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CPE 301-1001

December 13, 2022

Final Project

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Overview

This project is to demonstrate the design and implementation of a basic swap cooler. The following constraints are on the system:

- Components

The following are the list of all the components used in this design

- Arduino ATmega 2560 microcontroller
- LCD 1602 Module (LCD Screen)
- Power Supply Module
- ULN2003 Stepper Motor Driver Module
- Stepper Motor
- Water Level Detection Sensor Module
- DS1307 RTC Module (Time and Date Module)
- DHT11 Temperature and Humidity Module
- Fan Blade and Motor
- Diode Rectifier x1
- NPN Transistor PN2222 x1
- LED x4 (Red, Yellow, Green, and Blue)
- Button x2
- Jumper Wires

- Power

This design requires both the 5V and 3.3V power supply from the Arduino AT Mega in addition to a supplemental 5V power supply. The 3.3V is required to provide the backlight to the LED screen, and the supplemental 5V provides power to both the stepper motor and the fan motor.

- Operating conditions

The system will start in a DISABLED state. When powered on it will enter an IDLE state and begin monitoring the temperature, humidity, and water reservoir levels. If at any point, outside of the DISABLED state, the water reservoir levels fall too low the system will enter an ERROR state.

Once in an ERROR state it must be cleared by refilling the reservoir and resetting the system.

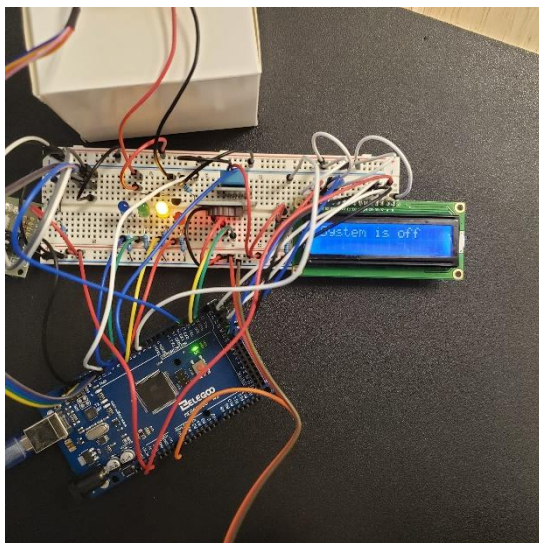
The system will enter a RUNNING state, fan on, when the temperature goes above 80° F.

- GitHub

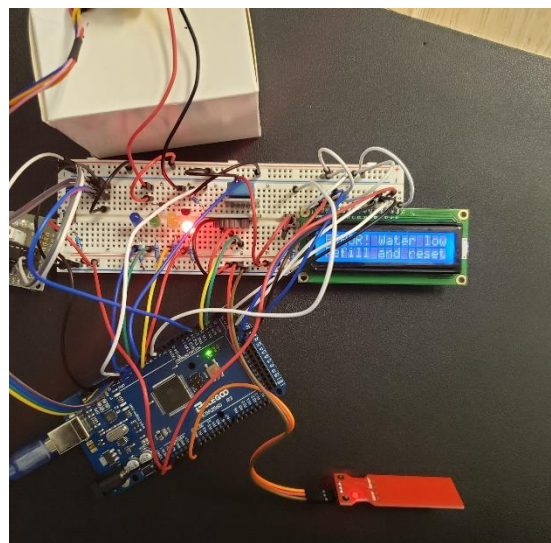
The .ino file as well as other supplementary documentation can be found at:

https://github.com/1001-Greenhill-Zachary/CPE_301_Final_Project

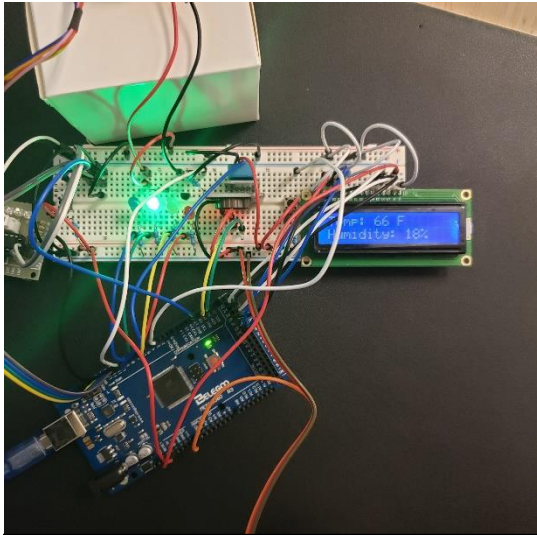
Pictures and Video



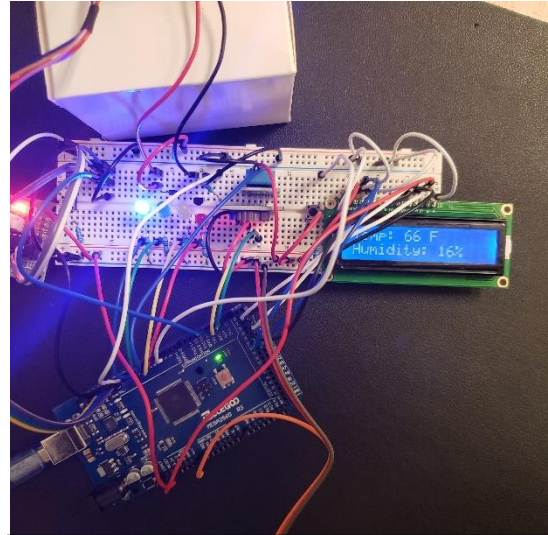
Starting state, DISABLED. Yellow LED is on.



ERROR state. User must press reset to exit this state and return to DISABLED.



IDLE state, temperature is below operating threshold.



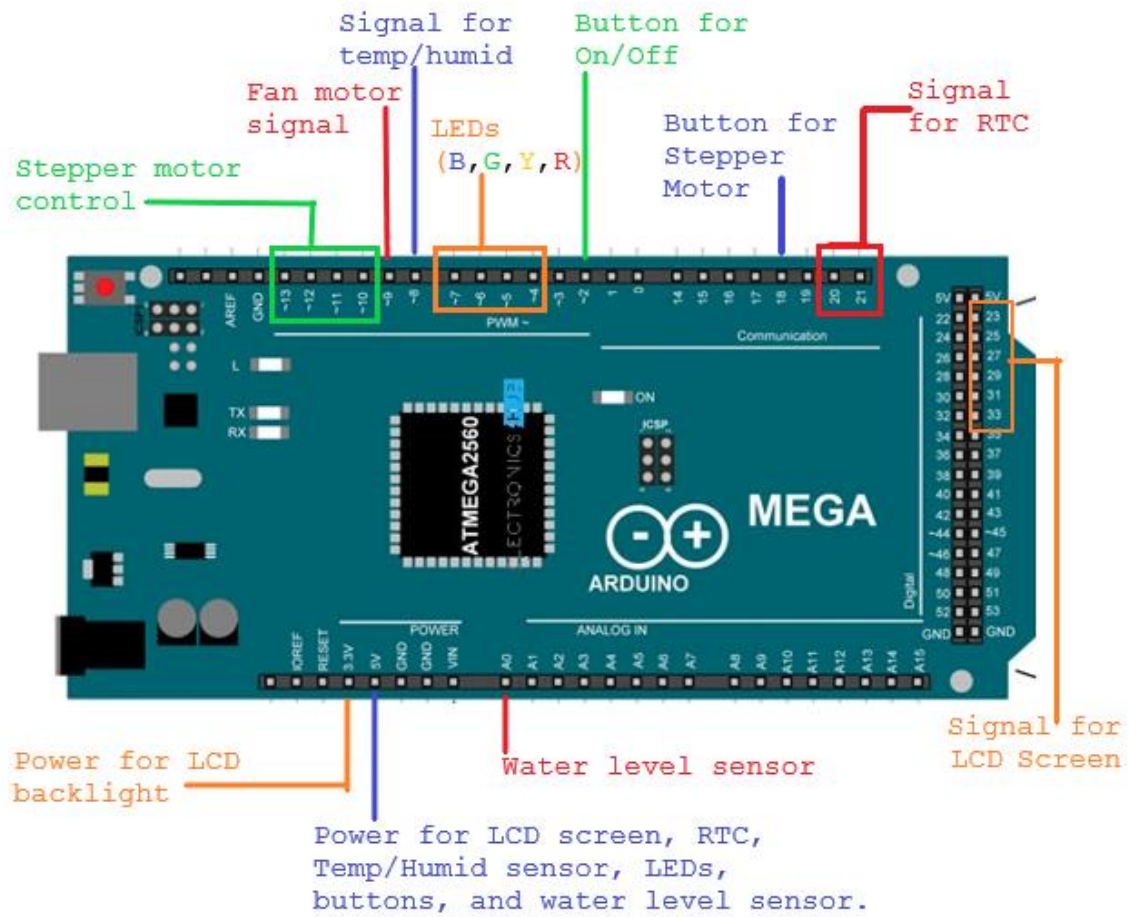
RUNNING state, temperature is above threshold. **NOTE:** In this picture the code has been modified to run at 60° F

