaches around. Overall, my experience was amazing.

Learning outcome: Industrial implementation of technology
- Data Mining techniques
- Python
- Soft skills

PS-I is an exposure oriented course: I agree with this statement. PS-I gave a great industrial exposure and aimed at giving us a flavor of real world jobs.

Name: Harikiran Tenneti (2017A2PS1462H)

Student Write-up

Short Summary of work done: My project was development and characterization of serpentine concrete for neutron attenuation. It deals with preparation of a special type of concrete by testing all the physical and mechanical properties of serpentine aggregates and preparing a mix. Shielding of neutron radiation is important because these are penetrating ionizing rays which create health hazards such as cancer, hair loss, heart failure or even death.

PS-I experience: Good.

Learning outcome: Got an exposure to the theoretical concepts that were taught to us in the first two years of engineering. Also, it enabled us to understand the working of an organization.

PS-I is an exposure oriented course: It's true.

Name: Vishav (2017A4PS0552P)

Student Write-up

Short Summary of work done: Developed the Micro-structure based Continuum Damage Mechanics Code for predicting the Creep behavior of 316 LN Stainless Steel. Code was written in the Matlab environment.

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

Learning outcome: Learnt the importance of optimization. And, gave me an opportunity to enhance my communication skills overall.

PS-I is an exposure oriented course: Its a great exposure oriented course. Helped in developing interpersonal skills and gave an idea about how a research organization works.

Name: Geethi Sreya (2017AAB30361H)

Student Write-up

Short Summary of work done: Two radio chips have been prepared at IGCAR one using SAMR21 microcontroller and the other using kinetis. The radio stacks of zigbee technology have been developed for SAMR21. These need to be imported to the kinetis based microcontroller. I first had to read about wsn networks and different types of multiple access's and about zigbee technology. I studied UART and SPI communication protocols which were required to import the radio stacks.The radio chips require a n operating system. So, I had to learn about contiki os.I started coding small programs like blinking LED's using different communication protocols. Then, the actual started where I had to import files and set timeres load contiki into the kinetis based radio chip. Import of files required knowledge of C language. Then, I used the test bed setup to compare the two radio chips.

PS-I experience: It was very good to have personal mentor who guides through your project. The project was by itself very interesting and to actually work on hardware and to see how devices transmit data was a very good experience. I learnt a lot of theory and new softwares within a short span of time.

Learning outcome: I learnt about WSN networks and 2 types of communication protocols learnt keil software.Understood about the information transfer in bluetooth etc.

PS-I is an exposure oriented course: It is really true. I could understand at IGCAR how the research is carried in my field.I understood the applications of many courses I did during previous 4 semesters.

Name: Potla Sai Aditya (2017A3PS0268P)

Student Write-up

Short Summary of work done: My project is implementation of servo control cable probe release mechanism for PFBR steam generator inspection system. Cable probe release mechanism is used for in-situ probe replacement during inspection. The objective of my project is to control the rollers which release or hold the probe by wedge mechanism using a linear actuator. FPGA is used for the control of the linear actuator. FPGA generates PWM signals which are given to H bridge and this drives the actuator. FPGA is programmed using Verilog. Different modules are made and different algorithms and logics are implemented in each of the module. Safety logic is implemented for the safe release of the probe using non contact limit switches. The program is simulated using Xilinx ISE and also flashed into FPGA using SPI and tested using hardware.

PS-I experience: PS-I is a great learning experience. Learnt how nuclear energy is used for different purposes.How research happens in that field and the safety measures they take. Technically form my project i learnt programming an FPGA to create a digital circuit using Verilog HDL and also handling the FPGA for hardware implementation. Also learnt about robotics. It is a great experience as everyone doesn't get an opportunity to work near the nuclear reactor. The field trips taught me lot of things .

Learning outcome: Learnt how nuclear energy is used for different purposes.How research happens in that field and the safety measures they take. Technically form my project I learnt programming an FPGA to create a digital circuit using Verilog HDL and also handling the FPGA for hardware implementation. Also learnt about robotics. Finally learnt how an organisation works.

PS-I is an exposure oriented course: PS-I helped me to learn how an industry and an organisation works and it also helped us to get that working culture.it also gives great opportunity to improve our communication skills.

Name: Ankit Kumar Sahoo (2017AAPS0303H)

Student Write-up

Short Summary of work done: Development, simulation and testing of a temperature sensitive toroidal transformer based on the principles of curie temperature. The sensor

is designed to have a quick response time to prevent the core meltdown of the nuclear reactor.

PS-I experience: Had to adjust to many things, and the experience was eye opening and awesome. Made some new friends and had fun.

Learning outcome: Most important learning outcome was how to put the already have knowledge put into use in the real life scenario.

PS-I is an exposure oriented course: PS-I really exposed us to the real life working situations and requirements. Learnt some survival skills.

Name: Pranav V Grandhi (2017B2A71604H)

Student Write-up

Short Summary of work done: In this project, we aim to find out the optimum architecture of the control rods inthe design of a fast breeder reactor core to maximize the efficiency. Theemblies within a reactor core is a multi-objective, multi-constraint combinatorial optimization problem with a large set of possiblesolutions. The aim is to develop and apply particle swarm optimization for findingthe optimal arrangement of twelve absorber rods (control rods) within the activecore of a fast breeder reactor, satisfying and optimizing operational and safetyparameters. The control rods prevent the nuclear reaction from exploding into adeadly chain reaction. However, the optimum yield cannot be achieved if thecontrol rods prematurely stop the reaction. The Particle Swarm Optimizationalgorithm is one such algorithm that tries to find a global minimum of acontinuous function or finds a perfect combination to minimize a particular costin any Discrete Combinatorial problem. This paper analyzes the various types ofthe Particle Swarm Optimization Algorithm and its applications. The algorithm isapplied to various continuous functions to find the global minimum including theAckley's function which has a lot of local minimum's and is often used as abenchmark to test such algorithms. Also, this algorithm is applied to discreteproblems such as the Travelling salesman problem which is a NP-Hard problem. This paper proposes a novel variation to the original PSO algorithm that furtherreduces the time taken to solve the Travelling Salesman problem. Further, theapplications of the Particle Swarm Optimization in the nuclear field are discussed. Concepts of Parallel computing are also discussed as the fitness function for thearchitecture of the nuclear reactor's core is very computationally intensive. So, the aim of this project is to write code in R, that finds the optimal solution.

PS-I experience: PS-I was a very nice experience. IGCAR is a place that is completely research oriented. The guides are helpful and the projects are nice. I have learnt a lot about how to do research and the overall experience was wonderful.

Learning outcome: I learnt how to do research and learnt a lot about working on a large scale. I learnt writing optimal code for huge scale and also, learnt a lot about finding research papers and implementing them. Coming to my project, I learnt a lot about various nature inspired optimization algorithms, especially particle swarm optimization. I also learnt R language, and also learnt parallel computing.

PS-I is an exposure oriented course: Yes. PS-I helps oneself to work on large scale real world applications. It gives a lot of experience about the industry and how research works.

Name: Pratik Ravikumar Sanghavi (2017AAPS0394G)

Student Write-up

Short Summary of work done: The objective of my project is to identify and suppress the noise pervading the signal so as to determine accurately and definitively the spectra of energies present in the radioisotopes present in the ambient environment with the aim to record these for further analysis. My project comprised of simulations that were deployed in order to test filter response of the lowpass filter designed before final implementation on the FPGA board.

PS-I experience: It was truly a one of a kind experience. I got to interact with some of the stalwarts of my field and gained valuable inputs that will prove to be helpful in my professional life

Learning outcome: I learnt about Digital Signal Processing and filter design techniques. I also learnt to make effective presentations and overcame my fear of public speaking. I saw different departments of an organisation come together to develop some really complex technologies. I honed my skills under the guidance of some of the best scientists actively engaged in the field.

PS-I is an exposure oriented course: I wholeheartedly endorse this statement. At first, the project seemed really daunting with a lot of unknowns thrown in together to form a chaotic mix. Bit by bit and with a fat deal of help for my mentor I was able to cut through the arcane layers and get my project to the current stage. PS-I taught me that in the real world there were no safety nets, no answer keys or solution manuals to unclutter the

mess I created. If I erred in a single step, it was my mentor and me who would have to step by step resolve the issue.

Name: Dwaipayan Bhattacharyya (2017A1PS0831H)

Student Write-up

Short Summary of work done: Fuel reprocessing is at the heart of the 2nd stage of India's Nuclear Power Programme. Study methods that make this task simpler and more efficient. Annular Centrifugal Contactors (ACCs) have proven to be helpful in this regard. Based on G.I Taylor's (1923) work on the mathematics of this annular flow, patterns have been observed at various operating conditions. With vast literature available on various flow visualization techniques and reprocessing we try to experimentally understand the flow regimes. Flow visualization with dyed water as aqueous and 30% TBP and dodecane as organic was carried out and different fluid flow regimes were identified. Photographs of different flow regimes were recorded for different operating conditions. The dispersed phase holdup was measured for various rotational speed and organic to aqueous ratio using displacement method. The measured holdup was correlated using empirical equation as a function of Taylor number, velocity of continuous phase to dispersed phase velocity . and Weber number.

PS-I experience: It was quite an intriguing experience. Learning how fundamental concepts of engineering are being applied at various scales proved to be extremely instrumental in appreciating them. Constant guidance from mentors was very conducive in completion of the assigned tasks.

Learning outcome: Improved my understanding of solvent extraction and fluid mechanics. Constant interactions with the mentors improved my grip on the basics. Regular field visits also helped me to understand the application of science and technology in the Nuclear Industry. Imbibed in me a research oriented scientific aptitude through the due course, by reading multiple journal articles, book sections etc.

PS-I is an exposure oriented course: Certainly, to a very large extent. IGCAR provided projects on a 1 student-1 mentor basis which resulted in exchange of great ideas. I got to understand the significance of a every branch of engineering in the nuclear field. Altogether the industrious efforts put in by all students must have given all of us a great exposure towards real life both in terms of work and living in the real world outside the bounds of our homes/ campuses. When I shall, with some hind sight remember these days, they shall always make me a better person and a more professional human being.

Name: Navdeep Singh Narsinghia (2017B5A71675H)

Student Write-up

Short Summary of work done: The topic of my project was “Spreading Resistance Imaging of Metal and Semiconductor Thin Films”. Thin films are well known for their application in the semiconductor industry. In this project, thin film deposition process was demonstrated by using DC sputtering (a variant of PVD technique) to sputter deposit a thin Au film on glass substrate. The surface topography of Au thin film was investigated using Atomic Force Microscopy (AFM). AFM is a type of Scanning probe microscopy (SPM) which can be used to probe and investigate the surface at nano scale. AFM consists of a cantilever with a sharp tip (probe) at its end that is used to scan the film surface. According to the nature of the tip motion AFM can be operated in two modes – semi contact and contact mode. Basic surface properties such as surface topography, surface roughness, average grain distribution, average grain size, etc. can be investigated using AFM. Apart from Au sample, samples of pyrolytic graphite, NiNbTa alloy and Si-Ge were investigated using semi contact and contact mode. Apart from the basic investigations, AFM can also be used to probe electrical properties at the same scale. Spreading Resistance Imaging (SRI) is a special case of contact mode where a conducting probe tip is used to map electrical properties like resistance mapping, current mapping, etc. SRI is used to study the inhomogeneity in electrical properties of non insulating thin films. Au-Si and HOPG samples were investigated using SRI and mapping of their electrical properties was obtained.

PS-I experience: My experience at IGCAR, Kalpakkam was very nice and full of learning. I got the chance to have a first hand experience about how research work is done in the field of science. All the scientists working at centre were humble, approachable and very knowledgeable. They were always ready to share their knowledge with us. We were flooded with a lot of projects to choose from on the very first day. It was a delightful experience to choose a project of my choice and work on it whole heartedly. The project work was challenging but exciting. PS-I really gave me an opportunity to dive into the world of academia. Under the guidance of my mentor I successfully completed my project and presented the results in front of the expert committee.
So, PS-I not only gave me an opportunity to work on a good project but also helped me to utilize my summer break in the most efficient manner.

Learning outcome: My project was focused on metal and semiconductor thin films and their characterization using Atomic force microscope in contact mode, semi contact mode and spreading resistance imaging (SRI) mode. A thin film is defined as a layer of material of thickness ranging from fractions of a nanometer to several micrometers. The

thin film deposition techniques can be broadly classified into two categories: Physical Vapor Deposition (PVD) that utilizes the physical movement of particles and Chemical Vapor Deposition (CVD) that utilizes a chemical reaction. Basic surface properties such as surface topography, surface roughness, average grain distribution, average grain size, etc. can be investigated using AFM in contact and semi contact mode. SRI mode which uses a conducting tip is used to study the inhomogeneity in electrical properties of non insulating thin films. SRI mode is also used to characterize electrical properties like current mapping, resistance, conductance, etc. of a thin film.

PS-I is an exposure oriented course: PS-I is really an exposure oriented course. PS-I provided us a platform to bridge the gap between academia and industry. Being exposed to the industry while you are still in your second year of college really helps to know how it feels like to work in an industry and understand the present demands of the industry. This course does not only helps us develop academically but also helps in overall personality development. The numerous group discussions and project presentations helped me develop my soft skills as well as improve my public speaking which I always was afraid of. All this added to my personality development and growth of my character. Also, the numerous official visits to nuclear power plants, test reactors, different research centres and labs, control rooms, water desalination plants were very fruitful and exposed us to application of science in real world.

Name: Nikhil Kumar (2017B5A70658P)

Student Write-up

Short Summary of work done: 1. Study on energy constrained IoT devices and making data communication between them more efficient.
2. Study of symmetric, asymmetric and hashing algorithms in cryptography.
3. Study of the mathematical basis of cryptography -- modular arithmetic, prime numbers, groups and fields.
4. Implementing symmetric key and hashing algorithms using OpenSSL library functions.
5. Testing and comparing performance (running time, CPU usage) of the algorithms considered and coming up with recommendations.

PS-I experience: I did a lot of self-learning and study of cryptography -- was an interesting and valuable experience. A significant portion of the work involved lot of background study on cryptography through online resources. I finished two projects -- 'Energy Efficient Data Communication in the Context of Internet of Things (IoT)' and 'Performance Evaluation of Security Algorithms'.

Learning outcome: 1. Basic idea of IoT, three-layer IoT model, the need for energy efficient data communication and communication technologies suited for IoT.
2. Symmetric and asymmetric key algorithms, Feistel structure, study of working of DES and AES algorithms, RSA, Diffie-Helman key exchange.
3. Hashing algorithms, Merkle-Damgard construction.
4. Modular arithmetic, groups, rings, Galois fields (prime fields and extension fields).

PS-I is an exposure oriented course: PS-I exposed me to new fields of study which I had not explored before, and I learnt a lot through my project work and self-study.

