Group members: Jordan Pache and Annika Valdez

CPE 301

May 9th, 2023

Final Project Technical Document

Overview:

This final project is the creation of an evaporation cooling system, also known as a swamp cooler. We utilized the Arduino Mega 2560 to achieve this, along with the DHT11 temperature and humidity sensor, water level sensor, a remote, liquid crystal display (LCD), a fan motor, and 4 colored LEDs. The swamp cooler functions by monitoring the water level from the cup that we provide it, which then leads it to display a message if the water level is too low. The swamp cooler also monitors the temperature and humidity levels, in which it will display those levels onto the liquid crystal display screen. This swamp cooler system is able to start and stop the fan motor as well as turn the system on and off. When it turns the system on and off, it is able to record the date and time when this occurred.

The temperature and humidity levels are the DHT11, which utilizes the DHT.h library. We defined the sensor in the code which allowed us to record the temperature and humidity results and send a digital signal to the corresponding data pin, outputting this information. The functions that we utilized from this library were the readTemperature() and readHumidity(). The readings from these functions are able to adjust the state of the swamp cooler.

The water level sensor is able to monitor the level of water depending where we place it. For this project, we took a small glass cup of water to use as a measurement. In order for this sensor to adjust the states of the swamp cooler, it needs to detect a certain water level. We

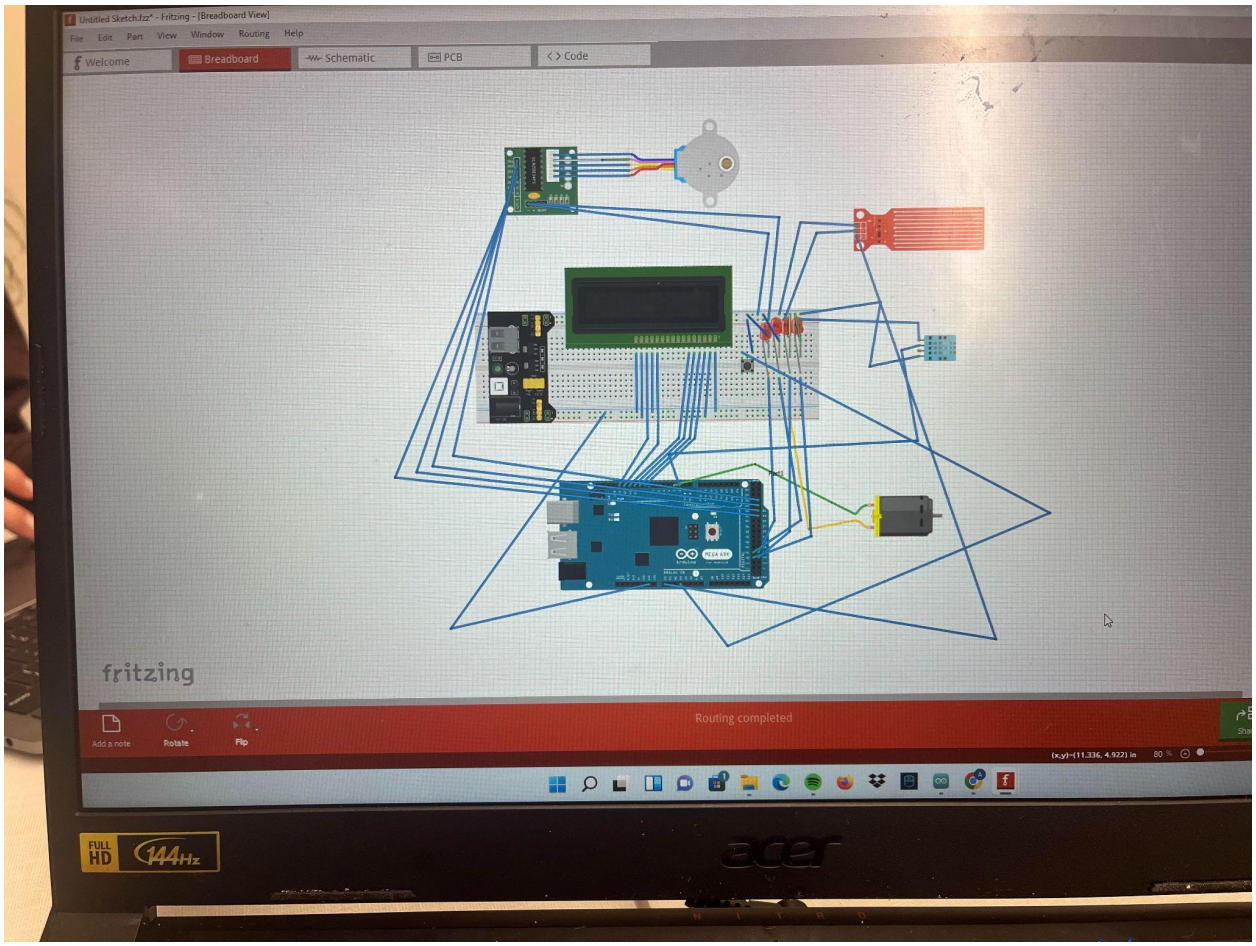
defined both water_level and water_threshold to inform the swamp cooler of when to change states and when to display an error.

We used a remote to control the system itself, implementing the IRremote.h library to achieve this.

