Timothy Hand's Group

Members:

Timothy Hand

Final Project Write Up

The goal is to create an evaporation cooling system (aka a swamp cooler). In dry, hot climates, evaporation coolers provide a more energy-efficient alternative to air conditioners. Air is pulled in from the outside through a pad that is soaked in water. The evaporation of the water cools and humidifies the air. As they rely on evaporation, they do not work in humid climates.

Design Overview:

Water Level Monitoring: The system will monitor the water levels in a reservoir and print an alert when the level is too low. This ensures that the system does not operate without sufficient water, preventing damage to the equipment.

Temperature and Humidity Monitoring: It will monitor and display the current air temperature and humidity on an LCD screen. This information allows users to assess the effectiveness of the cooling system and adjust settings as needed.

Fan Control: The system will start and stop a fan motor as needed when the temperature falls out of a specified range (high or low). This ensures efficient operation and prevents unnecessary energy consumption.

Vent Angle Adjustment: Users will be able to adjust the angle of an output vent from the system. This feature allows users to direct the cooled air where it is needed most, improving comfort and efficiency.

System On/Off Control: A user-friendly on/off button will enable or disable the entire system. This provides users with convenient control over the operation of the cooling system.

Time and Date Recording: The system will record the time and date every time the motor is turned on or off. This information will be transmitted to a host computer over USB, allowing users to track system usage and performance over time.

Constraints:

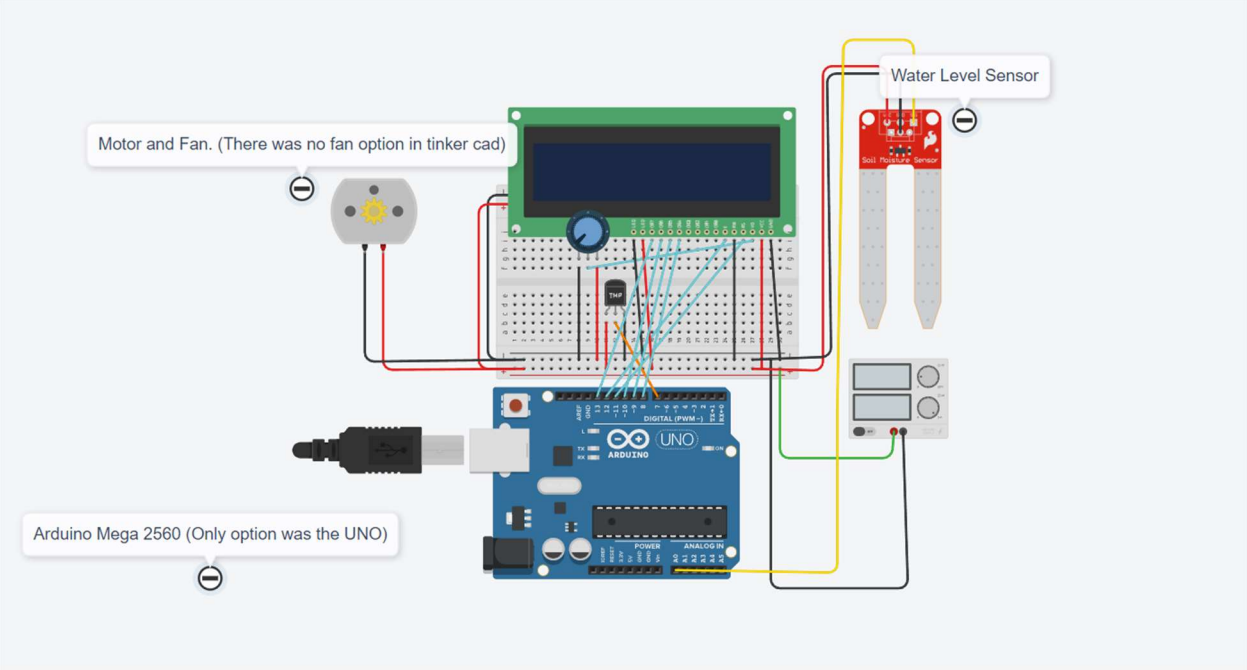
Operating Environment: The system is designed to operate in dry, hot climates where evaporation cooling is effective. It may not perform optimally in humid environments.