Name: Devanshi Mathur (2017ABPS1668H)

Student Write-up

Short Summary of work done: My project was on topic 'Analysis of tensile stress-strain behavior of IFAC-1SS clad tube'. IFAC-1 SS is used in the core Subassembly for wrapper and clad tube material. It is modified version of D9 SS in which three elements that are P, Si and Ti were optimized. Earlier works are done on solid sample my work was on hollow sample. So I found two more models that fitted the true stress-strain true plastic strain curves well. They show results better than the preexisting models. I have done analysis with four models Voce, Asymptote, Voce-type and Hyperbolic. In which Voce and Voce-type were preexisting and Asymptote and Hyperbolic were found by me.

PS-I experience: It was a memorable experience. I not only learned a lot of new topics but also made alot of friends. The scientists I knew here were the best people I could ever meet. We went to Pondicherry and mahabalipuram on weekends. All in all it was a good experience.

Learning outcome: Exposure to new fields. Growing interest in nuclear field. That nuclear energy is very safe, safer than thermal plants.

PS-I is an exposure oriented course: It's true. We got exposure to nuclear plants and insiders. Where we could never enter without the help of bits campus.

Name: Het Gala (2017B2A8PS0574P)

Student Write-up

Short Summary of work done: Multivariate calibratiob and testing of metal oxide sensor arrays. metal oxide sensors arrays and their wide application in the Atomic Nuclear power plant, is synthesis, in Nano domain with Zinc Oxide as the metal oxide and dopped with Chromium 1, 3, 5%. Sensor setup with an automated sampling unit where different mixtures of gases can be injected to the system, and using multivariate data analysis to differentiate the mixture of gases qualitatively and quantitatively. an unknown mixture of gas can be detected and can br said whic gases are present and in what proportion using models like PCA, Clster analysis, PCR, PLSR, ANN and other ML based methods.

PS-I experience: PS-I experience was very awesome, both technical and non-technical. Got an opportunity to study in depth about the nuclear enerrgy in industry apart from the projects. live seeing of Atomic reactor which is one of its kind in the world. visits arranged by the IGCAR evwry weekend t different groups and departments and exploring about the different equipments and instruments and exploring wide range of sudies carried out at IGCAR.

Learning outcome: I learned a lot of things from PS ranging from small and minute things like getting up early, how to read a researh paper and how to implement in real life, aking presentations to accomplishing the project in a small specific time , multivariate data analysis, models which can be used in fields of chemometrics, biology, econmics, mathematics electronics, and many other streams. I learned to simulate things on Matlab, Origin and Latex.

PS-I is an exposure oriented course: Yes, I stand upon and support the statement that PS-1 is an exposure oriented course. It gave me a wonderful exposure to stay in a new place, experince the industy and their operations, very good projects with one to one mentorship, with regular vivas and presentations to the department, that too very prfessionally and constant guide and enthusiasm from botht the IGCAR and students side. I will highly recmmend to go for PS-I wherever it may be.

Name: Kshitij Aroa (2017A3PS0197P)

Student Write-up

Short Summary of work done: My work involved porting of a 8051 processor IP to a Spartan 6 FPGA and then interface it with internal peripherals like UART, Timers, etc. as well as with external peripherals such as Thermocouple, Relay Output as well as

Leak Detector. For this, a literature survey was done on 8051 cores and then a reliable core was chosen. EXE were generated to produce COE file as well as VHDL files for RAM as well as ROM.

PS-I experience: It was a nice experience working in a place like IGCAR and seeing how the subjects taught in the college can be useful. The working hour depends on the scientific officer alloted to you. The projects offered are quite diverse.

Learning outcome: I got an experience about the work in digital electronics. I was able to learn VHDL and Verilog, along with Embedded C.

PS-I is an exposure oriented course: Yes.

Name: Venkata Sai Karthik Jagini (2017AAPS0371H)

Student Write-up

Short Summary of work done: Extracted vulnerabilities related info from 3 websites using Perl and displayed it on the portal created using PHP and run the program at a frequency of 1hr using crontab. Each time the program runs it append to the current information.

PS-I experience: It taught me how important it is to keep our phones away. It made me understand my strengths and weakness.

Learning outcome: Programming on Perl and Web-development both front and back end work.

PS-I is an exposure oriented course: I completely agree with the statement. Not only regarding academics but also to survive at a different place with different people for long. And also helps in understanding the work atmosphere.

PS-I station: Institute of Seismological Research (ISR), DST , Gandhinagar

Student

Name: Khusnbu Parikh (2017A2PS1464H)

Student Write-up

Short Summary of work done: Empirical relation of N-SPT vs Shear wave velocity and liquefaction hazard assessment.

PS-I experience: Learned how a research institute works. Did earthquake risk assessment and liquefaction hazard assessment.

Learning outcome: Learned about seismic microzonation, earthquake risk assessment for Gujarat state.

PS-I is an exposure oriented course: Yes.

Name: Khushboo Kumari (2017A7PS0012P)

Student Write-up

Short Summary of work done: The purpose of my project is to design a query based web page to extract ground motion time series from standard data archive maintained by ISR.

PS-I experience: I gained hand on experience on Python, PHP, HTML, etc while developing web application of my data extracting tool.

Learning outcome: I learnt Python, PHP, HTML which will be helping me in future while working at industry level.

PS-I is an exposure oriented course: I am agree with this. It was really great to implement things for my web application than just to read theory or classroom courses.

Name: Amod Gupta (2017A2PS0065P)

Student Write-up

Short Summary of work done: It was a research based work on seismological hazard which included liquefaction assessment. The area of study was Ahemdabad city.

PS-I experience: It was a new experience. This PS-I station exposed you to research areas in the field of earthquake engineering.

Learning outcome: Learnt about the various processes used to assess the soil conditions. Got to know about how earthquakes are recorded and seismic hazard assessment is done.

PS-I is an exposure oriented course: Yes.

Name: Neelanchal Joshi (2017B5A30624P)

Student Write-up

Short Summary of work done: Development of a MATLAB module to implement seismic signal processing. The module was used to calculate the corner frequency of earthquakes.

PS-I experience: It was good. The learning curve was great.

Learning outcome: Learnt how a research institute functions.

PS-I is an exposure oriented course: Exposure to research is quite necessary for engineering students so that they get to know the where their field currently is.

PS-I station: Inter-university Centre For Astronomy And Astrophysics (IUCCA), Pune

Student

Name: Nikhil P S Bisht (2017B5A70610G)

Student Write-up

Short Summary of work done: Dark matter power spectrum modelling at high redshift. Learning about cosmological perturbations, Linear and Non-linear Perturbation theories in Eulerian and Lagrangian scheme; using Fourier analysis as a tool to solve Differential equation; Zel'dovich approximation and simulation of large scale structure based on various density fluctuations.

PS-I experience: Loved the hospitality and the learning environment here at IUCAA. The accomodation was extremely good and the services were amazing. The project was well in sync with our previous knowledge and we got to explore more.

Learning outcome: Exploring cosmological perturbations and being able to mathematically understand the origin of the large scale structure of the universe and simulate it.

PS-I is an exposure oriented course: I completely agree with the statement with reference to IUCAA as a PS-I station.

Name: Chatrik Singh S Mangat (2017B5A70822H)

Student Write-up

Short Summary of work done: We modeled a special gravitational lensing system with one lensing galaxy and two sources behind it at different redshifts. After modelling the system to get the mass profile of the lens, we use those parameters to get constraints on the ratio for pressure to energy density of dark energy.

PS-I experience: It was truly inspiring. The environment here prompts you to work, and the work itself is very interesting. The mentors were very helpful and enthusiastic, so it kept us going as well. It was a great experience.

Learning outcome: I learnt the theory behind gravitational lensing and a bit of cosmology. I learnt using Ubuntu as an OS and Glafic, DS9, Python and Gnuplot as softwares.

PS-I is an exposure oriented course: For my case, atleast, I find this to be completely true. Exposure to a research environment at such an early stage is extremely beneficial. I really enjoyed myself here, and this firmed up my belief to take up research as a career in the near future.

Name: Ashi Sinha (2017B5A71149H)

Student Write-up

Short Summary of work done: My project was about an in-depth understanding of turbulence. I learnt here the basic fluid mechanics equations related to mass conservation and derived them. I derived the Navier Stokes equation using little bit knowledge of tensors. I learnt about the significance of Reynolds number and its formula. The characteristics of 3-D turbulence and its application in real world be it sugar getting mixed fast by stirring or dimples of golf ball. I learnt about eddies, vortices and vortex stretching and equation for evolution of vorticity. Then, I learnt about how energy flows to smaller and smaller scales which is the energy cascading mechanism. Finally I looked at the concept of two dimensional turbulence.

PS-I experience: My experience was really good here. I was allowed summer school lectures and lectures on refresher course. The professors were very helpful. I gained an insight into the world of astronomy research.

Learning outcome: I came to know of Latex and GNU plot software and my second seminar went much better than my previous one so, I think I learnt public speaking in general.

PS-I is an exposure oriented course: Yes, the group discussion and seminars are very crucial for personality development. Also, observing the work carried out in any organisation for 2 months is important and helpful.

Name: Avinash Sontakke (2017B5A70667P)

Student Write-up

Short Summary of work done: Worked with AstroSAT satellite's position and velocity data to find out the mass of the Earth and its oblatenss (how flat it is on the poles). Involved studying the multi-pole expansion of the gravitational potential, particularly the quadrupole term. Used various algorithms to reduce the error in computation.

PS-I experience: One of the best places to visit for people ego have a flare for astronomy and astrophysics. Knowledge of 2nd year physics is key. The faculty here are pioneers in astrophysics and to work under their guidance is a treat. The living conditions are amazing as we were accommodated in their guest house complete with an AC and balcony for free. Hospitality was A1. Provisions for recreational activities are plenty. No working hours as such. You can work from your room or their excellent library. Overall, the experience at IUCAA was fulfilling and really enjoyable.

Learning outcome: 1. Basic Celestial Mechanics
2. Python and C++
3. Using various algorithms like RK4 to reduce error in calculations
4. How to optimise code to make it run faster.

PS-I is an exposure oriented course: Yes, it is true. I never had thought about Astronomy seriously until coming here. I realized that astronomy was more that making observations on stars and required a lot of physics and a lot of computations. It has become clear now that this is a field that I can pursue and I want to.

Name: Shravan Kumar Shetty N (2017B5PS0559G)

Student Write-up

Short Summary of work done: My project title was, "Enhanced eddy current damping for suspension damping in Gravitational Wave detectors". Eddy current dampers are used to reduce suspended mirror motion in Gravitational Wave Detectors. However, these dampers also introduce ground motion into the mirror during operation of the detectors. This problem is circumvented by introducing ‘switchable’ eddy current dampers. However, the effectiveness of these dampers was found to be limited by copper coil impedance. A more effective approach using an electronic circuit to control

this coil impedance is explored in this project. Further, tuning the impedance & hence the damping, also helps us damp the suspension quickly and reduce effects of thermal noise. Inorder to demonstrate & do an analysis on the same phenomena, a single stage suspension model was built and various measurements were made.

PS-I experience: Doing a project at IUCAA was a very good exposure to the world of research in astronomy & astrophysics. The professors / scientists here are very friendly & approachable, we also get to meet various students from first degree projects to Ph.D. Exploration is not restricted to our own projects & supervisors. Apart from the usual thing, this is a great place for networking if you are willing. During my PS-I here there were lots of lectures, seminars, talks & lecture series. Apart from learning, giving perspective & exposure; it offers an opportunity to connect with the professors.
And last but not the least, my project. For me it was a great experience. During my project, I got to work in the lab of IISER, Pune and interact with the profs & Ph.D. students there. I got a feel of how real research world looks like. One may not always get the PS-I station or project of his / her choice. But if you put your heart & soul into it, it will anyway be a great experience. Nevertheless no one knows what experience, skill or knowledge will pay-off in what form in which stage of life!

Learning outcome: I never looked at it that way. Just be involved & dedicated to the process, what it yields is usually way beyond our perception.

PS-I is an exposure oriented course: Yes, it definitely was! I have talked about it in the 'PS-I experience' section.

PS-I station: ISRO Inertial Systems Unit, Trivandrum

Student

Name: Karthik B Nair (2017A4PS0229P)

Student Write-up

Short Summary of work done: The smart space robot is an automatic flying robot capable of performing extravehicular activities. It will be sent to space in PSLV and will be arranged to an orbital platform which will orbit the Earth. The robot had dual arms capable of grasping and manipulation. We plotted the workspace (reach) of each manipulator. We also obtained an analytical solution for inverse kinematics ie what joint angles(input) leads to a particular position in it's workspace(output). Then we found expressions for joint torques needed for the arm to trace a trajectory. We also worked

on reactionless control of the arm ie moving one arm in a fixed trajectory and moving the other arm accordingly so that reactions on the robot is balanced. This is essential as all operations are in space and there is a high risk involved. The whole work was coded in matlab. Simulations were also done to verify the expressions we derived.

PS-I experience: The environment in IISU is conducive for research oriented work. The employees are very knowledgeable and they encourage your work whenever they have time.

Learning outcome: Learned about robotics in general. Learned MATLAB and Adams simulations software.

PS-I is an exposure oriented course: True.

Name: N Sai Kiran (2017A4PS0455P)

Student Write-up

Short Summary of work done: The aim of this project is to perform Forward and Inverse Kinematic and Dynamic analysis of the SSR Manipulator. SSR (Smart Space Robot) is a sub-module of the PSLV PS-4 stage. An analytical expression for the Forward Kinematics is obtained along with the workspace of the manipulators. The closed form solution to the corresponding inverse kinematics problem is obtained. The Forward Dynamics of the manipulator is implemented and verified in Adams software. A generalized joint space trajectory to minimize jerks is proposed. The feasibility of various arm aided docking manoeuvres is studied. Reactionless Control of the SSR in flight is also implemented in this project.

PS-I experience: The experience was valuable. We had exposure to the working environment of a Government institution. The people here are very helpful and are ready to take up new ideas. They gave us sufficient time to learn the concepts and made changes in the structure according to our needs.

Learning outcome: We learnt the basic concepts of robotics and functioning of Adams multibody software. We also learnt about the satellites and the various thrusters used in it's operation.

PS-I is an exposure oriented course: Yes, definitely it's an exposure oriented course. Basically, we don't need any prerequisites for this course and whatever you learn from here, will change one's career.

Name: Gaurav Sharma (2017A4PS0532P)

Student Write-up

Short Summary of work done: Space robotics is a challenging field solely because it involves controlling a robot in Space where a slight error can cause the entire mission to fail. In ISRO Inertial Systems Unit, we were given the task of analyzing the kinematics and dynamics of the SSR (Smart Space Robot) arm. We were required to find the reachable points of the arm and the power requirements of the motors. The SSR (Smart Space Robot) is to be launched from the fourth stage of PSLV (Polar Satellite Launch Vehicle) to take pictures, perform pick and place operations and then dock itself back to the docking platform. We needed to ensure its smooth motion in space.

