CPE 301 Final Project

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Overview:

General Overview:

The general utility of the project is to create a swamp water cooler, where water is contained and analyzed for its current water level, temperature and humidity. Depending on these values, the program will enable a specific state, and provide information to the LCD screen, as well as turning on the corresponding components depending on the water's current state. For reading water level, we are using the given Water Level Detection Sensor Module, which reads through the analog pin. For detecting the water humidity and temperature, we are using the DHT11 Temperature and Humidity Module and its corresponding *DHT.h* library. For the motor controlling the fan (to cool and bring down water temperature) we are using a 3-6V Motor, and the stepper motor controlling the vent angles. For recording the time each state changes, we are using the Real-Time Clock Module DS1307 and the *RTClib.h* library. To print the information, we used the LCD Screen LCD1602 and its corresponding *LiquidCrystal.h* library. We also have other miscellaneous parts to help the function of the circuit, including the potentiometer, a diode, a transistor, and several resistors.

Program Functionality:

The program will begin in a disabled state, with the yellow light turned on. If this is not the initial state (i.e. there was a previous state before being in the DISABLED state), then the current time will be printed to the Serial monitor (indication the system is being turned off). Being a looped function, the program will continuously keep it in a disabled state until the dip button that enables the program is detected as pressed.

If the corresponding button is pressed, the program will go into an IDLE state, enabling the green LED, displaying time to the serial monitor, and displaying the current temperature and humidity. While in the idle state, it will initially check if water meets the current threshold, going into an ERROR state if so. If the previous button is pressed again, the state will become disabled. Then if the previous two states are not initiated, temperature is checked and sent into a RUNNING state if temperature is too warm.

In the RUNNING state, displayed information is the same as the IDLE state with a blue LED enabled. An additional functionality is the fan being enabled in order to lower the current temperature. Again, similar to the IDLE state, the same information is

checked and determines whether the system goes into a different state, this time checking if the current temperature is cold enough to go back into an IDLE state.

Finally is the ERROR state, which will occur at any point the water threshold is not met. A red LED is enabled, and the LCD screen will display the current water level. At this point, two options from the ERROR state are possible. The system will wait for the threshold to be met and once the reset button is pressed, the program goes back into an IDLE state. The alternative option is that the button to turn on the system is pressed again, which will disabled the system and change it into a DISABLED state.

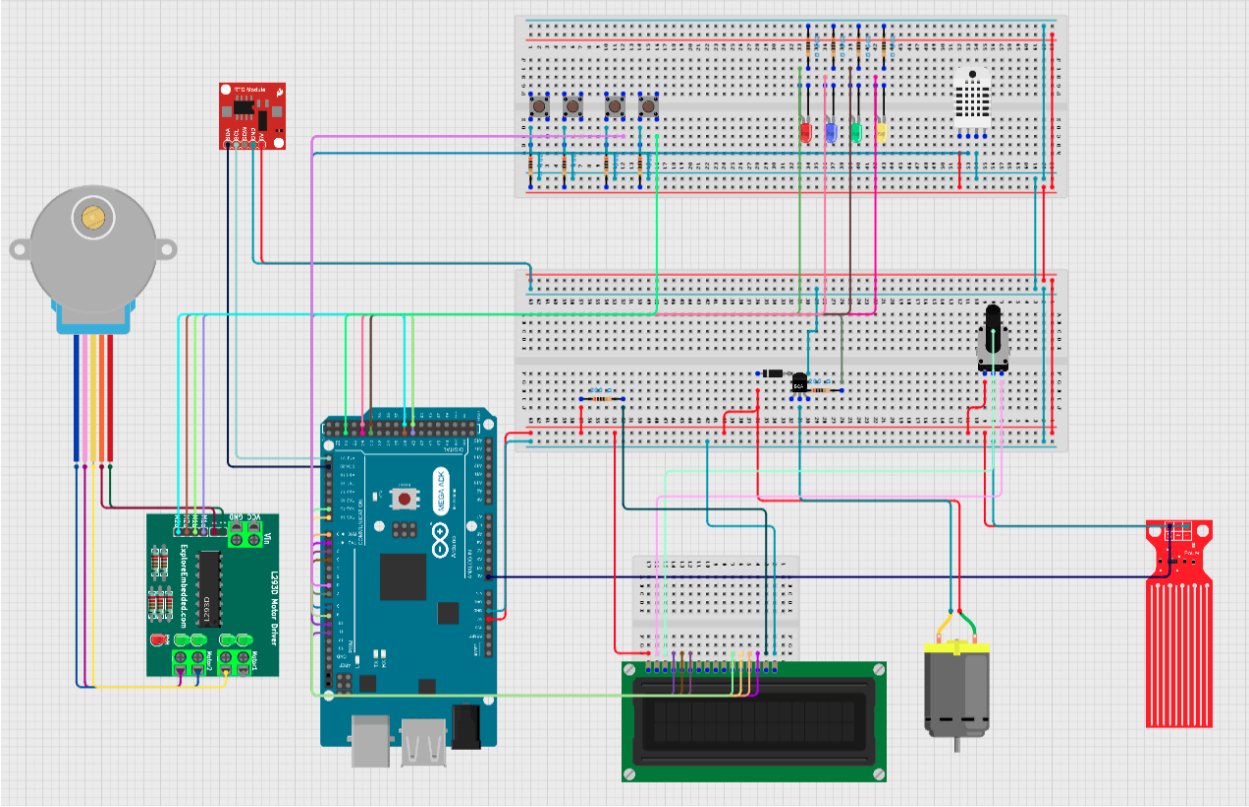
In all states but ERROR, a function is able to be called which will allow the stepper motor to be moved, simulating the ventilation system adjustment that would be used to moderate air flow.

Constraints:

In terms of constraints to the system, they primarily came in the form of how certain aspects of the water were measured. For temperature, the fan would only work at a certain temperature threshold to go into a running state (where the fan would then turn on). Likewise, the idle state would only be enabled if temperatures were below a certain threshold.

For power, no additional voltage power supply was necessary for the system to run properly.

Schematic (Designed in *Cirkit Designer*):



Component Reference Sheets:

Arduino Mega Board - Pinout, ATMega 2560 Sheet
LCD Screen - Liquid Crystal Display
Stepper Motor - Arduino Stepper Motor
Temperature and Humidity Sensor - DHT11 Installation, DHT11 Datasheet
Water Level Sensor - Water Level Sensor Information
Real-Time Clock - Adafruit DS1307, DS1307 Datasheet

Github Repository:

https://github.com/MagbanLeon/CPE301FinalProjectSP24.git

Demo Video:

https://drive.google.com/file/d/1gKh3uVJfl0HYty48OoK_R5lDYOdJ0EP6/view?usp=drive_link

Picture(s):