Power Requirements: The system should be designed to operate efficiently, with consideration for power consumption to minimize energy usage.

Component Compatibility: Components used in the system should be compatible with each other and suitable for the intended application.

User Interface: The user interface should be intuitive and user-friendly to allow for easy operation and control of the cooling system.

Schematic:



Components Used:

Arduino Mega 2560:

https://docs.arduino.cc/resources/datasheets/A000067-datasheet.pdf

LCD1602 Module:

https://www.waveshare.com/datasheet/LCD_en_PDF/LCD1602.pdf

Water Level Detection Sensor Module:
https://www.biomaker.org/block-catalogue/2021/12/17/water-level-sensor-tzt-water-level-sensor

DHT11 Temperature and Humidity Module:

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

Stepper Motor:

https://www.velmex.com/Downloads/OEM-Spec_Charts/PK264M-03B_StepperMotor.pdf

Fan Blad and 3-6v Motor:

https://wiki-content.arduino.cc/documents/datasheets/DCmotor6_9V.pdf

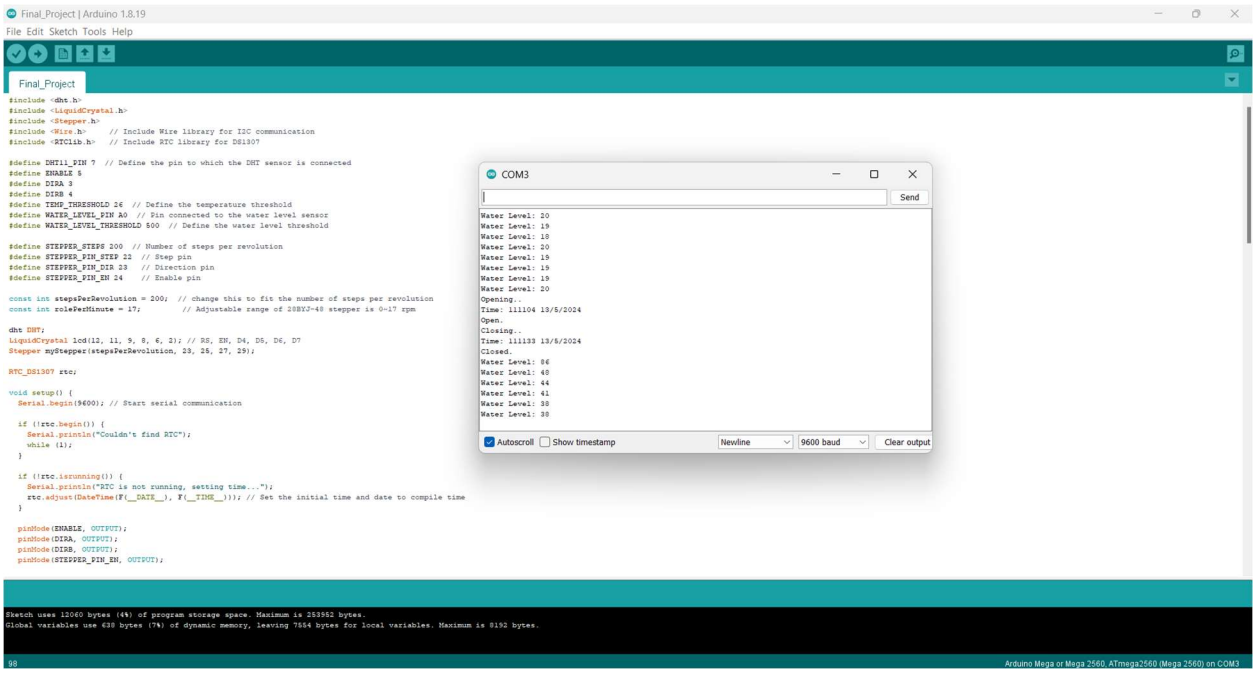
DS1307 Module

https://www.sparkfun.com/datasheets/Components/DS1307.pdf

L293D IC

https://components101.com/ics/l293d-pinout-features-datasheet

Working Code:



Final Setup: