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Professor Annexstein

CS5001

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Anthony's Individual Capstone Assessment

What this project is about is a combination of environmental, electrical, and computer engineering along with computer science principles to create a device that will help farmers of a vineyard. The device will monitor the vineyard and send alerts when there are hazardous conditions for the crops. I didn't know this at the time, but there is an environmental engineering group that is also working on the project. They are focused on the canopy design and the use of a solar panel. The electrical and computer engineers of our group are going to work with sensors to monitor the crops and program the microcontroller to utilize the sensors. The computer science students in our group will work on developing an app that can alert the farmer when there is bad weather as well as keep track of the current state of the vineyard. Academically, I believe this project will utilize multiple concepts that we learned over the years in our classes to make a successful prototype.

There have been a lot of courses that I have taken over the four years that I have been in college that I think will help me with this project. I believe the courses that will most help me

will be the more recent courses that I have taken since they are upper level and more applicable to real world scenarios. Last spring, I took the class Power Electronics (EECE 5125). Depending on how much power the solar panels provide and how much our microcontroller can handle, we might have to build a step down circuit which I learned in that class. I am currently enrolled in Intro to Mechatronics (EECE 5144C) which deals with the hardware of circuitry and the software of the microcontroller and I believe that both of those will be beneficial when it comes to programming the microcontroller. The class that I think will help me the most during this project is Embedded System Design (EECE 4038C). This class is similar to the mechatronics course that I'm taking but with more of a focus on the microcontroller and programming it with sensors. The project that I had for that class is similar to this project; for the final project that we had in that class, we were tasked with using at least three sensors from a sensor kit and build a prototype of our choosing with our microcontroller. My team chose to make a plant monitoring system which used a temperature sensor, water sensor, light sensor, and a buzzer. For this project, I imagine we will be using similar sensors and the implementation of it will be bigger in scale.

My co-op experience won't be related to this project too much, but I believe there are still some concepts that I learned that I could apply to the project. For all of my co-ops, I worked at Duke Energy here in Cincinnati. I was a part of the distribution side of the business meaning I dealt with having the power stepped down and delivered to the customers. I was in a different department each rotation, so I got to see a lot of the company. The first co-op was in project management, second was lighting, third was gird management, fourth was distribution planning and fifth was network engineering. For the power distribution of this project, I never

directly had to deal with power distribution, but I am familiar enough with the concept to do it on this smaller scale. A part of the project that we recently talked about was how we would store collected data and we talked about using a SQL database to store the data. In my third co-op, I was a part of the grid management team where I did more programming, and on that co-op, I learned SQL by watching videos about it, looking at older SQL codes, and coding in SQL myself, so I believe that if we need to program in SQL, I can refresh myself on the coding language and utilize it in our project.

One of the reasons that I am interested in doing this project is because of my minor. One of my minors is Electrical Energy and SmartGrid. I like the principles of it, and I believe the courses will help me in my career in the power and utility industry. For my minor, I have to do a project that relates to it, but outside of it being a requirement, I see a lot of the principles of my minor that I like being implemented in this project. The use of the solar panel to create clean energy, the use of the sensors to collect data and then analyze the data as well as power distribution. I also like the concept of renewable energy, so working with solar panels is something that I can hopefully pivot into in my career. Another reason I was attracted to this project is because it is for a non-profit organization and our design can potentially be used in other parts of the world, places that really need it. It would be great if our senior design project had some impact on the world making people's lives better and easier.

The preliminary approach to this project is to plan out how we will design the project this semester and then test and construct in the spring semester. For the EEs and CompEs, this semester we looked into the sensors that we wanted as well as a microcontroller with Wi-Fi. Next semester, once we get our sensors and microcontroller, we can start testing the sensors

and then start construction on the prototype. At the end of the semester, we should have the canopy set up with various sensors reading data along with an app that the farmer could use to monitor the vineyard. Our project will be done once both the sensors and the app are working as intended, is user friendly, and is well documented so other engineers can build upon our work. I believe if we have those three goals achieved at the end of our project, we will have done a good job.