As robotics was a new field to us, Dr. Joji Chaman (Group Director MDPG) gave us a book- “Introduction to Robotic Mechanisms and Control by John J Craig”, so that we get enough insight in this field. Another book from which we studied was “Theory of Applied Robotics” by Reza N. Jazar. We studied the kinematics and dynamics of a robot from these books. After that, we implemented the motion and forces on the SSR arm on MATLAB. This task needed verification through simulation in Adams software. Through constant guidance of our mentors (especially, Mr. Dileep) and team effort, we were finally able to verify the joint torques. The next step was to perform arm aided docking maneuvers of the SSR. We explored all the possible ways of docking and had some unconventional ideas. But we discarded these ideas after we did a feasibility study which concluded, that arm-aided docking was risky due to the presence of only two joints in the arm. The SSR’s motion was thoroughly analyzed to come to this conclusion.

Then we moved on to achieve perfect control of the SSR so that it doesn’t experience any force or torque while performing any maneuvers. After, solving the governing equations we found out that the forces and torques cannot be balanced simultaneously due to various design constraints. But our mentor appreciated our work and asked us to balance the torque only and assured us that the design constraints will be removed. And after that, we successfully implemented the torque balance equation. At our workplace, we also got the opportunity to meet other interns. An intern from NIT-Calicut was working on the gripper part of the arm. And other interns from CET (College of Engineering Trivandrum) are going to implement our work. We also met Mr. Gaurav Behrani who was working on the SSR project in 2018. He gave us some useful tips and some of us helped him out in the Optical Encoder project which he is currently undertaking. After doing this project, we now have knowledge about an arm's kinematics (reachable points or we can say workspace of the arm) and dynamics (torques required to do a maneuver).

PS-I experience: The people working in ISRO are open-minded and are ready to take new ideas. They are very encouraging. Even the employees working there would help us out if we encounter some problems. We presented our work to Dr. Joji and then the Electrical students from CET. Dr. Joji applauded us for our work and encouraged us to further explore this field in the future. Due to limited amount of time we were not able to perform stress analysis on the SSR arm and were not able to work on control part of the robot. Although being a government research lab ISRO has many restrictions (we were not allowed to use the internet at ISRO and to bring our phone inside!), still it is one of the best places to pursue cutting edge projects.

Learning outcome: At ISRO we learned how space robotics is an interdisciplinary subject which requires the culmination of both mechanical and electrical engineering. We also learned about the design of an optical encoder and made a virtual optical encoder which helped Mr. Gaurav in removing the eccentric error in a real optical encoder. Although being a government research lab ISRO has many restrictions (we were not allowed to use the internet at ISRO and to bring our phone inside!), still it is one of the best places to pursue cutting edge projects.

PS-I is an exposure oriented course: I truely agree with this statement.

Name: Ravisanker E (2017AAPS0433H)

Student Write-up

Short Summary of work done: The project assigned to me was – “Simulation and Modelling of Electronics for Navigation Sensors: MEMS Gyroscope”. The main objective of this project was to model the electronics of a Micro Electronic Mechanical System (MEMS) based Gyroscope and simulate its behavior with the help of a simulation software called System Vision. There are broadly two types of sensors used in Inertial Navigation Systems, they are accelerometers and Gyroscopes. Accelerometers are motion sensors whereas Gyroscopes are rotation sensors. The data obtained from these helps in determining the position, velocity, acceleration and attitude of the body under motion. My work was concerned with MEMS based Vibratory gyroscope which was being indigenously developed at IISU. I also took up the simulation of the temperature control card and the voltage to frequency converter.

PS-I experience: The project was indeed a great learning experience to me. It widened my perspective in field of sensor electronics and gave me a chance to apply the core courses that I had studied back in collage. It was a really good exposure to me in the

sense that I could get a taste of organizational culture here at ISRO. The time spent here was worth it!

Learning outcome: I learnt about the electronics of inertial navigation sensors, MEMS based resonator design, VFCs and temperature control electronics. I gained hands on experience in doing simulations using System Vision software.

PS-I is an exposure oriented course: Yes.

PS-I station: Maritime Research Centre (MRC), Pune

Student

Name: Sarwadnya Mutkule (2017B3A70450H)

Student Write-up

Short Summary of work done: I worked on Radiated Noise Analysis and Automated Report Generation. Basically my work was related with analyzing the noise emission by the ships mainly and draw as many conclusions as we can from it. We had to record the noise emission, make out a noise signature out of it and then plot it on a graph(popularly called the wenz curve) and then we had to write a code for the automated report generation of the same. The code should utilize the method of DFT to segregate each line (each line is equivalent to a signal) of the spectrum and then use the methods declared in the advanced signature analyser to figure out the different conclusions that we need to draw.

PS-I experience: It was very nice experience. The people there were very friendly and supportive. My colleagues very great people to hang out with and our faculty in-charge of the PS, Mr. Sanjay Sahay was a great person right from the start. He helped us in very aspect possible was also very supportive. Also, the director of MRC, Dr.(Cdr) Arnab Das was a great mentor for us. Last but not the least, Shridhar was always there for us like an elder brother to us. Overall it was an awesome experience.

Learning outcome: I got to learn a lot more about ships and came across this very interesting yet unworked underwater domain. This is an area which requires a lot of work and once this is done then it will be a great addition to our nation. Also, I got to know about how to write a code to split the spectrum of noise signals that are received.

PS-I is an exposure oriented course: Yes, this is an apt statement considering my experience of it. We got a lot of exposure as to what a workplace environment actually looks like and how to get along with people who are tough to get along with.

Name: Srishti Saraswat (2017B4A71419H)

Student Write-up

Short Summary of work done: Noise and vibration analysis onboard marine platforms and automated report generation. The project was about how the machinery and other components onboard a marine platform (in my case it was a ship) generate noise and vibration and how are they measured, analysed and reduced. The project analysed the Noise Code given by IMO and other policies issued in this matter by various organizations like ABS, DNV etc.
The second half of the project was the automatic report generator so that nothing had to be done / checked manually and we could figure out whether the ship is under specified regulations or not.

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

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

PS-I is an exposure oriented course: PS-I definitely provides you with industrial exposure.

Name: Ayush Kumar (2017B5A70761P)

Student Write-up

Short Summary of work done: Graphic User Interface for spatio-temporal mapping of low frequency ambient noise in the Indian Ocean Region.

PS-I experience: It was not a corporate environment but more of an academic environment. Projects were quite engaging.

Learning outcome: GUI designing and software development using PyQt.

PS-I is an exposure oriented course: PS-I gives an exposure of industry.

Name: Harshit Agrawal (2017A8PS0786H)

Student Write-up

Short Summary of work done: My project is to simulate a passive sonar based on spatio-temporal factors in Indian Ocean Region using various existing models.

PS-I experience: It was good and flexible.

Learning outcome: I learnt to balance professional and personal life.

PS-I is an exposure oriented course: Yes.

Name: Shreeya Nelekar (2017A7PS0093H)

Student Write-up

Short Summary of work done: The project undertaken was Machine learning and AI based solutions for Automatic Identification System. As a part of project, 2 modules were developed- AIS decoder and AIS Error Detector. Various machine learning algorithms and web browser automation was employeed to complete the project.

PS-I experience: The experience was good. Learnt many things out of PS-I. Got acquainted with office atmosphere. Overall good experience.

Learning outcome: Learned Machine learning algorithms, Selenium, etc. Got hands on experience with python coding.

PS-I is an exposure oriented course: It is true to some extent. If one really works on project with all the dedication then PS-I can bring very good outcomes.

Name: Aneri Jain (2017B4A30759P)

Student Write-up

Short Summary of work done: I have worked upon Underwater Acoustic Propagation Model for Indian Ocean Region. Basically, it involves developing an Underwater sound Propagation path with minimum transmission loss using existing theories and python for Indian Ocean .

PS-I experience: It was a nice experience and we had a lot of work to do. We used to have presentations on work progress every alternate week and also enjoyed the overall treatment at the centre.

Learning outcome: I learnt a lot many things on my PS-I and now I really good at presenting them too.

PS-I is an exposure oriented course: It is. But it also depends upon the type of PS-I Station you go to and kind of work you do.

Name: Yashaswi Pandey (2017B5A70971P)

Student Write-up

Short Summary of work done: Project was titled "Underwater Radiated Noise Generation". Worked on finding and simulating mathematical models which can estimate the radiated noise levels generated by a ship.

PS-I experience: Good mentors. Work timings were flexible. Were allowed to choose our own project from the given choices. Mostly research oriented work, relaxed deadlines, interesting set of projects spanning a variety of different topics in the maritime domain.

Learning outcome: Got to learn about a completely new domain (Maritime). Got good exposure to the way research is conducted.

PS-I is an exposure oriented course: True.

Name: Siddhesh Dalvi (2017A3PS0391G)

Student Write-up

Short Summary of work done: My work involved the creation of a dark ship detection and management system. I created a robust framework and sensor network so as to identify and localize dark ships present in an area so as to enhance maritime security.

PS-I experience: It was a great experience with a chance to learn new things and meet smart students from other campuses as well as from the organization.

Learning outcome: I learned about Underwater Domain Awareness, which was a completely new field for me. I learnt about underwater sensor networks and python coding for simulations.

PS-I is an exposure oriented course: Yes it is. It shows us how organizations work and how research is done at higher levels.

PS-I station: National Centre for Antartic and Ocean Research (NCAOR), Goa

Student

Name: Vinay Veerasangappa Kanakeri (2017A3PS0228P)

Student Write-up

Short Summary of work done: Satellite collected data was re-grid and the netCDF files were plotted using Antarctic mapping tools in MATLAB.

PS-I experience: The work was easy, initially it was quite boring and monotonous later we had some interesting work. overall the experience was good.

Learning outcome: Plotting the antarctic data on matlab.

PS-I is an exposure oriented course: Definitely PS-I is an exposure oriented course. I had a decent exposure to research field.

Name: Ritik Rohit Bavdekar (2017B4A70349P)

Student Write-up

Short Summary of work done: The work mainly involves learning and implementing data analytics for a variety of purposes on a data set of the weather conditions of Antarctica which is provided by the institute. We learnt how to clean and preprocess data using a variety of different algorithms. Then the processed data was used to predict the future weather conditions using machine learning and neural network models like ARIMA, RNN, CNN and LSTM. We also learnt how to visualise data using a variety of techniques. The data was plotted and visualised by using scatter matrix (correlation matrix), wavelet spectrum analysis, Fast Fourier transformation, etc. After all the data was processed and visualised properly everything was put up on the NCAOR website using Django for the use of scientists and students all throughout the country.

PS-I experience: It was a fun but tough and time taking job which involved learning a lot of math and python. After learning and implementing everything I got an experience of both a research institute and a data analytics job. It was an enriching experience.

Learning outcome: Data Analytics, Python, Machine Learning, Neural Networks and Django.

PS-I is an exposure oriented course: It helped in developing both soft skills and work skills. I also got an experience of a job type environment.

Name: Aditya Vasudevan (2017A7PS0175P)

Student Write-up

Short Summary of work done: While the station is a government research laboratory, the my project was a software development one. I started writing a Python package for Climate Data Analysis. In particular, NASA has a software, called Panoply, which is a Java-based application for data analysis, however my project guide though that it lacked some feature and hence asked me to create a Python package which had its features and some more.
Over the course of the two months, I worked with a variety of Python libraries used in data analysis and plotting, like numpy, cartopy, pandas, geopandas, and matplotlib. Since the mentor wanted a GUI, I used the Tkinter library to create the same. At the time of writing, the application could read multiple NetCDF files (.nc) and retrieve, export, plot and analyse data from it in a variety of ways. The code was written across multiple files, and used the functional programming paradigm. Extensive documentation for functions was also generated using Python docstrings and a software called Sphinx. Towards the end, a beta version was uploaded to TestPyPI, and I was able to download the package using pip and run it through a single Ubuntu terminal command.

PS-I experience: Overall, PS-I was a good experience. Living away from home, where you control every moment of your life, is an interesting feeling to have. The institute I was at had higher expectations and hence, more working hours than others, and that ensured that we worked a from 9 to 5 on all weekdays. It really helps you realise the 'TGIF feeling'. The time outside the PS station however is entirely yours to expend as you please. It is also a great time to meet new and interesting people.

Learning outcome: I learnt about software development and about the creation and distribution of Python packages. Reading through many pages of documentation and a huge number of Stack Overflow answers was part of my daily routine. I read about different types of programming practices, guides on methods to document code and make it ready for distribution, or sometimes just trying to figure out how to make two modules work together. While I would say that my experience with my PS mentor was good, he was an end-user rather than a software developer and hence, often I had to work things out on my own, whereas he simply described what he wanted. I suppose that is how actual software developers have to deal with clients, so it was a "real" industry experience.

PS-I is an exposure oriented course: Yes, I agree with that statement. It gives you experience of how people work in the real-world and can help you make a call about your future. While the evaluation components are not completely reflective of that notion, the exposure you get working in an institute / company is definitely valuable and a change of pace from the standard run-of-the-mill course.

Name: Komal Vasudeva (2017A7PS0103P)

Student Write-up

Short Summary of work done: Firstly, data files present in netCDF format (satellite data) were processed into a MATLAB-compatible form. Data extracted thus was used to obtain seasonal and yearly averages for sea-ice extent. Also, a separate data file present in Excel file format was used to find rate of change of sea-ice in various sectors of Antarctica, and other trends. Finally, correlation was established between different atmospheric and oceanic indices, and sea-ice extent in different sectors over different seasons, and inferences were made.

PS-I experience: My PS-I experience was pretty good. I was alloted NCPOR in Goa. The accommodation was provided by BITS Goa campus. My PS-I Station is one of the best PS-I stations in Goa. If you are more into IT, you should probably opt for better options in cities like Bangalore, Delhi, Hyderabad.
My PS-I instructor, Dr. Luis was a very caring mentor. He could empathize with the students and wasn't very strict about deadlines. He just wanted us to be done with the work (we wrote a research paper) by the end of our PS-I, and we didn't fail him.
Also, our faculty mentor, Dr. Mayank Goel was very generous. He guided us through all the procedures, and understood our problems well and duly resolved them. PS-I station was good, not 'lite' (you have to attend daily, Weekends off); travelling took a lot of time; Project was fine, could opt for a better option if interested in IT; good for Antarctic Research/Data Analysis; Both project and faculty mentors were caring and helpful; You get to write a Research Paper and get a Letter of Recommendation.

Learning outcome: I learnt about the power of MS-Excel as a data analysis tool. Also, I learnt to manage my time well. I get to know about many libraries present in python and how it made 'difficult-looking' tasks pretty easy.

PS-I is an exposure oriented course: It's true that PS-I is an exposure-oriented course. At the end of 2nd year, you are not expected to have a great amount of technical knowledge to work independently. PS-I mostly serves as an experience to acquaint you with the "Work Environment". You learn how to manage your professional and personal life when you have to work 9 to 5. On the work front, you are aptly guided by your faculty and project mentors, and get to learn a lot of new things.

Name: Swadesh Vaibhav (2017A7PS0030P)

Student Write-up

Short Summary of work done: The project was based on weather analysis and prediction in the polar regions of the Earth.