Link to video:

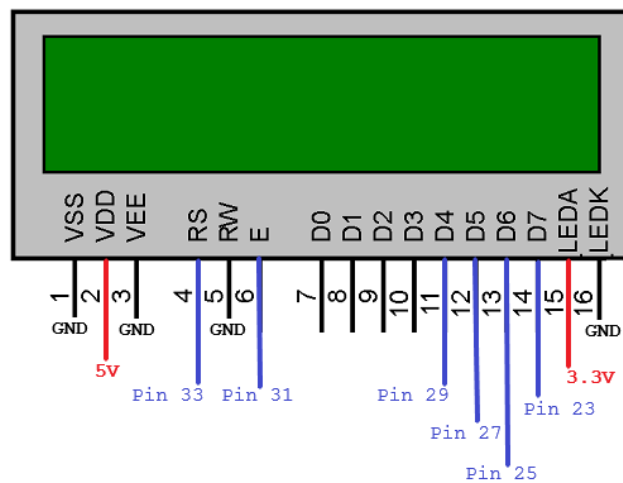
<https://drive.google.com/file/d/1UZjRkMaZhOVvSKgoNY8k4sUtxES9nrg3/view?usp=sharing>

Design and Schematics

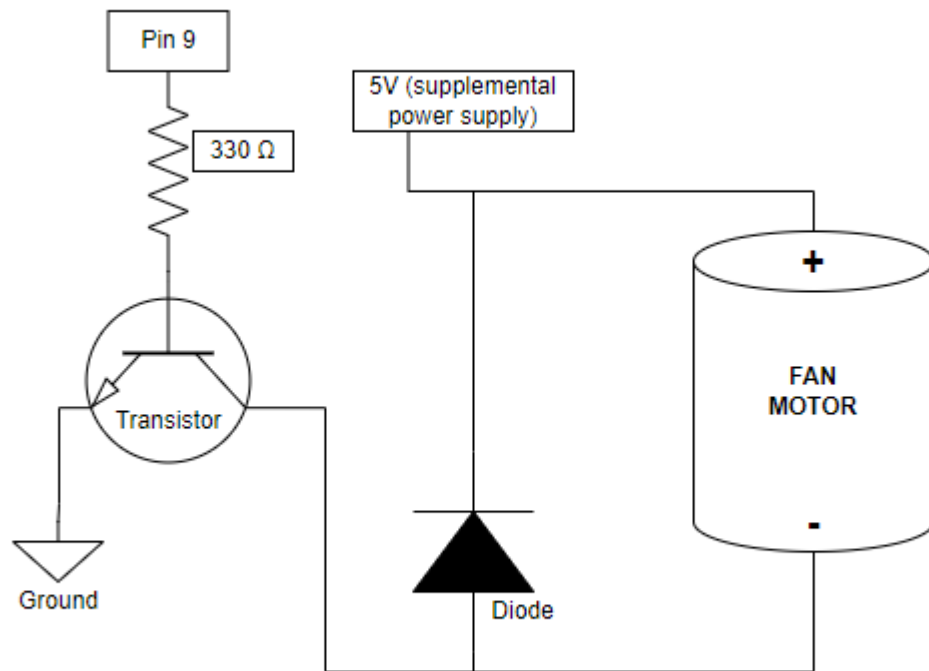
- Arduino



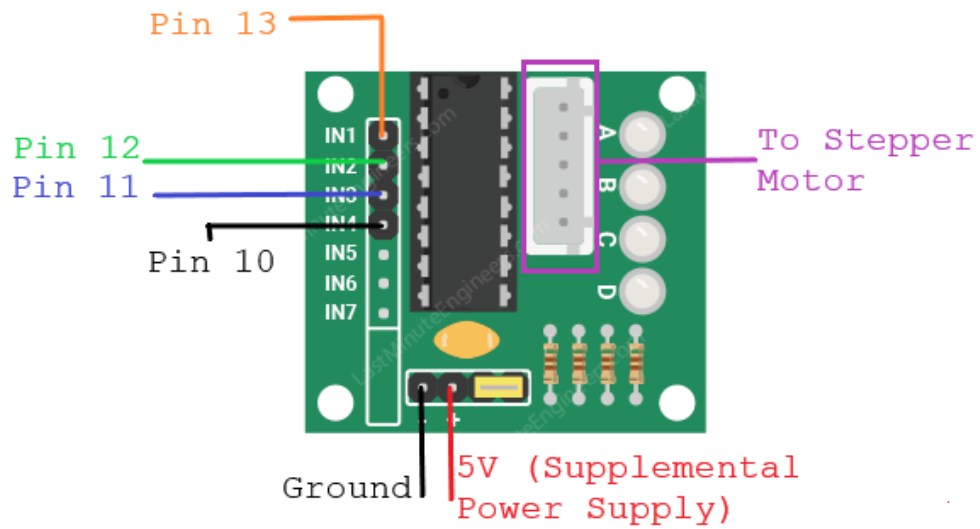
- LCD



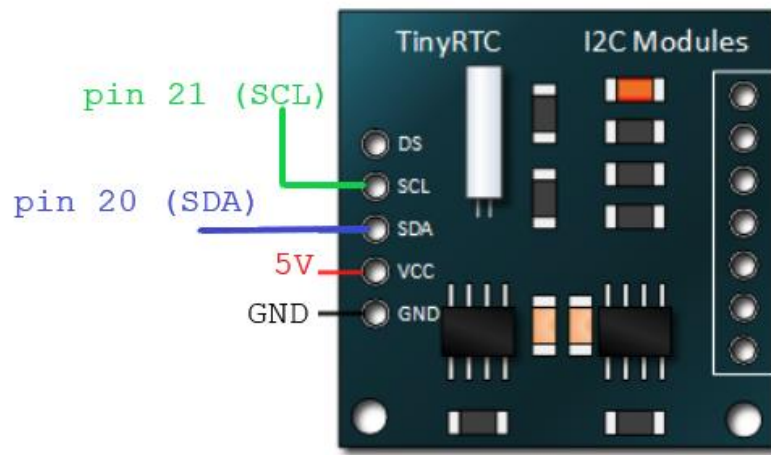
- Fan Motor



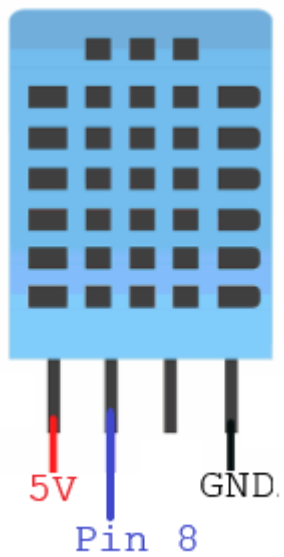
- Stepper Motor



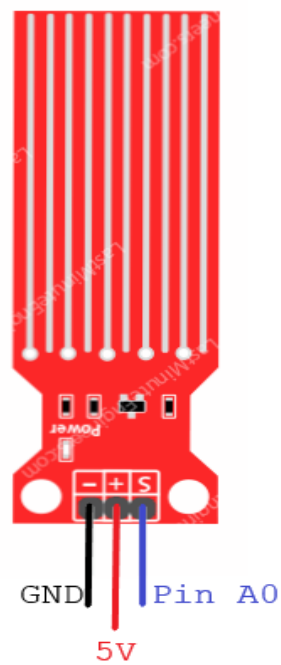
- RTC (Time and Date controller)



- Temperature and Humidity Sensor



- Water Level Sensor



References

The following libraries were used in this project:

<https://github.com/adafruit/RTClib>

https://github.com/adafruit/Adafruit_BusIO

https://github.com/adafruit/Adafruit_Sensor

<https://github.com/adafruit/DHT-sensor-library>

Other resources used were found at:

<https://lastminuteengineers.com/>

<https://arduinogetstarted.com/>

<https://create.arduino.cc/projecthub/>

GitHub Repository Link

https://github.com/1001-Greenhill-Zachary/CPE_301_Final_Project