**CS 499 Module Five Milestone Four Narrative**

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1. **Briefly describe the artifact. What is it? When was it created?**

This artifact was my final project from the CS-350: Emerging Systems Architectures and Technologies course which I took last term. The system was meant to function as a smart thermostat which enters either a heating or cooling state depending on temperature readings compared to the target temperature set by the user. The system consists of a Raspberry Pi 4 (4 gigabytes of ram) and a circuit made up of buttons, LED lights, and a LCD screen which are used to collect and communicate input and output data to and from the user and the environment. The program is a state machine written in Python, and data collected by the initial implementation of the system was not stored in non-volatile memory. All data was lost when the system would terminate.

1. **Justify the inclusion of the artifact in your ePortfolio. Why did you select this item? What specific components of the artifact showcase your skills and abilities in software development? How was the artifact improved?**

This artifact is highly relevant to the robotic industry, which is the industry where I would like to work as a professional. I see the enhancement of this artifact as an opportunity to meet the course outcomes while demonstrating the skills which I have acquired throughout my participation in the computer science program at SNHU. My enhancement ot this artifact will involve adding the functionality of determining air humidity and entering either a *humidifying* or *drying* state based on comparison between the target humidity level (set by the user) and the relative humidity detected by the humidity sensor.

The aforementioned enhancement will turn this simple smart thermostat program into a smart greenhouse system capable of controlling temperature and humidity in a closed agricultural environment. The integration of these changes to the circuit will show my proficiency in a variety of skills associated with the robotics industry. My use of the circuit components and Raspberry Pi’s GPIO functionality will also demonstrate my ability to program for embedded systems. My design of the enhanced circuit shows my ability to design and build low voltage electrical circuits as well as my ability to write code to control the interaction of the components of those circuits. The ability to design and program state machines for embedded systems showcases my ability to use industry standard system designs to create systems which provide real-world industry-specific solutions.

1. **Did you meet the course outcomes you planned to meet with this enhancement in Module One? Do you have any updates to your outcome-coverage plans?**

I have met both of the course outcomes which I had originally planned to meet with this enhancement in Module 1. My thorough documentation and my use of Git and GitHub to consistently upload changes to a collaborative environment align with the outcome of employing strategies for building collaborative environments that enable diverse audiences to support organizational decision-making in the field of computer science. My use of robotics-focused software and techniques, such as the ReductStore database and the practice of embedded systems engineering, demonstrates my ability to use innovative techniques for the purpose of implementing computer solutions to accomplish industry-specific goals.

As I had mentioned in this week’s journal assignment, I unfortunately had a problem acquiring soil temperature sensors for my project. I had ordered two different brands of soil sensors separately, there was a shipping issue with one of them and the other ended up not being properly configured for communication with the Raspberry Pi. Fortunately, I happen to have a relative humidity sensor for air humidity which I had purchased for a previous project. Since air humidity is arguably just as important for a controlled agricultural production environment as soil humidity, I will be swapping the soil humidity detection functionality with relative air humidity detection.

1. **Reflect on the process of enhancing and modifying the artifact. What did you learn as you were creating it and improving it? What challenges did you face?**

This week's modifications involving added database functionality to PlantSitter were challenging, and I was able to gain some important insight into the implementation of powerful industry standard robotics tools. ReductStore, the database which I chose to use for this enhancement, is meant to process complex and heavy visual data taken from camera sensors, associating captured images with keys such as timestamps and geographical specifications at the time of recording. While my use of this database is certainly more simple than what this powerful software is capable of, using ReductStore to record data from embedded system sensors is a great way to show potential employers and contracting officers that I am able to store and process data using robotics industry database solutions.

I have been able to open and run a ReductStore database on my Raspberry Pi, and to connect my laptop interface to the database aboard the Pi so that I am able to see the contents and structure of the database being served from the Pi on my client machine (which has a screen to visualize data). I have yet to correctly implement the functionality of the function which I have defined for storing sensor data in the ReductStore database. I will focus on finishing this over the course of this week. I am very close!