PS-I experience: The experience was very good. The mentors closely monitored our work and helped us in achieving the final objective.

Learning outcome: Technical- Making, fitting and optimizing Machine Learning Models for Time Series data.
Non-technical- Professionalism, Time Management, Development of Soft Skills.

PS-I is an exposure oriented course: PS-I succeeds in achieving all its objectives, making professionally sound engineers out of college students. It is well-rounded program which simulates an actual job to near-perfection.

Name: Ankit Goyal (2017B5A70905P)

Student Write-up

Short Summary of work done: NCPOR, Goa is a Government Research Institute which is responsible for the country's research activities in the polar, Himalayan and Southern Ocean realms.
Data is collected via satellite and other equipment installed later on analysed and interpreted by scientists to make deductions. The data is generally provided in NetCDF formats that support the creation, access, and sharing of array-oriented scientific data and has an extension of .nc . First of all I wrote a backend code in python to read the .nc file as it cannot be interpreted by any other text viewer . Then my mentor wanted me to move into Data Analysis of data from AETHLOMETER , an instrument for measuring the concentration of optically absorbing suspended particulates. The data is supplied in .dat file and for that data filtration software (back-end code) was to be written in python. Python was chosen because of its vast applicability and in-built libraries available to make the task easy. First of all , the time at which data collected had negative values was to be neglected. This was done easily by converting .dat file into .csv file and then using "pandas" (the in-build library of python) which makes the task of dealing with data much easy. Data was then assumed to have Gaussian Distribution (that is 99.9% data lies within mean +/- 3* standard deviation) and so outliers were to be removed for accurate deductions. After outliers removing, the plot of mean and error bar was done ,(by taking user input for the interval he like to have the mean and standard deviation calculated along with the column for which data had to be plotted) . Scientist use this plots and data to make future predictions and also deduce something from the trends of previous available data. The same process was also done .log file which had different

format and was provided by some other instrument. It was also converted to .csv file and the above process repeated.

PS-I experience: It was my first time experience with code writing for practical purpose and apply my abstract knowledge which i gained in college to solve real Life problems. My mentor described me the problem he was facing related to data analysis and so he told me to filter the data according to certain conditions and then plot the graphs so that interpretations could made easily and conveniently. Also the knowledge of previous learned courses example MATHS-2 was very helpful as the data was assumed to have gaussian distribution and so that outliers were to be removed to interpret and make deductions more accurately.

Learning outcome: I have learnt Python language as well as using Ubuntu (operating software) for easy compilation of code written in IDE. I came to know about the vast applicability of python in various fields such as Machine Learning and data analysis and much much more. Python is vastly growing because of its easy syntax and easy compilation with much less warnings and errors as compared to other languages.

PS-I is an exposure oriented course: Yes, I do believe that PS-I is an exposure oriented course as it shows us the basic work, problems and difficulties that are faced by corporate world and also in research institutes. It also teaches us to tackle with them at our own best level.

Name: Gandhi Atith Nikeshkumar (2017A7PS0062P)

Student Write-up

Short Summary of work done: My work was basically doing time series analysis using various machine learning methods. I used the Antarctic Weather data provided by NCAOR to us and used it to future predict various parameters of the weather. I applied CNN, RNN, LSTM and ARIMA models to predict the future parameters. I calculated the error rate of my prediction by splitting the data into train and test. I optimised my models and tried to reduce errors by reducing the test errors. My program will be used for showing weather prediction on the NCAOR website.

PS-I experience: It was a pretty good experience. I got to learn a lot about the working methods of an organization especially a research organization. The NCAOR staff was pretty helpful and the mentor provided to us was highly knowledgeable and kept pushing us to learn more things. The PS-I instructor alloted to us by the PSD division was also very helpful and motivated and guided us during the process. The PS-I helped me a ,ot to develop my soft skills.

Learning outcome: As I was beginner to the field of the work alloted to me I got to learn a lot.

PS-I is an exposure oriented course: Yes, it is truly an exposure oriented course as I have mentioned earlier I got to learn a lot about the working of an research organization. I got a lot of exposure to research as my PS-I was a research Institute.

Name: Pranay Gupta (F2017B5A70831P)

Student Write-up

Short Summary of work done: The project was based on data analytics, to be precise, time series data analysis and prediction. The objective of the project was to make a weather forecasting and plotting application using R studio package - R shiny.
Methods and Languages-
For forecasting, various statistical and machine learning algorithms like RNN, LSTM, CNN and ARIMA were used, while, various libraries of R were used to plot different kind of time series relevant graphs like trend-plot, seasonal-plot, behaviour-plot, correlation-plot, etc.
Result-

1) At last, every feature(plotting and forecasting techniques) was integrated in a Shiny application(GUI), which provided a graphical interface to the user to upload his/her time series data in form of a .csv file and then plot different graphs and forecast future values through different techniques both dynamically and statically.
2) Apart from developing the application, we also worked on generating spatial heat-maps and wind-dial diagrams.

PS-I experience: PS-I came out to be quiet a fruitful and enriching experience. It provided a great opportunity to learn both technical and soft skills. Overall, it was a good experience.

Learning outcome: PS-I enhanced my programming skills and opened the world of development for me. I learned R and different machine learning algorithms. Also, it strengthened my communication, presenting, technical writing and team management skills.

PS-I is an exposure oriented course: True.

Name: V. Aravindan (20170B4A7-849P)

Student Write-up

Short Summary of work done: Data analysis using Python.

PS-I experience: It was nice!

Learning outcome: Programming for data science.

PS-I is an exposure oriented course: True.

PS-I station: National Chemical Laboratory (NCL), Pune

Student

Name: Priyanka Goyal (2017A1PS1605H)

Student Write-up

Short Summary of work done: The melting point is an important characteristic of a compound and knowing it helps in various aspects in the field of research. The experimental analysis of this point is a long and tedious process with not much accuracy therefore using machine learning and deep learning to predict the melting point is of growing importance. The predictions must be accurate for it to be useful. This report focuses on the optimization melting point data to get more accurate predictions. The project was to predict melting point by using a dataset with 4500 compounds with 202 features for training and testing of models. The models were built using different machine learning and deep learning techniques to minimise the value of error and maximise the determination coefficient and obtain a model that could accurately predict the melting point of any compound based on the features entered by any user.

PS-I experience: Being from a chemical background with inclination towards materials sciences, I chose National Chemical Laboratory as my first preference. However, I was not given any lab oriented project, which was a little disappointing. Still, I do believe the

project assigned to me, that was computation based, would somehow be helpful to me in future.

Learning outcome: I learnt new programming languages like Python and was introduced to various artificial intelligence techniques, which was completely new to me.

PS-I is an exposure oriented course: I would agree to this as we were exposed to how research and development sector actually operates.

Name: Vishnu P Katkoori (2017A1PS0754P)

Student Write-up

Short Summary of work done: My work involved implementing an adaptive fuzzy logic controller to control non-linear chemical processes such as a continuous stirred tank reactor.

PS-I experience: My experience was informative and educational because I not only have exposure to the research industry, but also gained knowledge on various process control methodologies.

Learning outcome: I learned the theory behind different control strategies like fuzzy control and PID control. I learned how to implement these control strategies on MATLAB. I also learned different numerical methods which are used to implement these strategies.

PS-I is an exposure oriented course: I agree with this statement. You get to learn how normal coursework is actually implemented within industries.

Name: Abhishek Jain (2017A1PS0793P)

Student Write-up

Short Summary of work done:

The objective of this project was to make a graphical user interface in the form an executable file which takes feed inputs from the user as well as the required flooding to generate the pressure drop in the column.

PS-I experience: It was very nice experience as we learned so many things.

Learning outcome: We learned a lot from this PS-I. Apart from soft skills, we get to learn new languages and software like Matlab, c#, python, visual studio. We get to revisit many fundamental topics from our core

PS-I is an exposure oriented course: PS-I exposes you to the professional world. It helps you developing soft skills, team work and develop a sense of punctuality and responsibility.

Name: Abhishek Jain (2017A1PS0793P)

Student Write-up

Short Summary of work done: I developed a software in form of an exe file in visual studio that takes input from the user to calculate the required dimensions of the distillation column and pressure drop according to selected packing.

PS-I experience: It was a good experience and the staff and mentors were friendly.

Learning outcome: We learned about various calculations required in a distillation column, VLE in a reactive distillation, c# coding for windows form app.

PS-I is an exposure oriented course: PS-I gave an extremely good exposure to unvisited professional life. We learned many soft skills as well as technical skills.

Name: Isha Bhorkar (2017A1PS0034P)

Student Write-up

Short Summary of work done: My project required the use of a machine learning workbench to build classifier models. Breast cancer patient data was used to train and test these models. Clinical data was first employed to predict gene mutation status and then the mutated genes data was used to predict therapeutic drugs that were likely to be effective. For this last step, gene-drug interaction data processed by another open source was taken as a reference. The data analytics tools used were simple and did not require extensive programming knowledge. Similarly, knowledge of breast cancer biology was helpful but not necessary.

PS-I experience: NCL provides good exposure to work routines in a research organization. However, wet lab work is not to be expected. The scientists tried to accommodate our preferences while allotting projects but there are no dedicated intern projects. The work timings are flexible and other research staff is helpful. Since, the duration of the internship was very short, the guide was not very interested in telling me what to do and I ended up working on whatever I could figure out on my own.

Learning outcome: The project combined machine learning and biology in an interesting manner. I learned the basics of computational biology, working with biological data and the use of machine learning tools. Exposure to a research lab also acquainted me with the work routine of scientists and research organizations.

PS-I is an exposure oriented course: My PS-I station provided a good exposure to work in a research laboratory. We were allowed to attend meetings in which the scientists discussed project status with doctoral researchers. PS-I is majorly exposure-oriented and it is best to remember this while choosing a station.

Name: Swastik Chandra (2017A10754G)

Student Write-up

Short Summary of work done: I worked in CEPD division of NCL. My project was on data analysis and developing regression model using Artificial Neural Networks.

PS-I experience: Good.

Learning outcome: Learned the procedure and techniques of data analysis and various regression models. The PS-I offered an exposure to the working of a research institution and gave me chance to experience the work culture in NCL. The data analysis include data collection, pre-processing and other selection techniques that are necessary for the in the field of research.

PS-I is an exposure oriented course: Yes, it gave an incomparable exposure to the working of research laboratories and practical application of our learning and needs of the industries and science in the field of chemical engineering.

PS-I station: National Institute of Oceanography (NIO), Goa

Student

Name: Aabhas Asawa (2017A1PS0829P)

Student Write-up

Short Summary of work done: I was asked to work on the battery management system for an underwater coral reef monitoring robot being developed at NIO. I was also asked to work on the various chemical sensors to be used in the robot and some measures to prevent antifouling.

PS-I experience: I would recommend this station for anyone who wants to get interesting projects and learn. One can actually see the applications of whatever one has studied in various projects. There are many scientists working at NIO and one can learn a lot from them. My mentor was very chill and allowed me to work at my own pace. NIO is at a better location than other PS-I stations at Goa (although it's a bit far from the Goa campus).

Learning outcome: I have learnt a lot about batteries which could be and have been used in underwater vehicles. I also learnt about different AUVs and how their chemical sensors work and record information.

PS-I is an exposure oriented course: I agree to this statement as I've mentioned before that one can actually see the courses studied in college being applied. It provides a better understanding of the subject and one can work with scientists who have a lot of knowledge and learn from them.

Name: Prateek Mahajan (2017A3PS0317P)

Student Write-up

Short Summary of work done: My PS-I project was in the field of acoustics. I had designed and built a multi-channel data logger to log pressure variations in a water tank. Further, I processed the above data to identify fish signals within it and analyse the effects of the external environment on the water body within which the data was acquired.

PS-I experience: It was an enriching experience. I worked in the field of passive acoustics and enjoyed working on the project I was allotted. Further, Goa as a location is a wonderful place to spend your PS in. Hence, i would definitely recommend NIO as a PS-I station to my juniors, particularly those in EEE.

Learning outcome: Signal Processing.

PS-I is an exposure oriented course: Yes, it is, if you take the correct PS-I station. Make sure you take a PS-I which is aligned to your interests.

PS-I station: National Metallurgical Laboratory (NML), Chennai

Student

Name: Anshuli Sarjekar (2017B2A11030P)

Student Write-up

Short Summary of work done: The area in which we worked were extraction and purification of graphite ore by froth flotation process, flotation reagents and modifications to enhance mineral recovery and characterization studies of ores and minerals.

PS-I experience: My PS-I experience was good and memorable one. Explored few hill stations, famous temples, beaches, food and culture of South India. Learnt a lot my PS-I and enjoyed my stay at PS-I.

Learning outcome: During the two months of PS-I I got the opportunity to learn about following:

1.Work culture in research lab.
2.Collection, organization of literature and searching for research gaps in work already done.
3.Know about publishing paper and writing a research or review paper.
4.Practical knowledge of froth flotation on laboratory scale.
5.Improved speaking and presentation skills.

PS-I is an exposure oriented course: Yes, definitely it provides great exposure to students of research and corporate world.

Name: Sarmishta Madabusi Thodur (2017B2A11401H)

Student Write-up

Short Summary of work done: Designing of experiments using software. Extraction of Sesame and Eucalyptus oil which was used in the froth flotation of graphite ore. Optimizing the results obtained using software.

PS-I experience: It was a nice learning experience. We got to do a lot of practical work in the form of the experiments. Our mentor and the people who worked in the lab were very helpful and nice.

Learning outcome: We learned how to design your own experiment and optimize it. We also learnt practical application of what we learn in our courses. We got an experience of working in a lab performing research.

PS-I is an exposure oriented course: I agree with the statement. We definitely received exposure regarding the application of our courses.

Name: Hrishikesh Chandrayan (2017A1PS0665P)

Student Write-up

Short Summary of work done: We researched on alternative reagents for graphite froth flotation as existing reagent (diesel) is a fossil and is relatively costlier. We used design of experiments to design the experiments first. And then, we performed them.

PS-I experience: We learnt a lot from the organisation both in terms of work culture and research. The initial few days in the city were though filled of struggle.

Learning outcome: We learnt design of experiments and different instruments and methods used in purification of graphite and related studies.

PS-I is an exposure oriented course: This understates my PS-I experience. Our project was not restricted to exposure. The output we got from our research can even lead to a industrial revolution. Also, we are now heading towards publishing a research paper and a review paper with the help of our PS-I mentor.

Name: Oruganti Lakshmi Dheeraj (2017A1PS0901H)

Student Write-up

Short Summary of work done: We have extracted oil from gingelly cake which was later used as a collector in the process of flotation of graphite. In flotation, graphite was extracted in a Denvar flotation cell using the extracted oil as collector and some other reagents such as depprasents, frothers. After extraction of graphite, it was then used for ash analysis along with proximate analysis of raw graphite.

PS-I experience: It was a good experience. I personally felt as if I am an employee working there. Maintaining a good rapport with peers as well as the employees was important. I even got to know about time management to a better extent since my Pg hostel was a bit far from my station.

