Hunter Matthies
CPE 301
12/15/2023

Final Project – Swamp Cooler

Introduction

This final project is designed to showcase the skills I have learned throughout the semester. This uses everything including: GPIO, Analog Conversion, Serial Writing (without library functions), usage of motors and sensors, LEDs and buttons, interrupts and LCD.

Design

First off, power connections were required for this project especially due to the large volume of motors and sensors. I used a bread board power supply to power the DC and stepper motor and the Arduino to power everything else. Operation temperature was needed especially for changing the temperature of the DHT sensor. I ended up using my fingers or a hand warmer to heat it up rapidly when needed for the video. I used a glass to resemble the water reservoir for the water sensor. The motors were on their own breadboard due to their high demand of VC and the DHT and water sensor were on their own little breadboard for the ability of movement into the water reservoir. LCD and all other devices were connected to one large breadboard stand.

For the code portion of the project, I started by including all the libraries needed for the sensors and motors. I also initialized all the GPIO locations for the buttons, LEDs, motors, LCD, sensors, and the DS1307 RTC module and any necessary variables needed for those components. In the setup I would set any outputs and inputs necessary such as the motors as an output and the buttons as an input. Initializing any interrupt or external functions were also required in the setup function. In the loop portion is where the program would loop through each state: Disabled, Error, Running, and Idle. This contained many if else statements that would determine which state the program is in based on the values of the sensors or whether a button was pressed. Many external functions were used three are used for serial monitor writing, two are used for analog reading, and one for converting. The two ISRs were also external functions when any of the buttons were pressed.

Hunter Matthies
CPE 301
12/15/2023
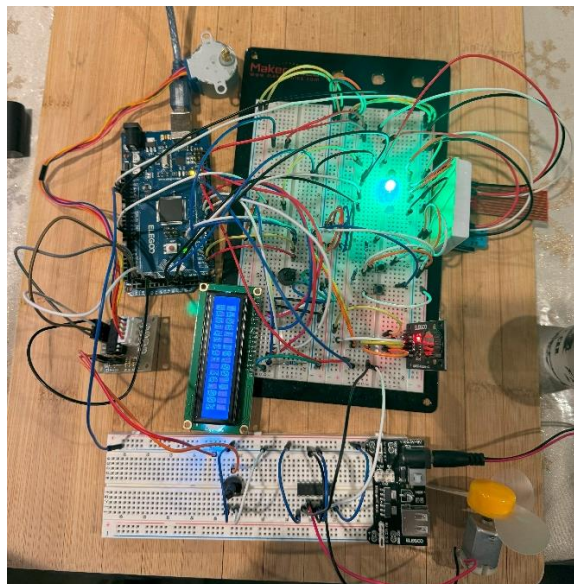
Results

The project works as intended. According to the project requirements for each state each component would behave as they should. The idle state would have constant monitoring and display to the LCD once a minute and turn on the green LED. In the running state it would have the DC motor turn on to cool down the temperature and turn on the blue LED. When the disable button was pressed everything would turn off and turn on the yellow LED. When the water sensor was removed from the water reservoir, the red LED would turn on with everything else turning off and displaying ERROR on the LCD. Every time there was a state change a time stamp would display as well as for when the stepper motor would turn on.