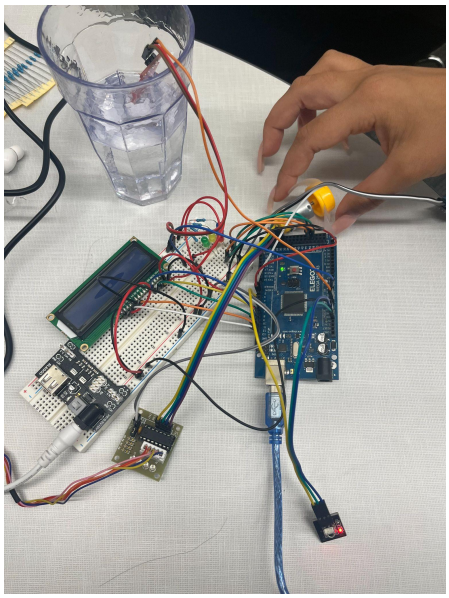
The liquid crystal display screen is able to show the temperature, humidity, and error messages relating to the water level. We utilized the LiquidCrystal.h library to achieve this, as well as the RTClib.b library to get the date and time when needed.

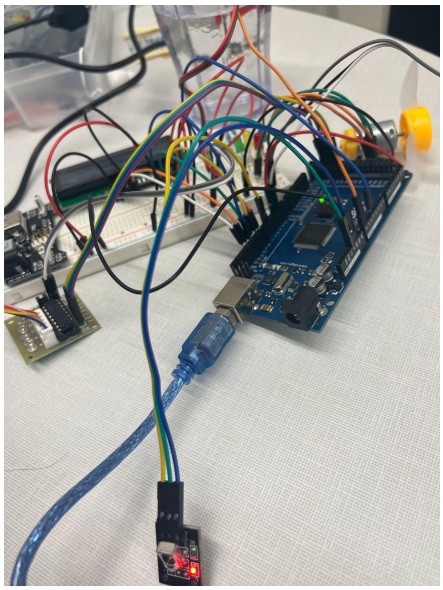
Our swamp cooler build includes the 4 colored LEDs. Each one represents a different state of the system. When the system is off or disabled, the yellow LED should be on. This implies that there is no water, temperature, or humidity monitoring taking place. When the system is idle, the green LED should be on. This implies that the water level is being monitored and the date and time is being recorded. When there is an error in the system, the red LED should be on. This implies that an error message will be displayed on the liquid crystal display screen and the motor is off. Lastly, when the system is running, the blue LED should be on. This implies that the fan motor is on and working properly, however, the system will change states if the temperature or water level drops below their specified threshold.

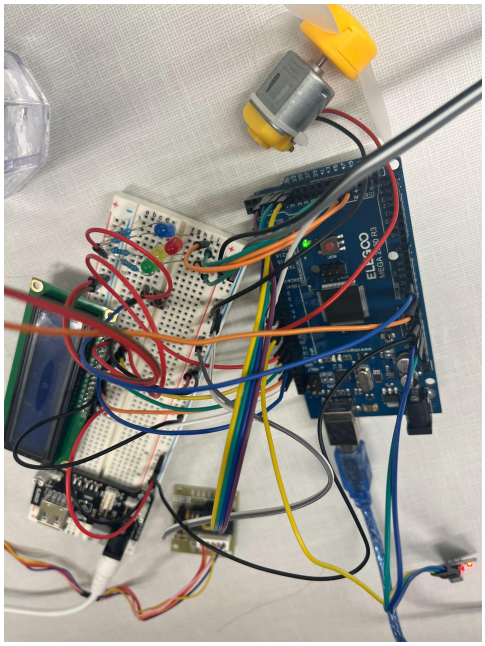
Schematic:

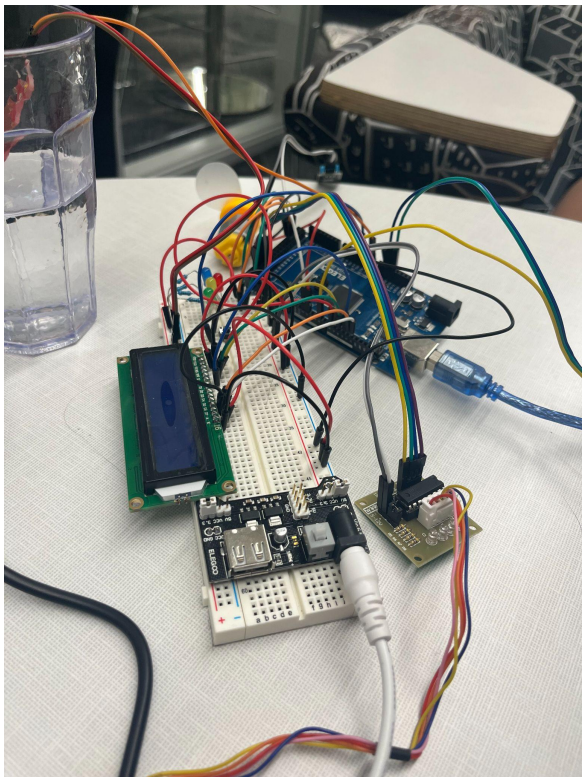


Operation photos:









Video link:

https://drive.google.com/file/d/12pt05TKsP7TBiVoiAPnETiiLplkmyutg/view?usp=share_link

GitHub link:

https://github.com/1001-Pache-Jordan/CPE-301-FInal-project-Annika-and-Jordan

Specification sheets:

Clock

https://www.analog.com/media/en/technical-documentation/data-sheets/ds1307.pdf

Arduino

https://ww1.microchip.com/downloads/en/devicedoc/atmel-2549-8-bit-avr-microcontroller-atmega640-1280-1281-2560-2561_datasheet.pdf

DHT11

https://www.mouser.com/datasheet/2/758/DHT11-Technical-Data-Sheet-Translated-Version-1143054.pdf

LCD

https://www.arduino.cc/reference/en/libraries/liquidcrystal/