Final Project

University of Nevada, Reno
CPE 301 Embedded System Design
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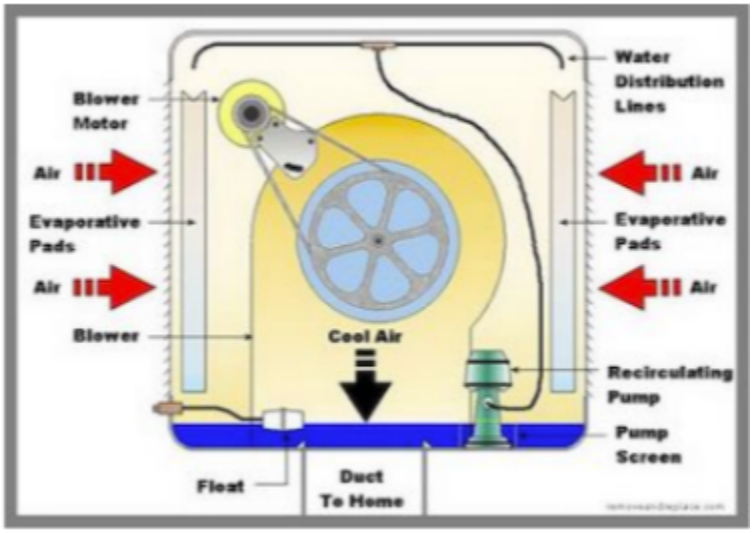
The objective is to develop an evaporation cooling system (aka a swamp cooler). Evaporation coolers provide a more energy-efficient alternative to air conditioners in hot, dry climates. A pad that has been saturated in water allows air to be drawn in from the outside. Air is cooled and made more humid by water evaporation. Since they rely on evaporation, they are ineffective in humid environments.



The required components used for this project are

- Arduino AtMega 2560
- Wiring Kit
- 330 and 1kΩ Resistors
- 10kΩ Potentiometer
- DHT 11 (Temperature and Humidity Module)
- Stepper Motor
- ULN2003 Stepper Motor Driver Module
- DS1370 RTC Module
- Water Level Detection Sensor Module
- Fan Blade and 3-6V Motor
- Button
- Red, Green, Blue, and Yellow LEDs
- Water in a cup

The cooler stages are controlled by the user or automatically by the events such as temperature changes. The whole process includes a total of four stages which are: Disabled, Running, Idle, and Error. All of them report the time of each state transition and the changes made by the stepper motor position for the vent.

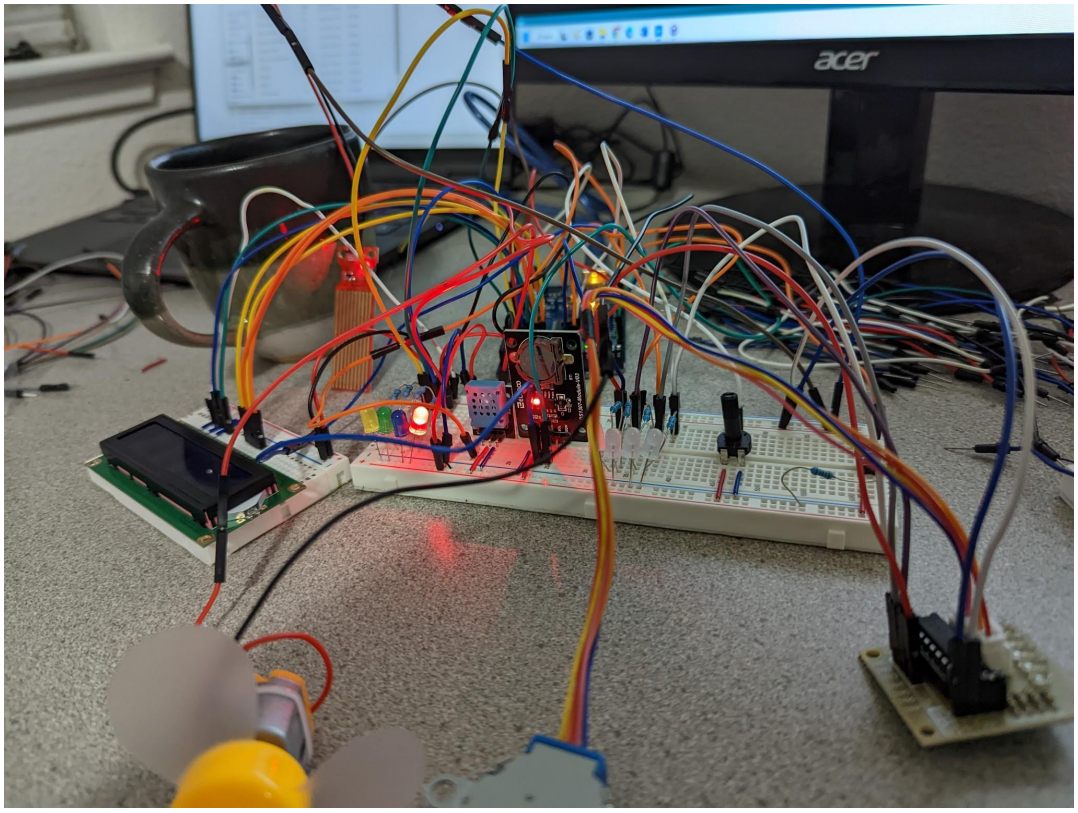
Also for all the stages except for the Disabled, the humidity and the temperature are monitored by the LCD screen and the updates occur once per minute. Also, the system responds to the changes made in the vent position, as well as the control to turn off (if on) the fan with a button to return to the Disabled stage.

