For the Databases category of enhancement, I created a MYSQL database to hold the data collected by the thermostat prototype. It was something I could start from scratch so I thought it would make the perfect enhancement. I think my skills really shine in this area because I was able to successfully create a flow of data from the thermostat to the usage dashboard web page with the help of a MYSQL database. I have the data being output from the thermostat to a .csv file at the end of every day and I wrote a .php script for inserting that data into the database. On the client side, getData.php successfully connects to the hvac database and selects all entries for the current month from the hours table to be used on the dashboard.

I think that I finally met course outcome [CS-499-05], “Develop a security mindset that anticipates adversarial exploits in software architecture and designs to expose potential vulnerabilities, mitigate design flaws, and ensure privacy and enhanced security of data and resources” with this enhancement by setting up a secure database and using prepared statements to collect data. Although the dashboard doesn’t currently take user input, it definitely could as its features are expanded. It will be nice to know that there are already mitigations in place to protect against SQL injection attacks. I also stored the database credentials in a separate file to be read by the dataInsert.php to increase security here.

I faced many challenges while working on this enhancement. First, I learned that C and MYSQL do not work well together. After trying countless different approaches, I finally realized that the IDE I’m using (proprietary to Texas Instruments for their MCUs) is even less SQL friendly. I was disappointed by this because I wanted to have the data inserted to the database straight from the board but, alas, that is how I ended up going with a .csv file instead. Lastly, I struggled with importing the .csv file to the database in dataInsert.php so, instead, I just have the

values being read into variables that are then used in the query. I incorporated instructor feedback on this enhancement by fixing the issue keeping me from inserting data to the database.