Learning outcome: I learned about how to perform experiments effectively and precautions to be taken carefully.

PS-I is an exposure oriented course: Yes, but it depends upon the person. Interacting effectively with the faculty and employees working there are the key components I suppose in order to get better exposure.

Name: Nikita Gohel (2017A1PS1062H)

Student Write-up

Short Summary of work done: We extracted leftover oil from sesame cakes via a Soxhlet extraction method. We used design principles to select parameters and test runs for all our experiments. We then used the extracted oil as a replacement for diesel as a collector in the froth flotation of graphite. Characterization techniques were applied on the feed and the concentrate, as well as various types of analysis. (proximate, dry sieve, wet sieve)

PS-I experience: We had a very helpful mentor, as well as the people who work in the lab were always willing to let us observe what they were doing. They were very helpful throughout every stage of our project and so it was easy to learn a lot. We had a definite project and we split it amongst the five of us and handled it step wise. Things were quite organized and our mentor checked in on our progress regularly. It was a good learning experience since we had access to a lot of work and research methods and we were involved directly in every step of our project.

Learning outcome: I learnt how to use a few new softwares - Minitab and Statistica, which we used to design our extraction and flotation experiments. I also learnt how some basic mineral processing techniques are carried out including froth flotation, ash analysis, acid tests etc.

PS-I is an exposure oriented course: I agree. Atleast in our lab, even the activities that were not a part of our project were open to us to observe, assist and learn from. All facilities and material that the lab and our mentor had to offer were available. We were able to get a decent idea of what the lab does in general too, because we could see it happening. There weren't any restrictions at all.

PS-I station: National Council for Cement and Building Materials (NCCBM), Ballabgarh

Student

Name: Rishabh SIngh (2017B4A81602H)

Student Write-up

Short Summary of work done: I was allotted two projects during my PS-I. The first was, IOT based electricity meter. In this project, I made a small sensor, coupled with a micro-controller that can measure the current (ampere) input of a room/device, in a non-evasive, user friendly, wireless manner. This helped the institute figure out potential repairs/replacement (especially AC's) which will help them save on electricity bill. Second project was to develop a website for the company's international seminar. This will help all the delegates attending the seminar know more about it.

PS-I experience: The experience was good. Better than what was initially expected of a cement based institute. I got to learn a lot of new things and how government facilities work.

Learning outcome: I got to learn how government PSU's work. Also, in the technical domain, I got to learn about IOT and website development in real life application, on a large scale.

PS-I is an exposure oriented course: I agree with this statement. However, student must make the best of what is given. They have to try and get projects of their interest, even if something different is allotted initially.

Name: Manish Kumar (2017AAPS1409H)

Student Write-up

Short Summary of work done: We were a team of three. We were appointed to the CQC department of the PS-I station. We worked on the project "EVALUATION OF THERMAL STABILITY AND UNIFORMITY OF A LIQUID TEMPERATURE BATH ". We had to vigorously study the concepts related to calibration and uncertainity evaluations. Then, we had to callibrate the liquid temperature bath present there with the help of Platinum Resistance Thermometer. We also used to callibrate instruments brought by other departments to the CQC lab.

PS-I experience: It was good.

Learning outcome: I learnt about the various aspects related to calibration and how calibration of instruments influence any hardware industry.

PS-I is an exposure oriented course: Yes,"PS-I is an exposure oriented course". We got to work with the people who had great experience and expertise in their domain. In all, it is good for our overall development.

Name: Shreyansh Jain (2017B4A20683P)

Student Write-up

Short Summary of work done: Analysis of porosity of cement and other cementitious materials. Used Mercury Intrusion Porosimeter. Data collection of various samples from MIP .

PS-I experience: The working environment at NCCBM was very good. Got to meet experts and scientists involved in industry.

Learning outcome: Learned about porosity, Mercury Porosimeter, particle size, cement industry.

PS-I is an exposure oriented course: Got to learn about the working of a well developed industry.

Name: Raghav Seth (2017A3PS0372P)

Student Write-up

Short Summary of work done: My project was to generate a Third Party Quality Assurance (TPQA) report and to look at how it's done. I was given an on-site project where i had to visit various sites in Delhi-NCR. I got to see real Transformers, Sub-stations, HVACs, HT Motors, etc. O travelled a lot, had a great time with the core TPQA Electrical team, got to learn about Power Systems and a few other tricks.

PS-I experience: It was an amazing experience overall since i interacted with people, improved my communication skills, learnt and practised many technical aspects of electrical.

Learning outcome: Learnt about wiring , selection of a suitable transformers, 3 phase power calculations, etc. Also saw big transformers and motors. Got to learn about TPQA and how inspection is done.

PS-I is an exposure oriented course: In my case, this actually sums up my project. What i actually got was an exposure to the real world problems and how different reading from books is.

Name: Gurkirat Kaur Arneja (2017A1PS1026H)

Student Write-up

Short Summary of work done: My work was to do a heat balance on a cement kiln and the assessment of waste heat recovery potential.

PS-I experience: PS-I was a refreshingly new experience which helped me set my expectations for any upcoming job opportunities.

Learning outcome: PS-I helped me out my theoretical knowledge to a practical use.

PS-I is an exposure oriented course: PS-I exposes us to a new world. Industries, research centres.

Name: Hardik Ahuja (2017A8PS0661G)

Student Write-up

Short Summary of work done: I worked to evaluate the uncertainty from uniformity and stability of a liquid temperature bath. It consisted of an extensive literature survey through multiple scientific journals and research papers (Mapan and NPL paper). Readings were taken by high precision thermometer, Isotech milliK. And the temperature bath was Isotech Orion 796. We calculated deviation from normal at multiple temperatures.

PS-I experience: It was very educational.

Learning outcome: Scientific methodology and temperature specifics

PS-I is an exposure oriented course: Yes. definitely.

Name: Shantanu Singh (2017B4A10755P)

Student Write-up

Short Summary of work done: My project title was "Co-processing of Refuse-derived Fuel(RDF) in a cement plant in India".So before my work on MSW and RDF, I had to get a proper understanding of the whole cement manufacturing process. I had discussions with my mentor and got my doubts resolved regarding the literature given to me on MSW and RDF (their generation, chemical composition, advantages and the challenges faced in their implementation). Review of some magazine articles on renewable energy. Background study of key chemical engineering concepts involved in the project like fuel combustion,gcv,ncv,tsr and heat transfer. My mentor asked me to search and read some content on solar thermal calciner,polluter pay principle,dioxins and furans. Impact assessment of co-processing of RDF in a cement plant in India on specific heat combustion,calciner and kiln residence time and CO2 emissions by taking a case study with my mentor.

PS-I experience: PS-I is for an exposure to how an organisation functions and how different departments collaborate together to perform a task. Apart from this, my personal experience was not so good. I am a dualite and I had no idea of Chemical engineering so, I had to take a project which didn't involve too much chemical engineering concepts and those which were required, I had to learn on my own. One of the biggest problem in learning from mentors was that they were mostly unavailable and were not able to devote their time to us either because they were busy in their work or they were on leave.

Learning outcome: I got to learn about the whole cement manufacturing process.
What are MSW and RDF?
What problems do the Indian Cement Industry faces in their implementation in cement kilns?
What are the impacts of co-processing of RDF in a cement plant on energy,process and environment?

PS-I is an exposure oriented course: I got an exposure to how an organisation functions and how different departments collaborate together to perform a task.

Name: Aman Taneja (2017A3PS1637H)

Student Write-up

Short Summary of work done: TPQA in electrical works of various sites across delhi including ITPO, Pragati Maidan, MP Flats, North Avenue, Maternity Block, AIIMS,Delhi, National Museum Institute, Noida. Noting down the NC's (Non Conformities) during the site visit and preparing a report at the end of the visit. Also, preparing a monthly report at the end of every month. The nature of work was inspection of electrical work at the various sites,taking notes and tracking the latest developements and weather the NC's (non conformities) pointed out are being complied to or not. Thus increasing the efficiency and productivity of thye various electrical machinery being installed and used at the sites. NC are created when the measurements or readings are not in accordance with the BoQ (Bill of Quantity) provided by the first party (the organisation which gives the contract to a contractor for electrical works). NC's are also created when the reading or measurements are not in accordance with government manuals such as the CPWD manual and the SIB. The Project revolved around the procedure of TPQA (Third Party Quality Assurance) which includes inspection of various electrical works at sites. It generally involves measurement of values such as resistances and voltages like in the earth resistance test. This might require devices like ground clamp meter,voltmeter or instruments like inch tape,vernier calliper or just counting the number of wires or conduits. The non-conformities are then noted down and given a unique number and presented in a daily / monthly report.

PS-I experience: PS-I experience was definitely a memorable one, I learnt a lot,knowledge that will be put to use in the remaining years of my engineering and further. This was my first experience in a corporate setup and i had the opportunity to go to various construction sites varying n sizes across Delhi NCR and do electrical TPQA.

Learning outcome: I learnt about various electrical devices such as DG sets, LT Panels, HVAC's, Cable Trunk Management Systems, AHU's, Chillers, Cable trays, cables, junction points etc. Their working, installation and how to do a comprehensive TPQA for them. How to overcome any NC, thus the correctrive measure for them. I also learnt how to compile reports. Lastly, i had to prepare the PS report where i could use my report making skills. Giving presentation also shot up my confidence levels and put my public speaking skills to test.

PS-I is an exposure oriented course: Yes, PS-I is definitely an expousure oriented course. Firstly,it provides expousure to the corporate world, how things work, reports and presentations. For me it meant a lot more than that, I learnt about TPQA and could go to various sites and actually make a difference because of the immense expousure.

Name: Rishi Raj Verma (2017B1A11758H)

Student Write-up

Short Summary of work done: NCCBM had conducted an independent lab oriented-study in 2012 about Carbon Dioxide sequestration using Algae. Taking it forward, I had to find more optimized ways in which it can become more feasible and practical at pilot scale from the available literature and research articles of last 1-2 decades.It included extensive study of various research articles to find out most suitable method and algal strain in terms of productivity, scalability, ease of operation etc. Based on above finding, my work also included basic calculations to be done for designing photo-bioreactors and some suggestions which can be done to bring it to practice at pilot or industrial scale.

PS-I experience: It was great. I was alloted to CME Dept .My mentor was super friendly and helpful. He constantly supported me and gave significant inputs regarding my project despite his busy schedule. All other employees were equally helpful. They let you work at your own pace.

Learning outcome: Exposure to working of a Research Institute & Cement Industries, Carbon emissions and steps taken worldwide in reducing it, Biochemistry of Algae, Designing Photobioreactors.

PS-I is an exposure oriented course: True. It provides the necessary exposure required for the industry by giving you the opportunity to work in real industries,meet professionals etc. It broadens the thinking process beyond classrooms.

Name: Nayan Dhar (2017B2A20988P)

Student Write-up

Short Summary of work done: A literature review on cement hydration and its interaction with industrial by-products was done for couple of weeks, followed by an introductory literature survey was done on X-ray diffraction and Scanning Electron Microscopy and their invaluable usage to cement industry. In the second part of the project, the durability performance of concrete made with fly ash was done which was done by a literature survey and going to the labs and understanding the functioning and principle of each every test and how it affected the durability of the concrete when fly ash was added to it.

PS-I experience: The PS-I experience at NCCBM, Ballabgarh was an invaluable one. The PS-I station was highly supportive of us and helped us at every step whenever we felt that there was a need. The staff and the supervisor allotted to me were easy-going and made me think that this wasn't a project but a new fun learning experience for which I thank them from the bottom of my heart. The duration of work was very flexible and we could resources whenever we wanted and in a good, calm environment which made the project work even much more easier. In totality the PS-I experience was a great one.

Learning outcome: First and foremost I learned about the working of an organisation and how each and every department is necessary for the proper functioning of the organisation. Secondly, I learnt about numerous other things which were related to the academics like hydration of cement which was my topic in the first half and I was also given a work on XRD and SEM which was related to my previously done course of Nanochemistry and also learnt about their uses in the cement industry. Lastly, I was able to learn about the durability of concrete and how it is affected when fly ash is added to it.

PS-I is an exposure oriented course: PS-I is definitely an exposure oriented course which was an invaluable experience provided to us by the institute. I also agree because in the college we are just given the theoretical knowledge and some practical knowledge but we aren't mainly taught that how could we apply it in the real world or what is used in the industry for. For that hands-on experience which was given to us by the PS-I station was definitely invaluable and also gave us a brief insight of the real world functions.

Name: Dhananjay (2017B4A81692H)

Student Write-up

Short Summary of work done: I was given two projects. First one was to make a IOT based online energy electricity meter that was needed to capture the power consumption going on in the organization. And second one was to develop a website for the seminar going to held on 3rd December. There was a need of website for the authors, delegates, exhibitors to get the information about the event.

PS-I experience: It was great experience according to work given.

Learning outcome: It got to learn new development langyages like HTML, CSS, JavaScript, etc.

PS-I is an exposure oriented course: Yes.

Name: Kunal Raj Vats (2017A1PS0795P)

Student Write-up

Short Summary of work done: In my PS-I at NCCBM-B, I worked on the topic ,"Characteristics of Alternative Fuels and it's impact on the cement process" and it mainly involved research but I also got to do some lab work like testing of alternate fuels. So, I began my project by studying the cement manufacturing process and including the important points in my report then I looked for the processes which involved the utilization of fuels and how alternate fuels can be used there instead of coal. Next I did the literature survey of different types of alternative fuels and found out their characteristics that affected the system design. After that I did the lab testing of some of the alternative fuels and found out which of them are fit to be used as fuels. Then I compared the current alternative fuel utilization in India with the rest of the world and figured out the reasons why India is behind the European countries (which are currently the best at using alternative fuels in cement industry). So, the next step was to find ways to enhance the TSR value in India so that we can be at par with the rest of the world. Last step was to list down the impact of these alternative fuels on the system design.

PS-I experience: I had a really good experience during my PS-I at NCCBM. It was really interesting and fun to work there and understand how the things work in the practical world. I liked the working environment there very much , everyone was very helpful and encouraging. I am also very thankful to my mentor as he helped me learn a lot of things and also constantly motivated me to achieve and learn more. Overall I had a great experience.

Learning outcome: I got to know about the Indian cement industry and understood the working of the cement manufacturing process and alternative fuels utilization. I gained industrial as well as theoritical knowledge and it helped me to get a clearer view of Indian cement industry.

PS-I is an exposure oriented course: The above statement is absolutely correct and self explanatory. PS-I is meant to be an exposure oriented course so that the students can get a practical idea of how things work in the real world and thus it helps them prepare for working in their respective sectors in the future.

Name: Rishabh Aneja (2017A2PS1029P)

Student Write-up

Short Summary of work done: My First project was on 3D Concrete Printing for which I read a lot of research papers and a complete journal on digital concrete and made a literature survey for the organisation and also we tried out 3D concrete Printing Practically using a funnel, piston and rail and we were able to achieve the buildability upto 5 layers.
My Second Project was on Reutilization of C&D Wastes in which we checked the impact of increase the use of % of C&D Wastes from 25%(i.e. specified in the IS 383) to 40% by calculating different properties like Compressive Strength, Flexural Strength, Wear etc.