The Disabled stage consists of turning ON the Yellow LED and the RTC is off, so there is no monitoring of the temperature.

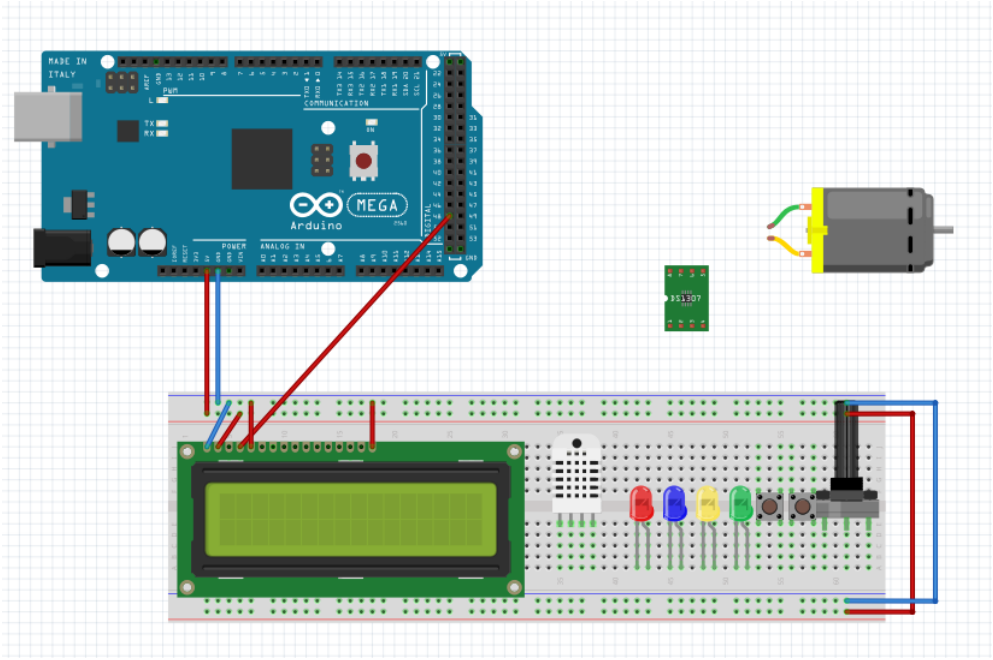
When the system is in the Idle state the Green LED is ON, and the transition is stamped by the RTC. The water level is still monitored and changes to the Error stage if the water level is too low. If the actual temperature is greater than the threshold of 80 degrees Fahrenheit the system automatically goes to the Running state.

In the Running stage, the fan and the Blue LED are ON. The system will transition to the Idle stage only if the actual temperature is below the threshold of 80 degrees Fahrenheit. It will mark Error only if the water level is below the threshold of 200.

When the water level is below the threshold (200) the system automatically enters the Error stage. The Red LED is on and the LCD screen says “Error”. It will return to the Idle stage only if the Reset button is pressed. If the stop button is pressed goes to the Disabled stage.



Final Outcome



Attempt made for the Schematic using Fritzing App

Github Repository:
https://github.com/1109-Pittenger-Michael/CPE-301-Final-Project-Michael-Pitttenger-and-German-Gomez.git

Video 1:
https://drive.google.com/file/d/1zjoqci3CijXWYOeE_OjS361qAFp6kQ7K/view?usp=share_link
Video 2:
https://drive.google.com/file/d/1zj9_5OnS-eqVXSpcGweSspdvtszCMUBV/view?usp=share_link

Datasheets:

DHT11: https://components101.com/sensors/dht11-temperature-sensor

DS1370 RTC Module:
https://www.analog.com/media/en/technical-documentation/data-sheets/ds1307.pdf

ULN2003 Stepper Motor Driver Module:
https://www.electronicoscaldas.com/datasheet/ULN2003A-PCB.pdf

LCD 1602 Module: https://www.openhacks.com/uploadsproductos/eone-1602a1.pdf