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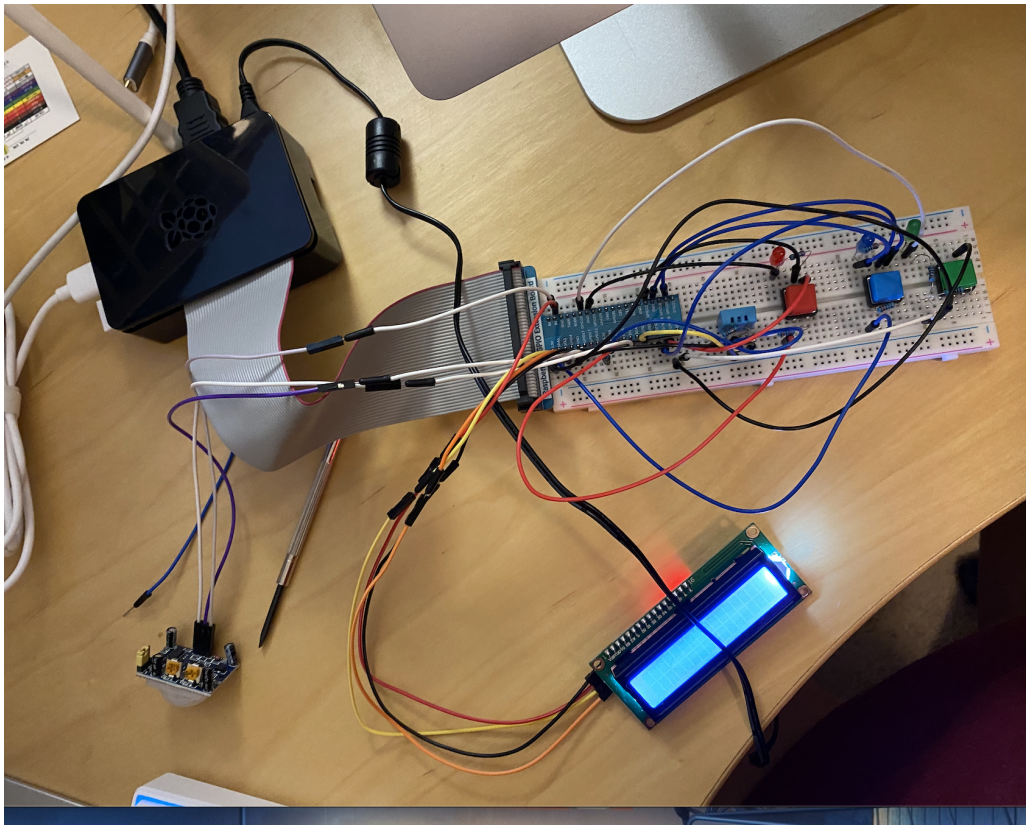
EECS 113 Final Project: BMS

Schematic:



HVAC & DHT:

For the actual HVAC system, the DHT needs to be implemented in the circuit in order to get the humidity and temperature from the surrounding environment. To the right of the GPIO board, I placed the DHT sensor and connected the pins in the same way described in the Freenove tutorial with the 3rd pin having no connections whatsoever. This component must be grounded as well. The code from this section mainly came from the tester file that Freenove had available in its libraries in order to check to see if it was on and grabbing humidity and temperature. For the actual functionality of the project, I used the given DHT11.py library to use functions from that and would call dht.temperature to get the current readings in order to use the formula from the project instructions pdf to calculate the average temperature of my environment. The values calculated are then used within the temperature check section of my code in order to determine if the system automatically goes into heating mode or cooling mode if it's past a certain margin of the standard temperature (which one can change with the red and blue buttons to warmer or colder).

Security/Door/Window:

The only time the HVAC system turns off is when the extra green button is clicked which signals that a door or window has been opened. To “save energy” the HVAC system should turn off temporarily until that door or window has been closed. When the green button is clicked for the first time (since the system starts closed by default), the LCD displays the message that the HVAC is halted and then displays the main menu again with all of the status. Then when clicked again, this closes the door or window and then the message that the HVAC system is resumed is displayed. Then the heating system or cooling system continues.

PIR/Ambient Light:

The ambient light system also depends on the PIR sensor or the component that is able to detect motion through infrared rays(heat). The two yellow circles on the side are its sensors so for example, when I wave my hand past it, it should detect the motion. In my code, I have it set so that once the motion detected is true, it turns the LED I have connected to the GPIO board set to GPIO.HIGH which turns on the LED. The functionality within the project is for it to be able to detect motion to turn on the lights in the building and after a certain amount of time that no motion is detected or if nobody is around to use the lights, the lights should turn off. I have a variable called max_time and if the lights are on and the current time minus the time that the last motion was detected exceeds the max_time, then the light should turn off. This light has no relation to the hvac system.