

To demonstrate my skills in software development I made several improvements to the original .c file that runs the thermostat and I designed a dashboard to display data collected by it. To enhance the thermostat prototype, I added logic to capture when the A/C should be running and set up timers for keeping track of daily usage of both heat and A/C. I also added a tick function to the task scheduler that periodically checks the time and at 11:59 pm triggers 2 events: the hours of heat and A/C usage that day are added to a .csv file and all counters are reset to 0.

For the web-based dashboard, I created 3 files to handle different tasks. A `getData.php` file gets all database data and stores it in arrays. An `operations.php` file performs arithmetic operations on the data (hours of usage) to get approximate wattage and costs. Finally, `index.php` is made up of HTML and JavaScript elements (`Chart.js`) that render graphs to the screen. Line graph shows the number of hours that the heat and A/C have been used so far during the current month. Beneath the line chart are two single bar graphs representing the approximate energy consumption for the heat and A/C and a pie chart showing the current estimated total and individual costs of each. All of this information is produced using the number of hours of usage from the database and the average cost/wattage per hour.

I would say that I absolutely met course outcome [CS-499-04], “Demonstrate an ability to use well-founded and innovative techniques, skills, and tools in computing practices for the purpose of implementing computer solutions that deliver value and accomplish industry-specific goals.” I leveraged several different, new-to-me tools to complete this portion of the project including HTML and PHP, `Canvas.js` charting, and I even learned more about working with microcontrollers.

My biggest challenge while working on this enhancement was my lack of knowledge and experience with HTML. Not only did I learn the basics of how to write program in HTML, I also

learned what it is commonly used for and how it can be combined with PHP, JavaScript, and other languages and external libraries to create impressive and unique experiences. To incorporate feedback in this project, I fully commented all of my front-end files and added descriptive headers to each.