PS-I experience: On the whole, My PS-I experience was good and was able to learn a lot about the industry working and was also very much satisfied as I got to be a part of R&D projects of the government.

Learning outcome: I learned a lot of the new technology of 3D Concrete Printing and was also able to learn about C&D wastes and there current use scenario also I visited different labs(like NDT Lab, MPI Lab) and was able to learn a of the daily practices of the organisation.

PS-I is an exposure oriented course: Yes, I totally agree with the above statement as on my part I got a lot of exposure to the industry working procedures and liked the practical way of learning very much.

Name: Ashwin Manoj (2017B1AA1457H)

Student Write-up

Short Summary of work done: We had to develop a new method to determine the concentration of iron in blood serum. To do that first we had to make a list of procedures. The chemicals were provided by our madam at NCCCM. We conducted various optimization experiments to determine the optimum volume of each substance

to be added and also to find out the minimum concentration of blood that can be used for the measurement.

PS-I experience: It was a good exposure. Got to use the instruments I had seen in the labs.

Learning outcome: Got to know the workings of a government lab and also met different scientists.

PS-I is an exposure oriented course: Its very apt. PS-I gave me the opportunity to work in a very good government lab with instruments that I had only once used as a part of my lab course. Also, the knowledge I gained through developing a new method gave me a lot of exposure.

Name: Sharvari Garge (2017B2A10608P)

Student Write-up

Short Summary of work done: NCCCM is an analytical chemistry department of BARC, Mumbai. It has numerous instruments to measure concentration of elements in different samples. I worked on the project titled "Determination of Iron concentration in Serum using single drop extraction". A method was developed and optimisation of reagents was done.

PS-I experience: I enjoyed the work I was allotted at my PS-I station. The mentor was also very helpful and she explained her own experience. I also assisted her in her other works of research, interestingly they were going for Indian patent.

Learning outcome: I got a wholesome idea about working in a public sector. How life of a researcher in Government Research Lab would be like. It helped also me in choosing my career options.

PS-I is an exposure oriented course: It gives enough exposure to work life. It helps in making an individual independent and boosts his / her confidence. It also teaches how to maintain work-life balance.

PS-I station: National Centre for Compositional Characterization of Materials (NCCCM), Hyderabad

Student

Name: Shashank Gupta (2017B5AA1093H)

Student Write-up

Short Summary of work done: Working on the simulations of time of flight mass spectrometer and learning about the functions and uses of all the equipment like vacuum pumps, lasers, detectors etc. that are used in the time of flight mass spectrometer also worked on finding out the relative abundance of rubidium isotopes using the resonance ionisation mass spectrometer using SIMION 8.0 software to simulate the ion flow in a time of flight mass spectrometer and changing the voltages of the reflectron and potential grids to get a perfect flow of ions and then using the same values of distances and voltages to find the relative abundance of Rb isotopes using a 7KHz pulsed laser.

PS-I experience: I had a very good experience working with my mentor at NCCCM, I had a very good opportunity to gain knowledge from them.

Learning outcome: If we are given any random material then to find the constituent elements in it we can use resonance ionisation mass spectrometer using a pulsed laser.

PS-I is an exposure oriented course: Yes, we get a very good exposure to the work that are done in the industries.

Name: Sachin Nair (2017B5A40758P)

Student Write-up

Short Summary of work done: Our project was about Deposition and Characterization of thin films and we worked in the Surface and Profile Measurement Lab of NCCCM.. Thin films are widely used in every aspect of our lives, from optical lenses to electrical appliances. So it is essential to verify the characteristics of a thin film before being used for a specific purpose. Our objective was to prepare Lithium Fluoride and Aluminium

Fluoride thin films and analyse its surface profile. We first deposited Lithium Fluoride and Aluminium Fluoride thin films on Silicon and Glass substrates respectively using Resistive Thermal Physical Deposition Technique. Then we conducted Particle-Induced Gamma(γ) Emission (PIGE) analysis to identify the constituents of LiF thin film. After that we used Rutherford-Backscattering Spectroscopy (RBS) to determine the depth and elemental composition of LiF thin film. Later Scanning Electron Microscope (SEM) was used to create an image of the surface topography of AlF3 thin film and Energy Dispersive X-ray Spectroscopy (EDS) was used to prove the existence of Al and F in AlF3 thin film.

PS-I experience: It was a great experience for me overall. I was grateful to see many sophisticated instruments like 3MV Tandem Particle Accelerator and Scanning Electron Microscope (SEM). It was a great experience working with highly qualified scientists who were very helpful and kind to us.

Learning outcome: I gained a lot of knowledge about NCCCM and its functioning.

PS-I is an exposure oriented course: Well in my case I had an exposure with various sophisticated equipments and many scientists. So for me it was an exposure oriented course.

Name: Gattem Sai Govind (2017B5A41636H)

Student Write-up

Short Summary of work done: Our project was simulating a time of flight experiment in a reflectron time of flight mass spectrometer using SIMION 8.0 software. We designed the various elements of the spectrometer, applied potentials and recorded ion trajectories. The aim of the experiment was to achieve maximum transmission of ions and optimizing the parameters of the equipment accordingly . We spent a considerable amount of time in learning the necessary concepts such as mass spectrometry, vacuum technology and laser fundamentals. We got to see the working of high powered Nd:YAG lasers being used for resonance ionization mass spectrometry experiments on Rubidium isotopes at the laboratory.

PS-I experience: It was an enriching experience where we got to witness the application of many concepts learnt in the classroom and understand the complexities and engineering challenges involved in designing scientific instruments and carrying out experiments.

Learning outcome: I got to learn the fundamentals of mass spectrometry, vacuum and lasers. I also got to witness the working of a government research laboratory.

PS-I is an exposure oriented course: The statement is absolutely true as the students get to work in a industry/laboratory and interact with scientists and engineers who work daily in the environment and have a first hand understanding of the challenges involved.

Name: I. Satya Kamala (2017B5A31408H)

Student Write-up

Short Summary of work done: NCCCM is set up by department of atomic energy, BARC. It caters to the increasing need of analytical services. I belong to physics background, so I was allotted laser analytical spectroscopy section. This lab is used in finding the isotope ratios in a gas, separating the required component (isotope or trace element), characterising elements required for cancer cure. As we were new to the equipment, we were only shown basic experiments using lasers and optics. We performed double and single photon spectroscopy experiments with small variations i.e., 2-photon experiments using forward and retro reflected beam, 2 separate beams, two beams with same and different frequencies.

PS-I experience: The lab demands high expertise. We didn't have any knowledge of it and we haven't finished any course yet. It was very hard for us to understand basics also. We got an idea about a wholly different field of physics.

Learning outcome: It was all about learning new concepts. We were asked to align the optics and rest were done by our mentor. We had to go through required relevant text.

PS-I is an exposure oriented course: It gave us an office-going experience. You would learn how to manage time, health and work simultaneously.

Name: Riju Kushwaha (2017B5A80940P)

Student Write-up

Short Summary of work done: Work done included,
Familiarisation with working principles and operation of SEM, EDS, physical Vapour deposition, Tandem Accelerator, RBS and PIGE. We deposited LiF and AlF3 thin films, identified the elements in deposited film using PIGE and RBS, determined stoichiometry using RBS, EDS and thickness using RBS. Lectures were also given by mentor for the above apart from some reading material.

PS-I experience: The support lend to us in terms of mentorship was admirable. It was a motivation to work with scientists, learn about their work.

Learning outcome: Characterization techniques and the importance of thin films.

PS-I is an exposure oriented course: The experiments were hand-on. A lot of interaction was involved with scientists.

Name: Annyun Das (2017B5A40685P)

Student Write-up

Short Summary of work done: Deposited thin film of Lithium Fluoride over Silicon and Quartz substrates after cleaning ultrasonically. After that, we analysed the film using Particle Induced Gamma Rays Emission and Rutherford Backscattering Spectrometry to find its thickness and stoichiometry.

PS-I experience: Amazing workplace and helpful and supportive mentor.

Learning outcome: Uses of thin films.

PS-I is an exposure oriented course: True.

PS-I station: North Eastern Space Applications Centre (NESAC), Umiam

Student

Name: Chetan Khanna (2017B4A70591G)

Student Write-up

Short Summary of work done: Software development and ML notebook implementation.

PS-I experience: Educative and remembering.

Learning outcome: Practical implementation of softwares.

PS-I is an exposure oriented course: Yes.

Name: Nrupesh Surya U (2017B2A70767G)

Student Write-up

Short Summary of work done: Software development for usage by scientists.

PS-I experience: Very good learning experience with new people in a new environment.

Learning outcome: Software development and working in an office environment.

PS-I is an exposure oriented course: Strongly agree.

Name: Vanshika Kapoor (2017B5A70624G)

Student Write-up

Short Summary of work done: Interpretation of cloud cover over India in the future with previous data given using Neural Networks.

PS-I experience: Got to visit several places whole still being able to do enough work. learnt how to balance things out.

Learning outcome: learnt something about Machine Learning.

PS-I is an exposure oriented course: I agree. Did give a flavour of practical applications of computer science.

Name: Garvit Soni (2017B3A70458H)

Student Write-up

Short Summary of work done: Software development and ML Notebook implementation.

PS-I experience: Educative and remembering.

Learning outcome: Practical implementation of software.

PS-I is an exposure oriented course: Yes, it is exposure oriented, we get to meet new people, learn to work in new environment.

Name: Aditya Dhoot (2017A7PS0101G)

Student Write-up

Short Summary of work done: The purpose of the study was to develop an efficient system, in which UAV Big Data of various forms and from various sources can be ingested in a systematic manner. This highly efficient and greatly fault-tolerant structure of storing these huge amounts of data can be queried depending on the ingested data to obtain the required information with great speed and accuracy.

This project was completed using the Spark ecosystem, with the help of a few other tools. We used GeoTrellis library of Scala for RDD Tiling and Catalog generation. The front-end of the system is built using React, Redux and Leaflet. The project aims to provide an efficient system for ingestion and retrieval of Big Data, which can be scaled both vertically and horizontally.

PS-I experience: It was a very good experience overall.

Learning outcome: Learnt about Big Data tools, communication skills and UAV Data.

PS-I is an exposure oriented course: True.

Name: Ira Indranil Bhosale (2017B4A71525H)

Student Write-up

Short Summary of work done: We worked on a model that will predict cloud cover based on Satellite Data (INSAT 3D). The model was formulated using Neural Networks (Convolutional LSTM to be specific). We successfully trained our model to obtain an average accuracy of 64%.

PS-I experience: It was an amazing experience. I got to learn a lot of new things; technical as well as non-technical. The location of the PS-I is also very beautiful.

Learning outcome: I got to learn a lot about the organization and various essential skills like team work. The project I worked upon was a bit new for me and the mentors were very helpful.

PS-I is an exposure oriented course: I'd agree to this. We got an excellent exposure. Not only exposure oriented but the projects assigned to the students were also interesting.

Name: Avil Aneja (2017A7PS0968G)

Student Write-up

Short Summary of work done: Our project title was "Video Classification on UAV data using deep learning techniques". With the help of documentation present on net we tried to implement firstly hand gesture recognition and then moved to classifying UAV videos.

PS-I experience: It was overall very good experience. It gave me an opportunity to explore some topics which would not be there as compulsory course in BITS.

Learning outcome: I learned various deep learning techniques to classify videos. Also got familiar with pyhton language and got an opportunity to explore jupyter notebooks.

PS-I is an exposure oriented course: With such practical projects it provides a total exposure for students like us who just have bookish knowledge.

Name: Soneji Visarg Balkrishna (2017A7PS0029G)

Student Write-up

Short Summary of work done: There are many sources that predict exponential data growth toward 2020 and beyond. Yet they are all in broad agreement that the size of the digital universe will double every two years at least, a 50-fold growth from 2010 to 2020. Human- and machine-generated data is experiencing an overall 10x faster growth rate than traditional business data, and machine data is increasing even more rapidly at 50x the growth rate. The purpose of this study is to develop an efficient system, in which UAV Big Data of various forms and from various sources can be ingested in a systematic manner. This highly efficient and greatly fault-tolerant structure of storing these huge amounts of data can be queried depending on the ingested data to obtain the required information with great speed and accuracy. This project was completed using the Spark ecosystem, with the help of a few other tools. We used GeoTrellis library of Scala for RDD Tiling and Catalog generation. The front-end of the system is built using React, Redux and Leaflet. The project aims to provide an efficient system for ingestion and retrieval of Big Data, which can be scaled both vertically and horizontally.

PS-I experience: My PS-I experience is extremely fun learning and beneficial for my future studies.

Learning outcome: Most importantly I got chance to be familiarise with computer science trending topic which is Big-Data and got to work under talented scientists at NESAC.

PS-I is an exposure oriented course: The title is very appropriate that PS-I is an exposure oriented course. We really got to work with what the real world wants and its very beneficial for our future studies or work in MNCs.

Name: Samanvay Lamba (2017A7PS0022P)

Student Write-up

Short Summary of work done: Autonomous UAV using Deep Reinforcement Learning. It required the application of Deep Learning and Robotics.

PS-I experience: It was the right balance of fun, learning and work. Really enjoyable an engaging experience.

Learning outcome: I learned a lot about robotics and Deep learning. In addition to that, I learned about the functioning and hierarchy of a Government research organisation.

PS-I is an exposure oriented course: The statement is very true, as PS-I lays most of its emphasis on exposure.

Name: Shreyash Chaudhari (2017A7PS0941G)

Student Write-up

Short Summary of work done: Designed a web-based platform for analysis of geospatial satellite data through machine learning / math based scripts.

PS-I experience: PS-I was a good experience in terms of exposure to various different platforms and frameworks in computer science. A practical application of these learnings was helpful to our understanding and the obstacles faced during development throughout the process requires a good understanding of certain languages and efficiency of code. Besides project work, staying in Umiam was an adventurous experience.

Learning outcome: Full stack software and web development, ML/DL applications for satellite imagery.

PS-I is an exposure oriented course: This statement is especially true for a station like Umiam where the focus on science and research allows students to work on and see things they normally wouldn't.

Name: Raunak Mantri (2017B5A71340H)

Student Write-up

Short Summary of work done: Clouds play a very important role in weather forecasts since they are key factors that determine heavy rainfall and thunderstorm. Our work at ps involved creating a model for predicting cloud position and shape using machine learning, given a time series sequence of satellite images (INSAT 3D) of clouds. The code was writtrn in Python 3.6. A structural model was created to compare the predicted output with the ground truth.

PS-I experience: It was a very nice experience. I got an opportunity to interact with various members of the organization which helped me learn various real life applications that the organization was working on.

Learning outcome: I learnt about neural networks, got to know about various python libraries related to machine learning and how Kalman Filters can be used for prediction.

