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CPE 301 Final Project

Final Project Overview

The project was to build a swamp cooler using the Arduino Mega board and programming. Some of the components that were utilized for this project was the DHT11 sensor for humidity and temperature, water level sensor, 5 buttons, 4 LEDS, LCD display, stepper motor, DC motor and fan, and a power supply. We used a cup of water in order to test the water sensor and also a potentiometer to control the LCD display.

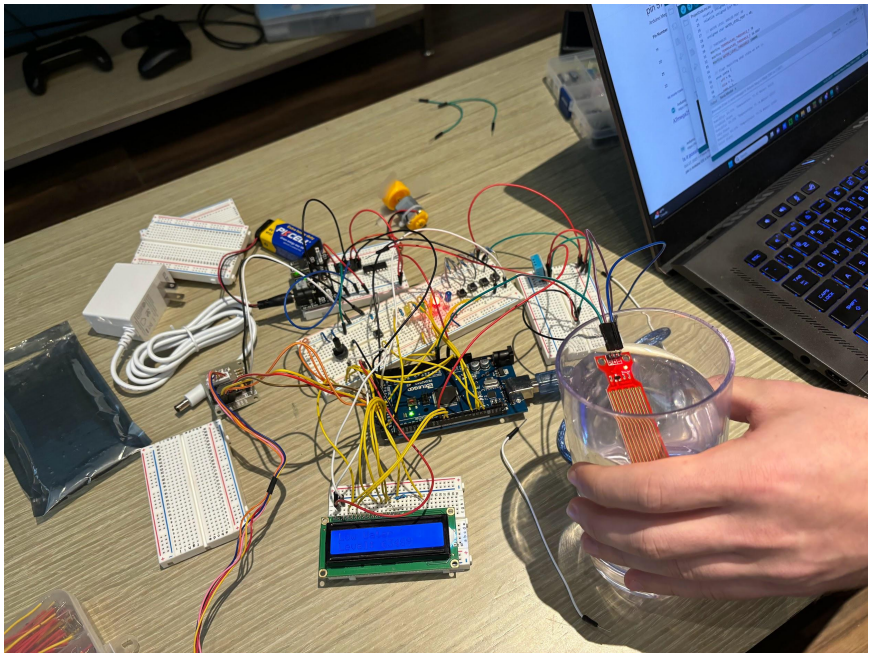
The program was made so that the yellow LED would be lit up when the system was disabled and the system wouldn't start until the push button was pressed to start the system. Then the light would turn green to tell the user that the system was on, but in an idle state where the fan was not on. The fan would then turn on if the DHT11 sensor read a temperature below 70 degrees fahrenheit. When this event occurs the system would then go into the running state and the light would turn blue and the fan would turn on. At the same time the date and time would be printed to the arduino serial monitor over usb. While the system was running the program would check if the water sensor is reading a value below the threshold which was set to 100. If it read a that didn't meet the threshold the system would enter the error state and everything would shut off and the light would turn red until the water level returns to a valid level.

The motors were set up on a separate breadboard from the rest of the system in order to better utilize the space that was being worked with. The DC motor and fan where then connected to a power supply and IC that would read input from the arduino system and waiting for the running state to be triggered in order to turn on. The power supply was hooked up to a 9 volt battery and the ground was connected to the arduino board. The stepper motor was reading input from the arduino pins and would be triggered depending on which of push buttons were pressed in order to adjust the direction of the fan and to rotate it.

The coding section of the project was done by working directly with the registers to avoid the built in libraries. We coded the UART, ports, ADC, and ISR utilizing code that was previously written by us during the labs throughout the semester and just had to modify it to fit this project better and to change the pins that we were utilizing on the arduino board. We did use the RTClib library, stepper library, dht library, and liquid crystal library for other aspects of the code such as the LCD, sensors, stepper motor, and recording the time the fan turns on and off. The time for the fan turning on and off was sent to the serial monitor by using the UART functions that we previously used for other labs throughout the semester and used the timeStamp() function to reduce the amount of redundant code in the state selection functions.

This function transmitted the data one char value at a time and needed to reformat the integer values that we were working with to a char in order to print the desired values to the monitor.

Pictures:

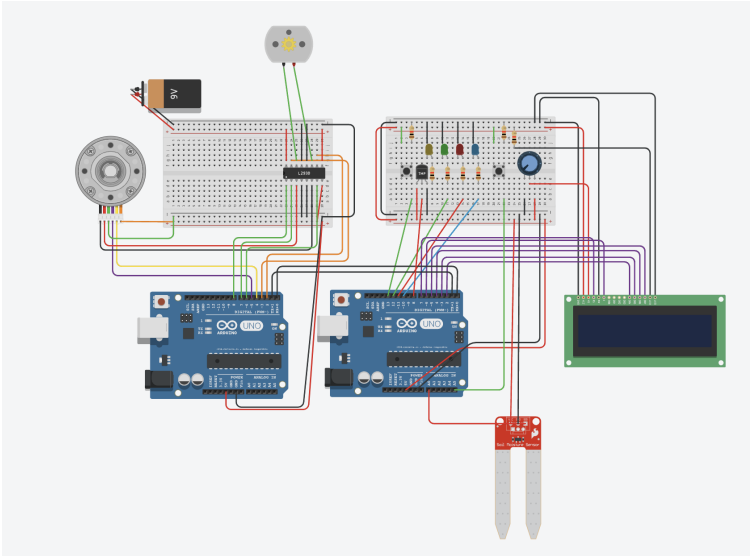


Schematic:

*NOTE

- Used a second arduino board in tinkercad for more digital pins out since there wasn't another microcontroller available
- Some components might be slightly different to the actual version

https://www.tinkercad.com/things/hhxyxIIun1t-shiny-migelo-bombul/editel?sharecode=rbqPz3BB47Bw_ARngIEFbgAKdWBJNi25zViAPCpKio0



Github: https://github.com/RamocinskiCarson1103/CPE301Final

Videos:
https://drive.google.com/drive/folders/1nGO2dKPPgHiMFDLUj9TDW8GEn4zvTIAm?usp=sharing

Other Links:

https://docs.arduino.cc/hardware/mega-2560
https://www.arduino.cc/reference/en/libraries/rtclib/
https://www.mouser.com/datasheet/2/758/DHT11-Technical-Data-Sheet-Translated-Version-1143054.pdf
https://www.arduino.cc/reference/en/libraries/stepper/