Final Project

CPE 301.1001

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Overview of Final Project

Operations

There are three controls to this machine;
1) The On/Off button, used for enabling and disabling the machine as well as clearing errors
2) Right button, which moves the vent using a stepper motor clockwise
3) Left button, which moves the vent using a stepper motor counter-clockwise

Operating Temperature: 20 c

The machine will always start out disabled, to start the machine the user must press the on/off switch, which will set the machine to idle or running, this is dependent on whether or not the temperature is above or below required threshold, this action will also report the timestamp of the operator to the user computer if connected via usb cable. Note that the temperature threshold is 20 Celius, in order to change this the programmer must manually change the value and recompile the machine. During run or idle states the user can locate the current room temperature and humidity values by looking at the lcd screen. If an error arises, such as the water level being too low, then the machine will shut down and an error message will be printed to the lcd screen. To switch out of the error state press the on/off switch, this will also reset the machine into the idle state. To control the vent direction, there are two buttons connected to a separate board, a left and right, the left will rotate the vent counter clockwise and the right will rotate the vent clockwise, note that pressing the button one time will rotate it one full rotation, if the button is held down it will continue to rotate, on release the vent will stop rotating. Please also note that there are two Leds each corresponding to their buttons that will turn on when that button is pressed or held down and turn off on released.

State Description

Disabled – Project startup position, disables fan, readouts, etc. Yellow led indicates disabled mode.

Idle – Base project on state, green led turns on. Temperatures are read as well as humidity percentages every minute using a delay. During this delay the Arduino will look for three things; one if the temperature is above threshold if so then the state will be changed to ‘Running’, two is if the water level is low if so then the state will be changed to ‘Error’, three if the user presses the on/off switch if so then the state will be changed to ‘Disabled’. The fan will also be disabled.

Running – Blue led comes on and the fan becomes enabled. Temperatures are read as well as humidity percentages every minute using a delay. During this delay the Arduino will look for three things; one if the temperature is below threshold if so then the state will be changed to ‘Idle’, two is if the water level is low if so then the state will be changed to ‘Error’, three if the user presses the on/off switch if so then the state will be changed to ‘Disabled’.

Error – Red led comes on and an error message appears on the lcd screen. If the user presses the on/off switch, then the machine will switch to idle state, originally as the project required it must have switch back to idle.

Overview of Final Project

Pin Layout

Leds
Red – pin 22
Yellow – pin 24
Blue – pin 26
Green – pin 28

Motors
Stepper Motor: pin 23, pin 25, pin 27, pin 29
Fan Motor: pin 32

Buttons
On/Off Switch - pin 19
Right vent control - pin 38
Left vent control - pin 40

