

UNR CPE301 – Fall 2023

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CPE Final Project Overview

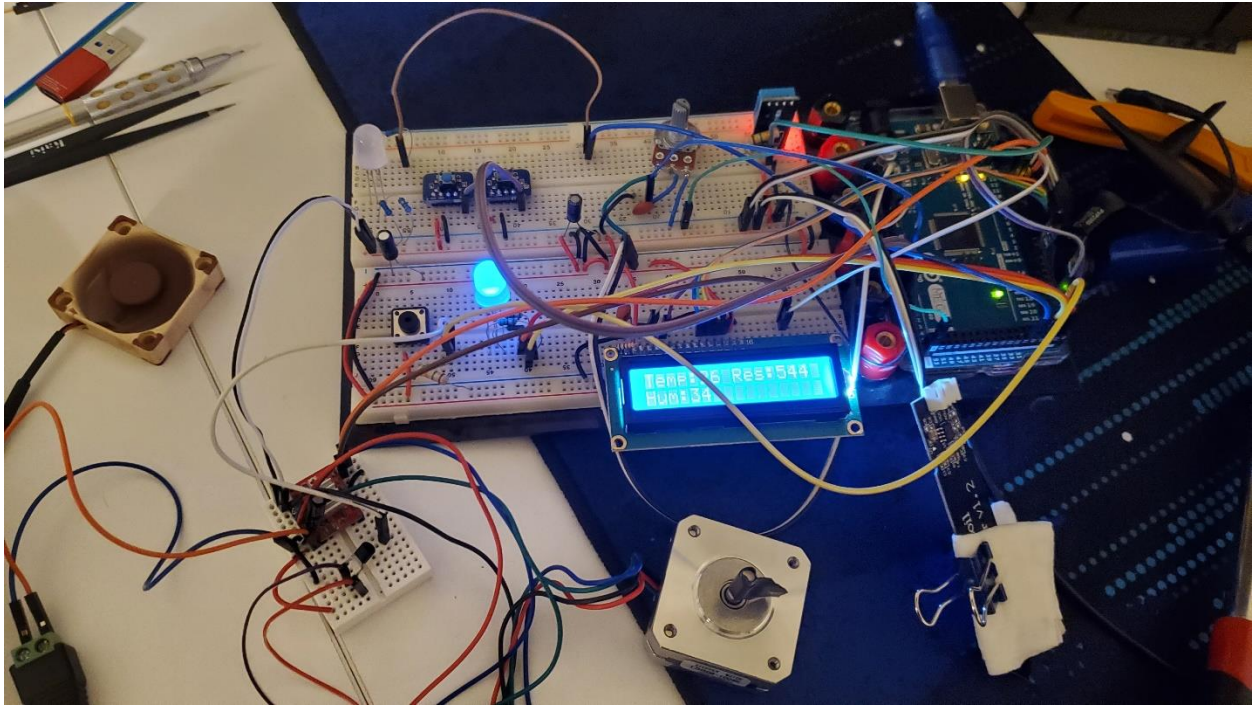


Figure 1: The swamp cooler shown above is running.

GitHub Repo:

<https://github.com/GCovertUNR/CPE301-Final-Project/>

Design overview and constraints

User interface:

There are **two buttons**, start/stop and reset. Both are on Pin Change Interrupt 2 (PCINT2). When the ISR function is triggered by a button press on either, a flag is set depending on which button was pressed.

- Both buttons cannot be pressed at the same time.
- On rare occasions, the button will bounce and the ISR will run twice.

