

William Hopkins

Professor Annexstein

CS 5001 – 001

12 September 2022

### Senior Design – Individual Capstone Assessment

Our senior design project focuses on an area of study known as agrivoltaics. According to the project document specified by faculty advisors Dr. Je-Hyeong Bahk and Dr. Mohsen Rezayat, agrivoltaics is “the dual use of land for both photovoltaic (PV) power generation and agriculture.” This project is all about designing a “wireless microclimate sensor system” which facilitates generating solar power and growing crops at the same time, on the same land, effectively and efficiently. The project will consist of multiple areas of focus: obtaining and installing the hardware involved, such as solar panels, sensors, and motors; interacting with said hardware via software, e.g. Arduino systems; and bundling panel control and data visualization into a user-friendly application. I will be focusing on the software portion of this project. I intend to contribute to the development of a user-friendly application which enables automation and control of the sensor system, as well as comprehensive data extraction and visualization.

Many of the courses I have taken here at UC over the past 4 years will serve me well in contributing to this project. Despite taking place 4 years ago, ENED 1100 and 1120 (Engineer Design Thinking) provided me with a solid foundation and understanding of how to solve a problem using applied engineering skills. The last time I worked on a project of this size was during ENED 1120, and I am noticing a lot of similarities in preparing for this senior design project; team contracts, planning matrices, Gantt charts, and individual assessments are all

making a return this year. Many Computer Science fundamentals will also be making an impact. CS 2028 (Data Structures) will be of particular importance as we develop an application from the ground up to handle the control and data visualization of our smart PV panel system. The fundamentals learned in EECE 3093C (Software Engineering) will also play a role in informing decisions that we make during our initial application design process.

Co-op has also served an integral role in forming experience necessary to tackle a project such as this. Over my 5 rotations with Siemens Digital Industries Software, I have spent 4 working on full-stack web application and web service development. These experiences have also been complete with cloud technologies and Agile methodologies. This has helped me to develop numerous soft and technical skills which will be applicable here. My experience with working on a software engineering team that engaged in daily scrums and biweekly sprint reviews can be applied to setting up an engaging and product team work environment. My experience with working on full-stack web applications and technologies, including having worked on deployment to the cloud, can certainly be applied to the application we will develop for use with our smart PV panel system.

I am very glad that I was invited to be a part of this project. The fact that this project is grounded in a real-world application really appeals to me. It is not “just another app”; it is a system that, if done right, can have a tangible impact on the real world. I have not worked on a project like this before, and being outside of my comfort zone excites me. I am also very excited to work on something across majors. Having the opportunity to work with and learn from majors other than my own is exactly how I want to spend the last year of my time here at UC.

I feel that our team composition is very conducive to designing this solution. The project consists of clear areas of focus – hardware, interfacing with said hardware, and abstracting these

interfaces for a user-friendly experience. Our team, consisting of EE, CE, and CS majors, matches these areas of focus almost perfectly. By the end of the project, I expect us to satisfy all of the project deliverables, including having a fully functional wireless microclimate sensor system and a user-friendly application to allow automation, control, and data visualization of the entire process. I will evaluate my own performance by determining whether my contributions are in fair proportion to the rest of the team, and by determining the degree that these contributions were successfully fulfilled. If I am able to make clear, sizable contributions to the success of the project, and if these contributions produce tangible results, I will feel that I have done a good job.