Richard Harrison

Lab 3

Discussion:

This lab focused more on the most practical aspects of the design project as a whole, and thus the entire system more closely resembled the finished product. At this point in the project, the parts list was finalized and the commercial products were used for breadboarding, many of which will actually be integrated into the final embedded system. Each part was tested, first for basic functions (correct power, receiving input or giving output), and then the students moved on to bringing out the potentials of each part (specific programming for each part, logic tests for correctness and desired operation).

Ensuring each part to work as intended was not without problems. The biggest issue that hindered progress most was the relay, which was confirmed to be broken. A new relay was purchased, but not delivered in time. Another issue that arose when setting up the system was setting up the button for its intended operation. Using the button that was connected to a 3-pin breakout board for testing worked well, even being able to fully perform its intended function. But when the version of the same button was used with no breakout board (i.e. connected by its four pins directly to the breadboard), the changeover to a 4-pin design required some changes to the system that weren’t immediately obvious. The main issue that arose at this point was that the button would not properly change the counter on a button press, so that part of the system had to be rewired from the original 3-pin design.

The final main issue that arose was that the PIR sensor was supposed to fulfill a more robust role: room occupancy, or counting the people in the room. The issue was converting the PIR system from one that simply detected movement to one that could detect a quantity of movement. So instead of that part simply triggering a bit that would then enable the system, the final version of this would still include the original PIR sensor, but it would increment a counter that signifies the number of people in the room based on how many times the sensor was tripped. While this method could be prone to error, specifically if the same person walks in front of the sensor more than once, it does show that the sensor can fulfill a more robust role than originally intended.

Conclusion:

Moving away from the raw theory of the project and on to the more applied aspect of assembling the system as a whole was the main goal of this lab, with the finished product of the experiment being a working prototype of the climate control and room occupancy system. This was the part of the project that shows proof of concept with the parts that were ordered. Such a proof of concept takes in account all of the values associated with each part’s input/ output, and relating that to its proper function and how it contributes to the function of the final product. Another consideration was drafting the flow of the (as it is at this point) control loop that is responsible for reading inputs and deciding outputs based on said inputs. However, as the project matures, so will this flow diagram, so it is by no means a final copy. This lab follows directly into the next phase of the project, which is moving forward with the first version of the final product, with all applicable parts surface mounted to a single printed circuit board.