

CPE 301, Spring 2024  
Final Project: Swamp Cooler

Team Name:

7uice

Team Members:

Seth Begonia

# CPE 301, Spring 2024

## Final Project: Swamp Cooler

### **1. Introduction**

For the final project we are instructed to create a swamp cooler without the body. The concept is easy on the surface, but the class's objective was to go more in depth with the Arduino microcontroller and not use the given library functions.

### **2. Experimental Design**

This project presented a lot of good and bad about working this kind of project as the only idea funnel is just you and essentially the coding part itself will be difficult. The first thing I decided to do was just calibrate each component. I used both TINKERCAD and other websites cited below to help me with this first part. I then modified the library functions that we were not allowed to use and implement the functions we were taught in class and in the labs. After I looked through and calibrated all the parts, the only part I unfortunately have left out was the stepper motor, more on that in Section 3 of this report.

When the calibration tests were done, it was time to put it all together. My first approach was to implement all the libraries I used in the calibration round. Then I took the “my\_delay” and “adc” functions with its given variables and then started to setup. I first put the interrupt button with an if-else statement to test if the LEDs function properly with what I need it to do. Then I add the water and DHT sensors to include more if-else statements for more LED testing. Then I implemented the LCD Display to display the temperature and humidity when it is in its idle state. (Also, in its disabled state, I added a little statement to let the user know that the cooler is currently inactive.) I then added the fan to activate when it needs to and to be turned off when it is not. Finally, I added the RTC and finished up the project with the video.

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### 3. Errors Encountered

There was only 1 error I encountered and could not solve., the stepper motor. I decided not to include the motor as there was no definitive source where I could rely on and give me the code and schematic to use it. The tutoring center in SEM was also unable to help me and so I shall take the deductions where necessary.

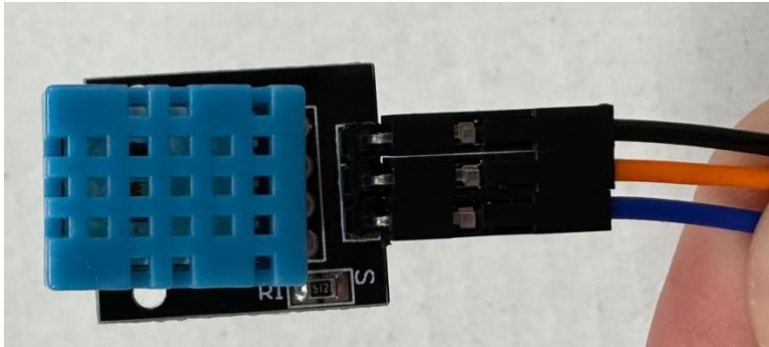
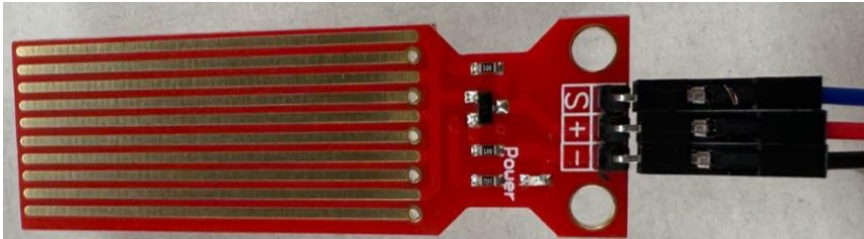
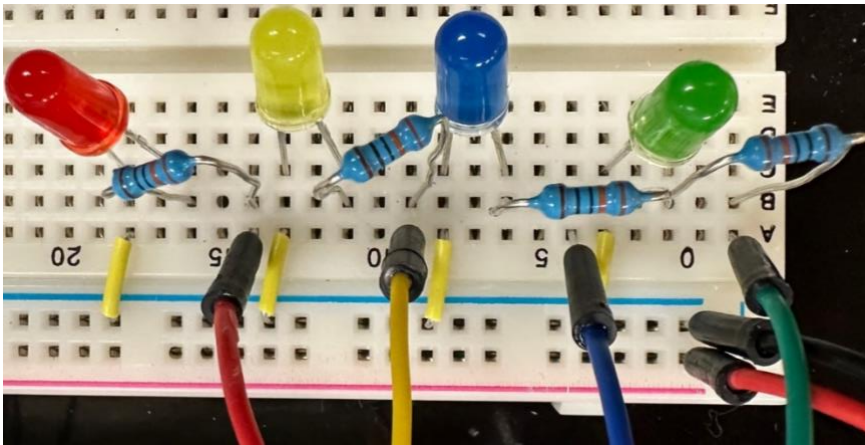

### 4. Final Design

I was only a little unhappy with the structure of the whole circuit as there was most definitely a way to alter it to make it look nicer and for the human eye to be able to follow the leads and where it connects to. I have also provided a table as to where each lead from each component connects to just to have some ease of grading. Below is the list of parts and their purpose and a table of the component's images and its connections.

