CDS International Academic Internship

Somesh Pratap Singh | 19110206

# Interning at

Department of Mechanical Engineering, University of Washington

# Under the guidance of

Prof. Anirudh Vashisth

# Report contains the updates from

15 May 2023 to 31 May 2023

1. Arrived in Seattle, settled in the temporary housing that was there for first 15 days.
2. Internship began on 15 May. One of the lab members showed me the labs and the Department of Mechanical Engineering Building on the first day (15 May). We also had the J-1 Visa orientation on the same day. An official welcome event was organised a day later for the interns from IITGN.
3. I met my PhD mentor (PhD student at the lab who would be mentoring me for the project) on Thursday. He gave me a detailed overview of the project I would be working on. He also showed me the lab equipements required for our project.
4. Project Details: We will work to improve paint adhesion on composites. I have to optimise this process using machine learning and other optimisation techniques.
5. I had two days of continuous meetings with my PhD mentor wherein he explained to me in stages the science of the problem.
6. On Monday, May 22, I had my first meeting with the Professor. I showed to him the pre-requisite homework, which he had given to me. This was to be completed before I arrived in Seattle for the internship. After looking at the toy codes, he gave me some additional details about the project. He also told me his expectations of me upon completion of the internship. He ended the meeting by giving me the instructions and tasks to be done till next meeting which was to be scheduled after 2 days on 25 May 2023.
7. On May 25, I had a meeting with both my PhD mentor and Professor. PhD mentor told me about the number of entries and the type of data that I have to analyse as a part of the internship. He also gave me details about the specific process parameters he had mentioned in the previous meeting: what are the techniques to get more data from these surface characterisation techniques? PhD mentor also conveyed about some other processing parameters that we would be using in our experiments. In the meeting with Professor on the same day, he guided me to the first step which is to be completed in the internship. He also gave me a clear path to complete this step wherein I should not first worry about the intermediate steps and just focus on the final output as a function of the inputs.
8. On May 30, in the scheduled meeting with professor, I gave him an update on what all tasks I have accomplished after the past meeting. This comprised of an almost exhaustive study of ML techniques which can be used in our experiments. I also showed him some toy implementation of a few techniques some of which worked out and others did not. Following this, Professor shared with me an article that had implementation of the the ML model we were looking for. He again summarized the final goal we need to achieve by the end of the internship and gave a rough plan to go about it. He also assigned me a list of tasks which I had to complete before we had to meet next.
9. After the meeting with Professor, I met PhD mentor. I told him that if we have the type of data given to us it would be difficult to run the ML model we are aiming for. To which he replied that we have limited resources and time to carry out the experiments. Some of the dat we get back after 3-4 months of analysis and it might not always be possible to change the data as per the ML model you apply but you have to find the optimization technique for the type of data we have. He also posed some of the practical questions, the answers to which would be seeked by an application user.

The report reflects the progress made, the concerns raised, and the directions provided by Prof. Vashisth. The report captures the key discussions and outlines the subsequent tasks to be completed, it does not include the specific physics, code implementations, theory and other details about the project.