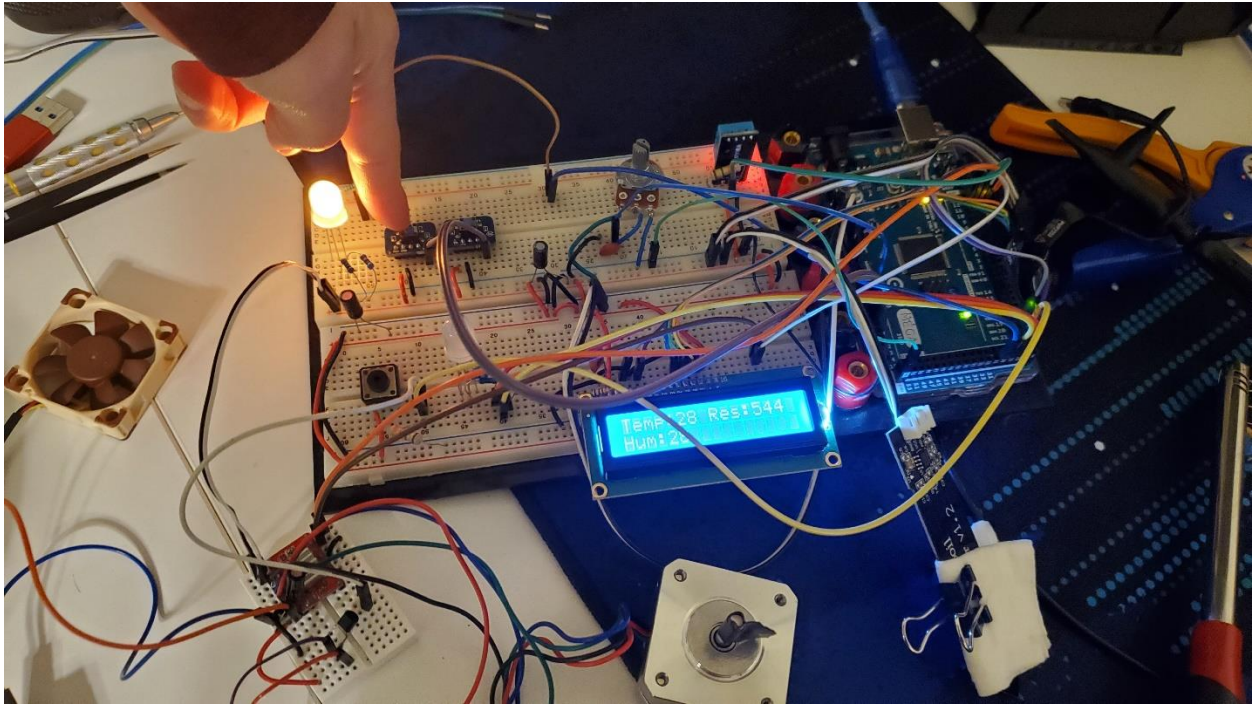


Figure 2: Pushing the button disables the fan until a button is pushed again.

The **LCD Display** will tell the user the temperature in Celsius and the relative humidity percentage. When in the error state, the LCD will indicate the error message and the time of occurrence.



Figure 3: The LCD shows the reservoir level, temperature, and humidity values.

The **Serial monitor** will update when the state of the system changes to tell the user whether the temperature or low water thresholds are reached or whether the start/stop or reset buttons are pressed. The date and time of the event will also be reported on the same line.

The **potentiometer** sets the position of the vent motor. The motor turns approximately 360 degrees over the range of the potentiometer.

- The ADC read value for the potentiometer is sometimes noisy. To minimize this, the voltage is sampled 64 times and averaged.
- The motor will not move when the system is in the error state.
- When the error state is reset, the motor will update to the new position if the potentiometer was moved while in the error state.

Environmental Sensors:

- The DHT11 sensor measures the humidity and temperature.
- The capacitive soil moisture sensor measures the reservoir water level.
- The Real Time Clock (RTC) keeps track of the time and date by sensing the passage of time.

Operation:

The device is set to turn on when the temperature is greater than 24 degrees Celsius. When the water reservoir measures 430 or lower, the low level threshold will trigger an error state. These thresholds can be adjusted from the global variables in final-main.ino file.

In the error state the motor fan will turn off and the vent motor is not adjustable. To clear the error state, ensure the reservoir detects water and press the reset button.

To put the device in an idle state, the start/stop button can be pressed at any time.

Video Operation Demo:

<https://youtu.be/MxMUI4j9mvQ>

Schematic