Component Name	Purpose
DHT Sensor	This component is used to detect the temperature and humidity of the environment to activate the fan and the vent if threshold is met or not met
Water Level Sensor	This component is used to detect the water level and will activate the ERROR state if threshold is not met
LEDs	A different color LED will activate when the cooler states change. Red is ERROR. Green is IDLE. Blue is RUNNING. And yellow is DISABLED.
DS1307 Module (RTC)	This component is used to display the time and date of the process.
LCD Display	This component is used to display the temperature and humidity. It is also used to display the error state when the water level is too low. I also added in the “start” display to let the user know its in its disabled state.
DC Fan	This component’s purpose is just to activate when the temperature gets too hot.

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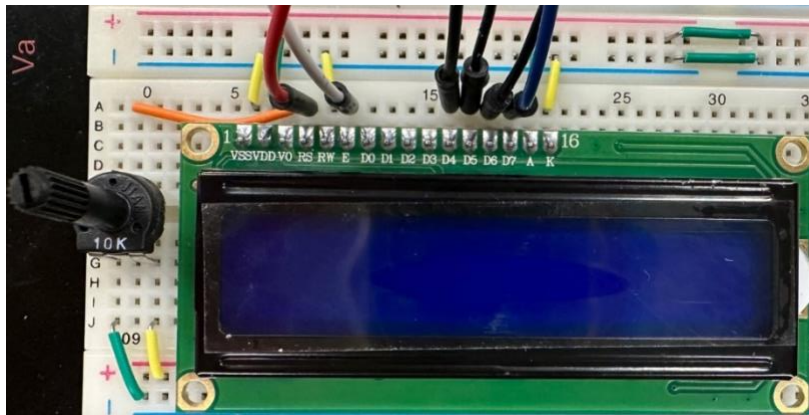
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Component Name	Component Image	Component Leads										
DHT Sensor		<table><tr><th>Component Pin</th><th>Arduino Pin</th></tr><tr><td>Bottom pin</td><td>D44 / PL5</td></tr><tr><td>Middle Pin</td><td>Power</td></tr><tr><td>Top Pin</td><td>Ground</td></tr></table>	Component Pin	Arduino Pin	Bottom pin	D44 / PL5	Middle Pin	Power	Top Pin	Ground		
Component Pin	Arduino Pin											
Bottom pin	D44 / PL5											
Middle Pin	Power											
Top Pin	Ground											
Water Level Sensor		<table><tr><th>Component Pin</th><th>Arduino Pin</th></tr><tr><td>+</td><td>D7 / PH4</td></tr><tr><td>-</td><td>Ground</td></tr><tr><td>S</td><td>A5</td></tr></table>	Component Pin	Arduino Pin	+	D7 / PH4	-	Ground	S	A5		
Component Pin	Arduino Pin											
+	D7 / PH4											
-	Ground											
S	A5											
LEDs		<table><tr><th>LED Color</th><th>Arduino Pin</th></tr><tr><td>Green</td><td>D13 / PB7</td></tr><tr><td>Blue</td><td>D12 / PB6</td></tr><tr><td>Yellow</td><td>D11 / PB5</td></tr><tr><td>Red</td><td>D10 / PB4</td></tr></table>	LED Color	Arduino Pin	Green	D13 / PB7	Blue	D12 / PB6	Yellow	D11 / PB5	Red	D10 / PB4
LED Color	Arduino Pin											
Green	D13 / PB7											
Blue	D12 / PB6											
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Red	D10 / PB4											
DS1307 Module (RTC)		<table><tr><th>Component Pin</th><th>Arduino Pin</th></tr><tr><td>GND</td><td>Ground</td></tr><tr><td>VCC</td><td>Power</td></tr><tr><td>SDA</td><td>D20 / SDA</td></tr><tr><td>SCL</td><td>D21 / SCL</td></tr></table>	Component Pin	Arduino Pin	GND	Ground	VCC	Power	SDA	D20 / SDA	SCL	D21 / SCL
Component Pin	Arduino Pin											
GND	Ground											
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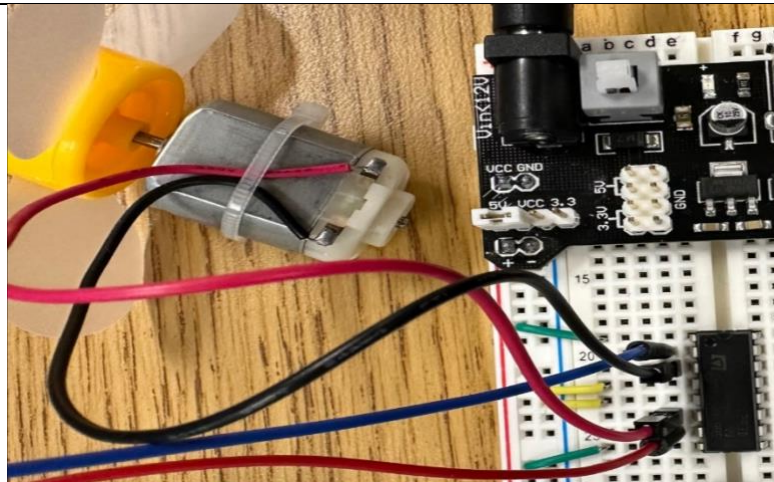
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LCD Display