PS-I is an exposure oriented course: Yes, PS-I is an exposure oriented course since the projects give are more related to real life situations which helps a student relate the college curriculum with practical application. Also, it helps student get corporate exposure which helps in development of his / her cognitive skills.

Name: Srisreyas S (2017A7PS0065G)

Student Write-up

Short Summary of work done: At NESAC Umiam, I worked on deep reinforcement learning for the navigation of autonomous UAVs. After an initial exploration of reinforcement learning, deep Q-networks, PyTorch and Microsoft's AirSim simulator, our team simulated a UAV controlled by a simple reward function on Microsoft Airsim. After this stage, we moved on to designing software for a physical UAV. The main flight controller was a Pixhawk running the PX4 flight stack with a Raspberry Pi as a companion computer. We used the Monodepth deep neural network to convert RGB camera input to a depth map for obstacle avoidance. Robot Operating System (ROS) was used on board the Raspberry Pi to interface the python scripts with the hardware and provide low level hardware control, sending instructions in the form of MAVLink messages to the flight controller via MAVROS to give the UAV autonomy and reduce its dependence on the ground control station.

PS-I experience: During PS-I, I had the opportunity to gain hands-on experience in a relatively new area of research and use the industry-standard technology associated with it. I also had the opportunity to interact with some of the country's top scientists and engineers. The working hours also provided the ideal work-life balance.

Learning outcome: I learnt deep reinforcement learning, training of RL algorithms for autonomous vehicles on simulators, ROS, PX4 and the Dronecode open source platform while also working to improve my presentation and public speaking skills.

PS-I is an exposure oriented course: This statement is accurate in my case as I had the chance to interact with some of the country's top scientists and work on cutting-edge research areas with them.

Name: Vaibhav Mittal (2017A7PS0947G)

Student Write-up

Short Summary of work done: We built a deep learning model to identify human actions from UAV videos.

PS-I experience: This PS-I gave me a lot of opportunities to learn new things and new concepts.

Learning outcome: I learnt about deep learning and building different deep learning architectures .

PS-I is an exposure oriented course: Yes, it exposes you to the working environment of today's world and teaches you to interact with your seniors.

Name: Vaibhav Chaudhari (2017B5A70834G)

Student Write-up

Short Summary of work done: We have created an online website for analysing the Earth Observation Data using the Open Datacube. The website directly takes the Satellite Data from Datacube using which its efficiency is greater than simply ingesting the data. We have also made the website highly customisable. User can use different satellite data for a same place so as to get a more accurate information by comparing the data. We have given some pre-existing algorithms like NDVI, NDWI, NDBI, Cloud Mosaic etc which can be easily run on the data. User can even add their own algorithms to be implemented on the data. We have also created a Machine Learning Notebooks in which we have classified the land on the basis of land cover using the Random Forest Classifier using the various Geo-Spatial Libraries.
Our project will be used by the organisation to further develop more Algorithms so that they may be able to get useful results from the satellite data which can be further used for Flood Prediction, Land Cover Classification, Mapping the network of Highways across a particular region. Our project will act as a platform on which scientists can directly implement simple algorithms on a region and can get the meaningful result which will be used in future for their research.

PS-I experience: Our PS-I was excellent. The projects given to us were very interesting and educative. The accomodation provided to us was probably one of the best accomodations provided including all the PS-I stations. The food and lodging expenditure was less as compared to all the PS-I. The mentors alloted to us were very helpful.

Learning outcome: We have learned how to make a complete website and have also learned Machine Learning.

PS-I is an exposure oriented course: Yes, this is true as we now know how the things function in an office and we have definitely gained exposure to the outside world. Working in office like environment has made us learn the working ethic and punctuality.

Name: Avil Aneja (2017A7PS0968G)

Student Write-up

Short Summary of work done: Video classification on UAV data using deep learning techniques. We started with hand gesture recognition and extended this model on UAV data.

PS-I experience: It was a great learning outcome. We learned to apply theoretical knowledge to real life applications.

Learning outcome: We learned some basic deep learning techniques. Also learnt python and automation of excel using python. Object detection was also an interesting topic that we look at.

PS-I is an exposure oriented course: It exposes to real life applications and make students think for the solution of real life difficulties.

Name: Sivaramakrishnan KN (2017A7PS0153H)

Student Write-up

Short Summary of work done: Creating a cloud based platform for geospatial applications on earth observation data obtained from satellites using datacubes through an interactive web interface. Creating Machine Learning algorithms to run on the web platform for performing analysis. Facilitating the scalability of the platform by including a provision for the user to design.

PS-I experience: Very good educational and life experience.

Learning outcome: Learnt Django web framework along with database management using postgresql, front end design using HTML, CSS and Javascript, back end scripts such as AJAX for the development of the web platform. Learnt the use of various geoscientific python libraries such as gdal, opendatacubes and other libraries for making the applications such as sklearn, rasterio, pandas and xarray. Learnt how to perform threading by utilizing multiple processors to improve the running efficiency.

PS-I is an exposure oriented course: Highly agree.

PS-I station: Regional Remote Sensing Centre (RRSC), Jodhpur

Student

Name: Ankit Sonthalia (2017B4A70468P)

Student Write-up

Short Summary of work done: My project consisted of two parts. The first part comprised research on different Machine Learning Algorithms for identifying red gram crop from satellite imagery. The second part involved the creation of a website which will function as a Soil Information System for Arid Western India.

PS-I experience: My experience at PS-I was a fruitful one in terms of learning, exposure and growth, both personal and professional. I had a great time interacting with my PS mates and working with the accomplished scientists at RRSC.

Learning outcome: Apart from the technical skills in Machine Learning and Web Development I gained this summer, I learned how an organization the size of RRSC-West functions. I also had the opportunity to develop my communication skills through the various group discussions and presentations.

PS-I is an exposure oriented course: PS-I is definitely an exposure-oriented course, since it provides a first-hand experience at working in a real-life scenario and gives us the opportunity to apply theoretical knowledge to real-life problems.

Name: Jasdeep Mehndiratta (2017A3PS0216G)

Student Write-up

Short Summary of work done: Scientists at ISRO sometimes require environmental data directly from the fields, farms, water bodies etc. to compare with the data they collect from the satellite. Currently they have to go to the field themselves and collect the data directly. Our aim is to make a device which will make this whole process automatic saving our government a lot of money on wages. The scientists can also

focus their time at more important projects and not waste their time on such redundant jobs. We designed an Atmel328 based datalogger for the above purpose. Using Internet of Things technology, we will send the collected data by the sensors attached to the device to the desired locations. We created our own PCB Design for the micro-controller board, gave it power of data storage and LPWAN (Low Power Wide Area Network), set up and hosted an IoT server using Thingsboard to receive and process the data collected. The final device which we have created is cost-effective, compact in size, power efficient and can connect up to 17 sensors. This device fulfills the requirements that were given to us.

PS-I experience: It was a great experience working for RRSC Jodhpur. I interacted with many scientists who are doing some excellent research work and got to know a lot about remote sensing and the way it impacts our country. I got to experience work culture and discipline.

Learning outcome: I learnt about the working of RRSC Jodhpur. I learnt about work ethics, teamwork, problem solving skills, and time management. I also learnt new skills such as PCB designing, Internet of things and virtualisation.

PS-I is an exposure oriented course: PS-I helped me gain insightful experience about working in a company. It helped me not only understand office culture but also made me a part of it. I learnt the difference between textbook learning and real life application.

Name: Shikhar Tayal (2017A7PS1392H)

Student Write-up

Short Summary of work done: Our project aims at developing a mobile-based augmented reality platform to help visualize MRI data that has been collected via an MRI scan itself. The basic aim is to alleviate the mundane and tiresome task of 2-D image inspection by radiologists all over the world. Using this technology , the data can be easily visualized by the concerned physician himself/herself just by hovering and changing the position of the mobile phone over the sample. In our work we have used Augmented Reality (AR) to visualize the MRI data. Currently a controller based system is employed to generate slices and traverse through them. The movement occurs parallel to the controller movement. The intended technique also adds functionalities of changing the slice colour and that of taking the screenshot of a slice to the controller. This way a full-fledged independent setup is created using VR-based HTC Vive controllers. The future application uses a mobile-based AR platform which is capable of producing brain slices from all possible angles depending upon the distance of the

phone from the sample and its orientation w.r.t the same. The ultimate goal is to reduce human error and time complexity of this otherwise dreary process and to improve efficiency of the results.

PS-I experience: My experience of PS-I at Regional Remote Sensing Centre (RRSC-West), Jodhpur has been quite fulfilling and great. The main reason of choosing RRSC was because of the exposure one gets at a Government Research Lab. Here not only I gained technical knowledge but also, I learned about the practical aspects like how the things are done in a research Institute, how the government decides which projects to fund and how the transfer of technology takes place from RRSC to its parent body ISRO. Also, the time spent at Practice School plays a significant role in preparing one for the industry and provides one an opportunity to put their theoretical knowledge into practice.I got an opportunity to interact with and learn from scientists at ISRO who shared their knowledge and valuable experience. The constructive feedback from them as well as my mentor has helped me in developing new skills as well as refining other skills

Learning outcome: PS-I projects are essential as they push students to learn new technologies, expand their skillset and get better acquainted with industry standards and guidelines. It serves as a teaching experience in matters of professional relationships and teamwork. During my PS-I realized how important it was to interact with the right people at the right time, to enhance the workflow and improve the progress towards the assigned task. After completion of the project, I had a presentation with my mentor and other scientists of RRSC who gave their constructive feedback which servers as a boost on how one can boost their presentation skills. These aspects of learning are difficult to obtain in the college, hence I am grateful to BITS Pilani for the PS-I experience.

PS-I is an exposure oriented course: The main aim of PS-I is to provide first industrial exposure to college students. This course helps us to apply our academic knowledge in solving real world problems. Through this course students also learn how to develop their professional skills so that a student does not have to struggle in his initial years in the industry. By working in the industry one realizes the difference between academic and practical knowledge. It also helps to develop our communication and presentation skills which are of utmost importance in any industry. This course is one of the most unique features of BITS Pilani and it truly makes it stand apart from rest of the colleges.

Name: Prakhar Suryavansh (2017B4A71017H)

Student Write-up

Short Summary of work done: I, along with my 2 team members, conducted a comparison of different image classification techniques for identifying red gram crop, the second most important pulse of our country. It is more difficult to identify the pixels of red gram crop in Gujarat and Rajasthan because in these areas, crops are usually scattered, and grown by farmers in small areas as heterogeneous patches. Also, it is often mixed with other crops like ground nut, cow pea etc. The satellite images used in the study were obtained from the Landsat-8 satellite data. Subset of the data for the specific region of Bharuch, Gujarat (in the month of January) was acquired. In this study, we implemented nine different Machine Learning Algorithms and investigated the comparative performances of the classifiers. The evaluation of performance was based on overall accuracy, for the study area located in Bharuch, Gujarat. Radial Basis Function (RBF) kernel was used here for the SVM classification. Results demonstrate that SVM classification outperformed other classification methods, with an accuracy of 91.52%, whilst the Parallelepiped obtained the lowest classification accuracy of 46.12%. Further, the second and the third best performances were observed to be delivered by the Mahalanobis Classifier (87.69%) and the Neural Network (86.62%) respectively.

PS-I experience: It was a wonderful experience working at RRSC-Jodhpur. My mentor was very helpful and guided us throughout the project work. All the scientists at RRSC were very supportive. The staff was very humble and polite. My PS-I instructor Dr. Gautam Singhvi always motivated us to work hard and focus on learning. Overall, PS-I was fruitful.

Learning outcome: I learned about the structure and functioning of an organization in general and about RRSC in particular. I gained knowledge about remote sensing technology and its working. Also, my project on image classification helped me to enhance my knowledge on machine learning and artificial intelligence, a growing field of computer science.

PS-I is an exposure oriented course: This statement proved to be very true for me. I got an exposure on working of an organisation. The technical learning was good but PS-I also focused on giving us a work experience in real world.

Name: Keshav Beriwal (2017B4A71301H)

Student Write-up

Short Summary of work done: In the present project, we conducted a comparison of different image classification techniques for the red gram crop, the second most important pulse of our country. The satellite images used in the study were obtained

from the Landsat-8 satellite data. Subset of the data for the specific region of Bharuch, Gujarat was acquired. We implemented nine different Machine Learning Algorithms and investigated the comparative performances of the classifiers. The evaluation of performance was based on overall accuracy, for the study area located in Bharuch, Gujarat. Radial Basis Function (RBF) kernel was used here for the SVM classification. Results demonstrate that SVM classification outperformed other classification methods, with an accuracy of 91.52%, whilst the Parallelepiped obtained the lowest classification accuracy of 46.12%. Further, the second and the third best performances were observed to be delivered by the Mahalanabis Classifier (87.69%) and the Neural Network (86.62%) respectively.

PS-I experience: My PS-I experience was quite enriching. Working at a project that may influence millions of people was a rewarding and fulfilling experience. Furthermore, watching scientists and other interns work with sincerity was in itself a humbling experience. It also gave us the opportunity to demonstrate of the application of theoretical knowledge to real-life scenarios.

Learning outcome: I got to know about the finer details of satellite imagery and the complexity involved in the processing of the same. I also had a hands-on experience at operating a premium GIS application and using it to work on a satellite image acquired from the Landsat-8 dataset. Simultaneously, while applying machine learning to the task of classifying redgram, I learned about many machine learning algorithms and the technical details behind the same. Further, I got to build a website from scratch, using HTML, CSS and JavaScript.

PS-I is an exposure oriented course: PS-I has helped us both personally as well as professionally. Personally, it taught us staying away from home as well as college, in a whole new city, which in itself was a fruitful experience. Professionally, PS-I served as a hands-on precursor to professional life. Essential skills in social interaction and collaboration were acquired during the training.

Name: Ayush Sarda (2017A3PS0226G)

Student Write-up

Short Summary of work done: DEVELOPMENT OF AN ATMEL BASED DATA-LOGGER TO ESTIMATE ENVIRONMENTAL PARAMETERS USING IOT.

PS-I experience: It was a great experience working at such a prestigious institution. The data which is collected by the satellites, often that needs to be verified with the ground. For that the scientists has to go to the field and collect the data manually. Our

task was to design a board which could make this entire process automated, collecting the data and then sending it over to the server which could be accessed only by the scientists.

Learning outcome: We learnt about designing our own PCB from scratch, getting that PCB onto a board, hosting a local server.

PS-I is an exposure oriented course: Well it's true. Over these 55 days we learnt a lot about work ethics, professional development, teamwork, getting out of some really challenging problems related to project, professional environment and also about the working of RRSC, NRSC/ISRO.

Name: Vitthal Bhandari (2017A7PS0136P)

Student Write-up

Short Summary of work done: We made a project on "MRI data visualization using mobile based augmented reality ". Under the guidance of our scientist mentor we aimed at creating a mobile based GUI which could be used to traverse through brain slices.

