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ECE 388 Lab 2

Discussion:

As this lab dealt mostly with familiarization with possible equipment for the design project, ensuring the correct operation and interfacing was the goal. That meant understanding the pinouts, input signals, and outputs of each device and ensuring they all worked as designed.

For the RGB LED, the pinout and outputs were simple to understand. Since all inputs would go through the R, G, and B pins, and the output would be the specific color of the LED based on what pins are getting an input signal, ensuring that it would work was very simple, and a sample block of code was used to test each hue of color that the LED could produce.

The servo motor only contained three pins total, meaning interfacing with the microcontroller was even easier, as only one pin was actually used for input. Since it is also an actuator, the output was the intended actuation, that being the sweeping motion of the motor.

Because the rest of the components (excluding the LCD panel) were sensors, proper outputs were measured by various means:

The PIR sensor, like the servo, only had one I/O pin, meaning its output would fall on one pin (with power and ground pins), making communication to the microcontroller very simple once again. However, because the PIR sensor had its own LED that blinked when movement was detected, connection to the microcontroller was sufficient for testing its operation, and connection to the LCD panel was not required.

The temperature sensor contained only wire outputs (no LEDs or other displays), so measuring it required the use of the LCD panel. The sensor had two output pins (alongside power and ground pins), and a sample block of code interfaced it with the microcontroller (as it functions as a thermistor, it would actually return a value that must be converted using a formula provided by the manufacturer), and outputted the value to the LCD panel. This sensor was initially connected incorrectly, and produced the wrong reading (which was checked with a thermostat), so it had to be rewired to produce the right value.

The LCD panel contained a row of pins (also with power and ground pins) that would generate a character given a valid output to the panel. Depending on the output, it would decide which of the two rows it would output to, and the string of characters to appear on screen. Initially, the panel did not display the correct information, and it was determined that the panel was installed backwards (much like the temperature sensor) because the user manual was misinterpreted. Its outputs were tested alongside the temperature sensor and if it displayed the temperature (verified by a thermostat) it was then concluded that both of the devices worked.

Conclusion:

The second lab experiment was an introduction to the possible parts that could be used for the final design of the climate control and occupancy sensor project. It was designed to get the students used to interfacing with these components so the project would run more smoothly. Test-driven design was the driving factor of the lab, with each step focused on the functions of each device for testing and determining how the devices (or very similar models) could be helpful to the project. If a device is determined to be useful for the design project, the next step would be deciding how it would be integrated into the prototype, and then, the final product.