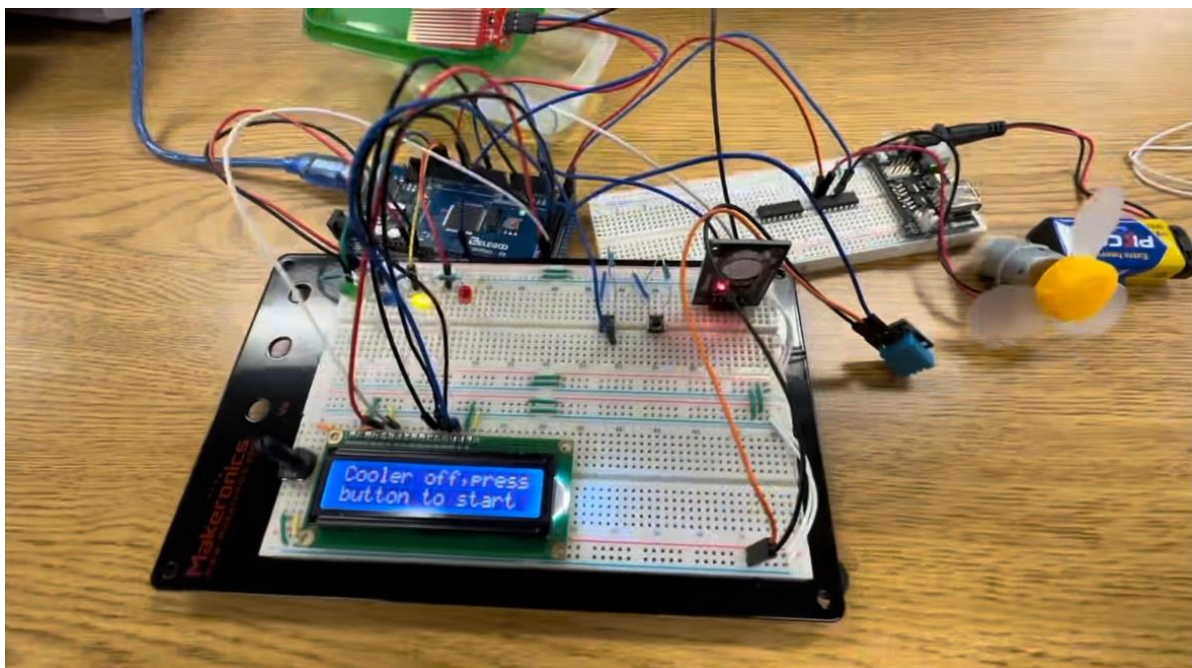


Component Pin	Arduino Pin
VSS	Ground
VDD	Power
V0	Potentiometer
RS	D52 / PB1
RW	Ground
EN	D53 / PB0
D4	D50 / PB3
D5	D51 / PB2
D6	D48 / PL1
D7	D49 / PL0