PS-I experience: The experience was a fruitful one. Apart from the trouble we faced for finding a proper accommodation, everything went well. The scientists were very helpful and instructor was very supportive.

Learning outcome: I learnt about working of organization. So industrial experience was a nice outcome. We learnt about conducting ourselves in GDs, presentations and also about communicating with seniors. Apart from that, we learnt some technical concepts regarding our project.

PS-I is an exposure oriented course: The above statement is absolutely true. We learnt a lot about the working of RRSC Jodhpur as an organization during our PS-I. The scientists there asserted that in the limited time frame available to us, the focus was more on exposure and learning about the industry rather than completion of a project.

Name: Mohammed Noman Razvi (2017A7PS0002H)

Student Write-up

Short Summary of work done: My project was "Automatic Detection of Sand Dunes On Mar". Scientific images were provided, we have to detect the sand dune boundaries. For that, I have used semantic segmentation (Unet). I build semantic segmentation or Unet model on Keras train it and store the model file and used it (model file) to predict sand dunes.

PS-I experience: It was nice and worthy. I have learnt lot of knowledge about satellite imagery and satellite data collection.

Learning outcome: I learnt many things like image process, machine learning. But, the main thing was how to use this techniques to provide some things what people need rather what they desire.

PS-I is an exposure oriented course: Yes, it allow us to explore the mechanism of how actually a industry is working, how it is organized, what are its requirements and learning new things after all PS-I is all about learning.

Name: Prakalp Tiwari (2017A7PS0137P)

Student Write-up

Short Summary of work done: I was given a project titled "Developing early warning system for dust storm". India does not have an early warning system for dust storm till now. The task was to read some research papers for detecting dust storm using INSAT-3D satellite images. After reading research papers I was asked to develop a system that would automate the process of dust storm detection. I was required to automate the process the downloading images from FTP server as soon as a new image arrives from INSAT-3D. The newly downloaded images would then be sent for image processing using algorithms implemented by me. It was also asked to develop a web portal where a user can view data about an image. It feels great when you develop a system that will be used for nation.

PS-I experience: RRSCW is an excellent organization. The scientists here are friendly and are always willing to develop something new which serves as an inspiration for a student. The facilities out here are great. The organization has a dedicated training room which consists of high-spec computers.

Learning outcome: Learnt image processing. The codes were written in Python, HTML, CSS, PHP. We made use of PostgreSQL database.

PS-I is an exposure oriented course: PS-I gave me the opportunity to implement the things learnt in classroom to practical use.

PS-I station: Semi- Conductor labs (SCL), Mohali

Student

Name: Desai Mohil Sandip (2017A3PS0445P)

Student Write-up

Short Summary of work done: I was allotted my project in VLSI test division. SCL had fabricated a new IC called high voltage solid state switch. I had to perform various tests on that IC. IC had a MOSFET with some other circuit blocks. There were various necessary parameters to be tested like voltage drop across the MOS, noise of the device, channel resistance, various currents and voltages, transients, temperature testing, etc. These tests were performed by making a test setup with measuring instruments like digital multimeter, source measure unit, oscilloscope, spectrum analyzer, function generator, thermonics, etc. After these tests were conducted on the IC, all the data was tabulated and graphs were made to demarcate the behavior of the device. Then I had to make a test report and datasheet of the IC in proper format for end users.

PS-I experience: I had a really good experience at SCL. I was able to relate many things taught in my 2nd year with the project. I was supposed to wear an antistatic coat and walk through an air room before entering the testing lab. My mentor spared lot of time with me explaining in detail why and how each tests were performed. Apart from this, all other employees and scientists were very helpful and encouraged the trainees. Most importantly, we had a visit to fabrication lab, where we were introduced with machines and entire process of fabricating the silicon wafer in various steps.

Learning outcome: There were many things worth knowing, which could not be learnt in your regular studies. I was explained how entire circuits are made on silicon wafers and how connections are done from device terminals inside the wafer till the pins coming out of the IC. There is a gap between, circuits we study in our curriculum and how actually, they designed and device is made. At SCL, I could fill this gap by knowing

about actual layouts and connections in an IC. Concepts, like why and how device generates the noise, temperature effects on the device, conditions and rating at which circuit should be operated were taught. Learning about trends in voltages, currents, leakages with load, supply etc was an important outcome. I was able to learn the operation of various measuring instruments, test setups and take readings on them. Moreover, I learnt about format of test report and to make and interpret a datasheet. I was able to gain good insights of semiconductor devices.

PS-I is an exposure oriented course: Definitely, PS-I is a work oriented course. I was testing devices in the same lab where other employees were engaged in their testing work. Of course, there are some things to be studied which are required for your project. But one gets practical or industrial exposure to the things they might have studied theoretically. One gets hands on experience and knowledge which would be very helpful further.

Name: Lakshaya Maheshwari (2017A8PS0616P)

Student Write-up

Short Summary of work done: I worked in VLSI Testing Division. The project given to me was Characterization of High Voltage Linear Voltage Regulator. I tested the linear voltage regulators for its various electrical parameters to prepare its testing report and datsheet. I learnt about the fabrication of CMOS and MEMS devices through a visit to the fabrication lab. I understood the design of the Linear Voltage Regulator and the importance of the tested parameters.

PS-I experience: Semi-Conductor Laboratory, Mohali has great infrastructure and the staff here is extremely cooperative and supporting. My mentor was well experienced and he supportive. He helped us in learning new concepts. He gave us his time to undestand the concepts more deeply.The overall experience was very enriching.

Learning outcome: I closely saw the working culture of a research laboratory. I understood about the various steps in the fabrication of a device. I operated various instruments used for testing. I learnt Visual Basic Applications used to set up automated test setup.

PS-I is an exposure oriented course: I completely agree with the statement.

PS-I station: The Institute of Minerals and Materials Technology (IMMT), Bhubaneswar

Student

Name: Aamod Vinayak Atre (2017A1PS0790G)

Student Write-up

Short Summary of work done: I was allotted the process modeling and simulation department. My work was based on the the subjects quantum chemistry and computational chemistry. The project was a study based on covalent organic polymers, for their application in selective carbon dioxide capture. In a molecular approach employing Density functional theory, the objective was to study and design a nitrogen containing covalent organic framework, while simultaneously searching for the DFT methods suited for the carbon capture system. The molecular simulation study was performed for select nitrogen containing aromatic rings, to gauge their selective CO_2 capture potential. Further, these groups were used as building blocks to form longer fragments and propose a model COF.

PS-I experience: IMMT has a good work culture. The faculty scientists are great mentors for someone really passionate about their work. The only downside was the seemingly random allotment of departments for some branches which may have hampered some students' productivity, due to a clash of interests. The work allotted to all students was of a good standard, with all projects being research oriented and of value in the industry.

Learning outcome: The learning outcomes include practical applications of basic subjects such as quantum mechanics and quantum chemistry. Accessing and learning to use commercial software employed in the field. Lastly, building a research oriented frame of mind and thorough analysis of the results.

PS-I is an exposure oriented course: Of course, PS-I has provided a decent exposure to research methodologies and formalities and also the techniques related to my subject. But more importantly, PS-I has provided the varied exposure that comes along with living alone in a new city. Having to put up with a long list of compromises and restrictions may be seen in negative light by some, but it's an important experience nonetheless.

Name: Sreeram Panigrahi (2017B2AA0803G)

Student Write-up

Short Summary of work done: Synthesis of schiff bases and learning various laboratory techniques.

PS-I experience: The work mainly compromised of designing and synthesis of various schiff bases and learning their use. Further throughout the duration, various advanced equipment and instruments were used for the synthesis and purification of the product. Being a research station, you work under scientists who guide you and help you in your work. The load depends on the scientist allotted to you.

Learning outcome: Starting from distillation of your own solvent for reaction to using various instruments, and also designing and synthesizing your own compound, The PS-I station has various instruments which I learned to use. Further, I was able to design and synthesize compounds and how they can be implemented in real life.

PS-I is an exposure oriented course: PS-I definitely helps to give you an exposure in day to day working of any institution. While sometimes the work might not be very extensive, it gives you an exposure to what to expect in real life and boosts you where to avoid mistakes in an actual working environment. Sometimes, the work can also be exhaustive and leads to good results and boosts your morale to pursue the field you are working on. Overall, PS-I definitely broadens the perspective of a BITSian at the initial stage of study.

Name: Abhideep Tripathy (2017A4PS0791H)

Student Write-up

Short Summary of work done: Analysing the mixing time and power consumption of high concentration slurry for different impellers and suggesting a improved impeller design to reduce the power consumption with optimal mixing.

PS-I experience: The Environment was learning and our research work was assisted by the project assistants. Working with experimental setups and machinery was a fun learning process all together.

Learning outcome: Helped me to improve my time management, presentation and team work skills.

PS-I is an exposure oriented course: I definitely agree with the statement quoted.

Name: Satchit Nagpal (2017A1PS0801H)

Student Write-up

Short Summary of work done: My task was CFD modeling of a Packed Bed Reactor. Basically, I worked on ANSYS software to simulate the working of the packed bed. In order to do I had to read research papers on similar work done by people across the globe. My guide and many other people had a lot of experience in this kind of work and by their constant guidance i was able to complete my project.

PS-I experience: Overall, it was a great experience as I was able to finally apply what I had studied over the course of my engineering degree. Although, it was quite expensive for me to not stay in my hometown, i gained some valuable insights by living in another city.

Learning outcome: Now I have a better clarity about CFD and its application in industries and research. The basic working inside a government established lab, dealing with people older than me, having so much to offer. The report work helped me to know how to write an official scientific report. I also learned the software ANSYS which would help me with my coursework next semester and possibly in the future too.

PS-I is an exposure oriented course: PS-I gives us the exposure, very much needed by us to decide which line we want to purse. It helps us in deciding our interests by spending time in the industry. The project work, presentations, quizzes based on our observation, all this helps us in our overall development and not just technical course work.

Name: Animesh Sahoo (2017A8PS0976G)

Student Write-up

Short Summary of work done: My topic was applications of machine learning algorithm for pellet size recognition. I have developed 2 projects one where CNN deep learning network is used to automatically estimate the approximate size of majority of pellets from image qualitatively and in the other I have used non deep learning algorithm know as aggregate channel features (ACF) along with circle detection algorithm to approximately estimate the pellet distribution on the basis of size which is the quantitative analysis.

PS-I experience: The organisation is not much into AI and all till now but its gradually taking initiatives to incorporate various labs like simulations labs and image processing lab so as to stay with advanced topics like Artificial Intelligence, IOT. It was really a good experience to work there got to know about how research is done how they publish papers how they implement research paper results. Overall it's a good PS-I station for people who belong to chemica, biotech, electronics and mechanical background.

Learning outcome: Scientist and research assistants are very cooperative and helped me in adjusting to the organisation environment. Got to know about how literature review is done and how products are implemented in real industries and I have developed a real time industrial product as well. It helped me to explore my research interest.

PS-I is an exposure oriented course: Yeah, indeed PS-I is an exposure oriented course because it helped us to learn organization structure and function, improve our soft skills and to enhance our communication and presentation (both oral and written) skills.

Name: Sanket Jena (2017A4PS0744H)

Student Write-up

Short Summary of work done: Prepared iron ore slurry sample. Using the sample, we performed the mixing experiment using different shapes of impeller and power readings were noted. After analyzing the data, we provided an optimal blade design for proper mixing with minimum power consumption.

PS-I experience: Overall experience was good. Got practical knowledge about how industry works.

Learning outcome: Learnt how to design the impeller for mixing high concentration slurry.

PS-I is an exposure oriented course: Totally agree with it.

Name: Ayush Porwal (2017A1PS1090H)

Student Write-up

Short Summary of work done: Coal beneficiation of raw coal and float coal was done. The testing of the samples was done using proximate analysis. Aim was to reduce the ash and sulphur content.

PS-I experience: Good.

Learning outcome: Experimentation techniques and full exposure on how research is done at CSIT-IMMT.

PS-I is an exposure oriented course: True, it is an exposure oriented course!

PS-I station: Variable Energy Cyclotron Centre (VECC), Kolkata

Student

Name: Souradeep Chakraborty (2017A3PS0170G)

Student Write-up

Short Summary of work done: Our work was comprised of two phases - research and implementation. In the research phase we reviewed and surveyed various works in swarm robotics and in the implementation phase we tackled one task that is suitable for a swarm - optimal area coverage of a known environment.

PS-I experience: The project and tasks alloted were very interesting and was fun to work with. We gained a lot of learning experience in the technical aspects of robotics and simulations; and the interaction of BITS faculties further strengthened our skills of communicating with fellow researchers and presenting our work. The PS-I faculty alloted was extremely helpful and guided us even though the organization mentor was not available at all times.

Learning outcome: We learnt how to model a swarm of e-Pucks in WeBots and controlled them using Python along with WeBots PROTO nodes. Further, the research phase strengthened our understanding of the working of swarm robots and the multiple challenges and achievements that are introduced with a swarm instead of a single robot.

PS-I is an exposure oriented course: I wholeheartedly agree with this statement. The working environment being a government research institution, provided a lot of valuable exposure. Further, the PS-I faculty alloted went out of his way several times to ensure our learning experience was smooth and problem free.

PS-I station: Maritime Research Centre (MRC), Pune

Student

Name: Sarwadyna Mutktule (2017B3A70450H)

Student Write-up

Short Summary of work done: We, at Maritime Research Center had, on the first day of our PS-I, told to choose one project for each one of us according to our preference and choice. We were given a list of 11 projects to choose from and the number of persons choosing were 11. The project that I got was "Radiated Noise Analysis and Automated Report Generation". It deals with the noises emitted by the ships as seen from a far location from the ship. It also includes study about how the noise travels through the water body. In the first 2 weeks we were told to establish a state-of-art in our respective fields. For that we had to undertake a literature survey which would reveal what all has been done in the field already. Then we had to submit it to Arnab sir, the founder director of MRC, pune. He then suggested us some changes which we incorporated in our research note. After that the real work began in our project i.e the work that would be our original work then began.I had to list down the components that are there in the ships, which was actually the part of the literature survey. Then I had to figure out the different regimes of operation for those components for the ships and this is to be used as a framework to future experiments. For this, I had to take help from outside as recommended to me by Dr. Arnab Das and hence I then contacted Mr. Yezdi Batliwala through mail and received the necessary help from him. Then, finally I listed down the steps for the making of the algorithm for automatic report generation which is a future scope of my project.

PS-I experience: It was a very enjoyable experience. The work environment was very friendly and contributed a lot to me getting addicted to my work and that place itself. Overall, it was a great experience and a hugely useful exposure to the outside world.

Learning outcome: I now have a lot more knowledge on ships and navy than I had when a started. Now, I understand the importance of oceans and why and how they are to be protected and used to our advantage.

PS-I is an exposure oriented course: It is an apt statement. We got exposure to what kind of environment actually exists in any organization. We also got an exposure to how to work as a team and accept your colleagues the way they are and getting used to whatever is there. So, I think the statement aptly explains what goes on in the practice school.