DC Fan



L293D Motor Driver Pins	Arduino Pin
1	Power
2	D23 / PA1
3	Fan Ground
4	Ground
5	Ground
6	Fan Power
7	D25 / PA3
8	Power





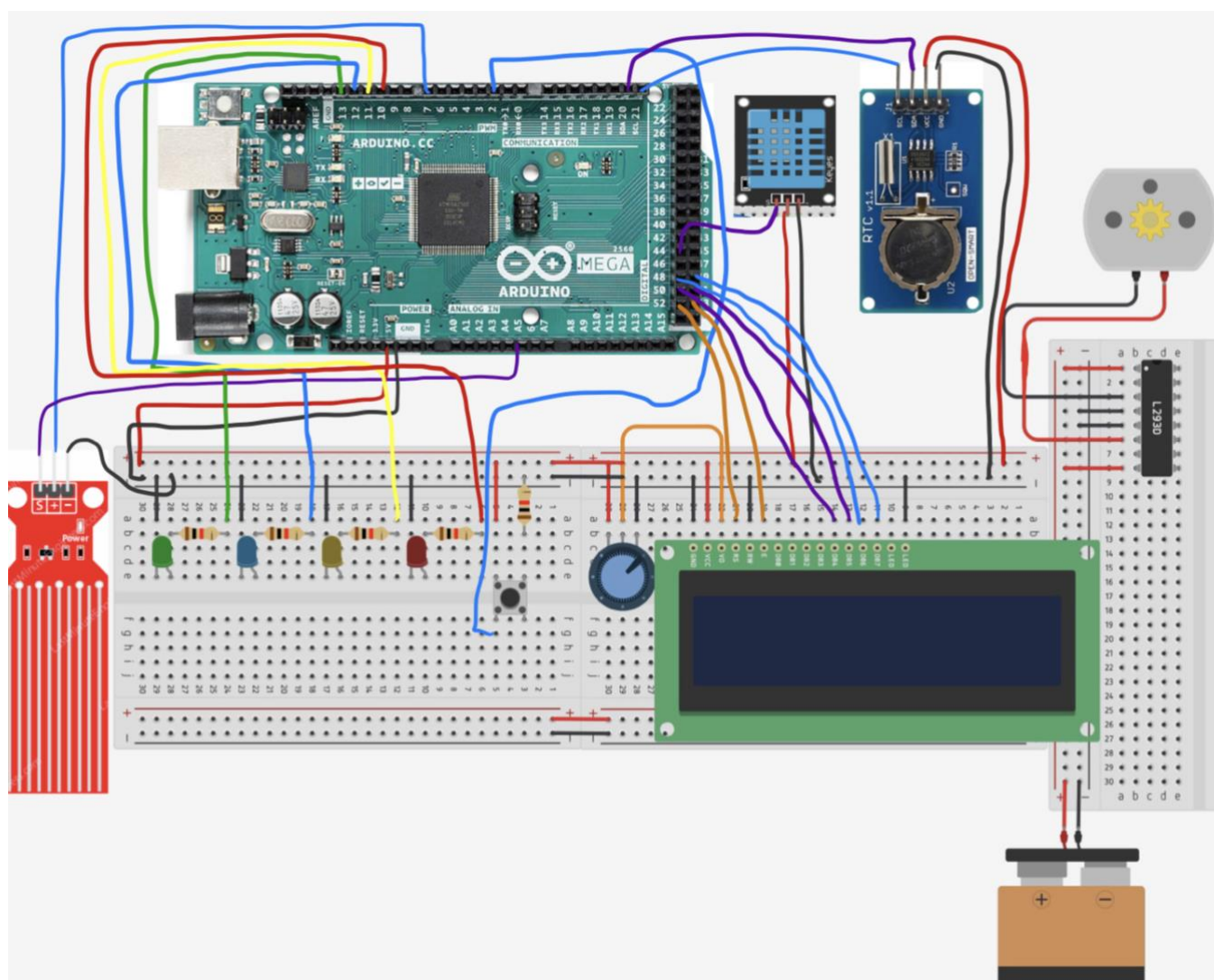
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### 5. Closing Remarks

This whole project was stressful and rewarding at the same time. Hopefully you can tell I put in a lot of time and effort into this project just from this report as well. Although I am going to lose points on the stepper motor not being present, this was still extremely fun and challenging to put the whole circuit and code together.

### 6. Schematic



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### **7. Links to Github and Video**

[GitHub](#)

[Video To Google Drive](#)

[Video To YouTube](#)