Sensors
Temp./Humid. - pin 31
Water – pin A0
Clock – pin 20, pin 21

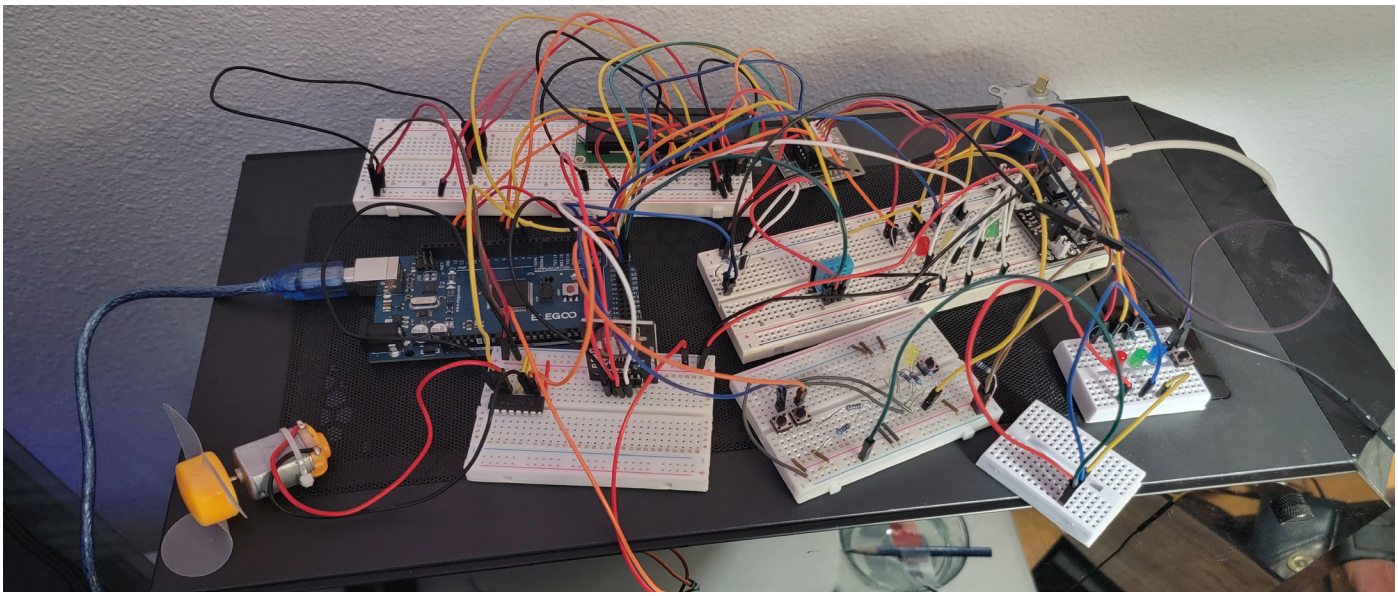
LCD: pin 12, pin 11, pin 2, pin 3, pin 4, pin 5

Problems - Constraints

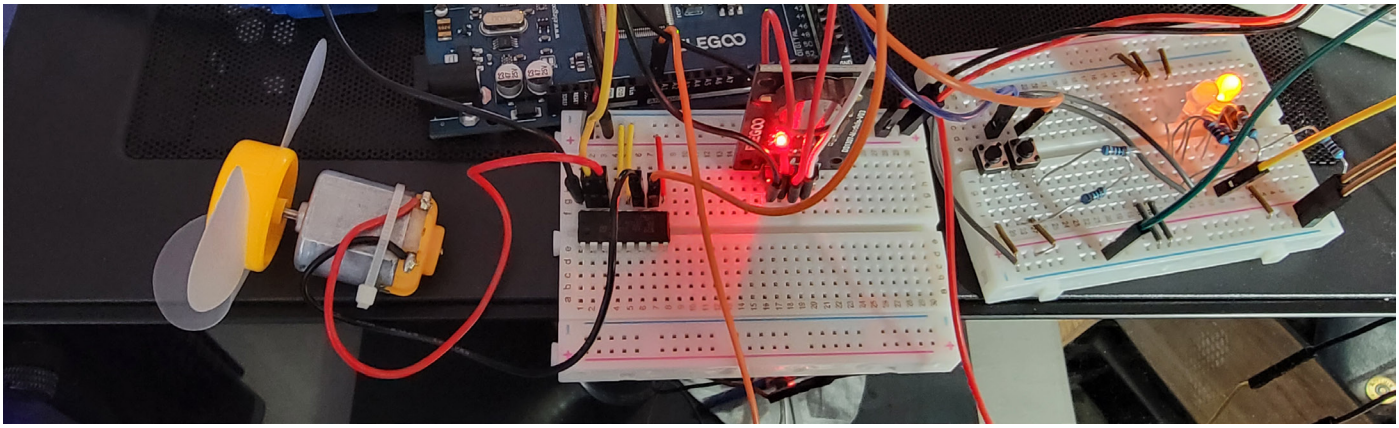
I didn't really stumble upon many problems or constraints while working on this project, but I briefly mention two that I did come upon. One the water sensor, for whatever reason I originally could not get the sensor to read properly however I found out later it was simply because I didn't plug the analog signal into an analog pin on the Arduino. Two the clock modulo, the problem I had with the clock modulo was being able to install the correct library and setting up the actual modulo, however I was able to figure it out after watching a few tutorials online and plugging the SDA and SCL into the right corresponding locations on the Arduino broad.

Final Project Images & Boards

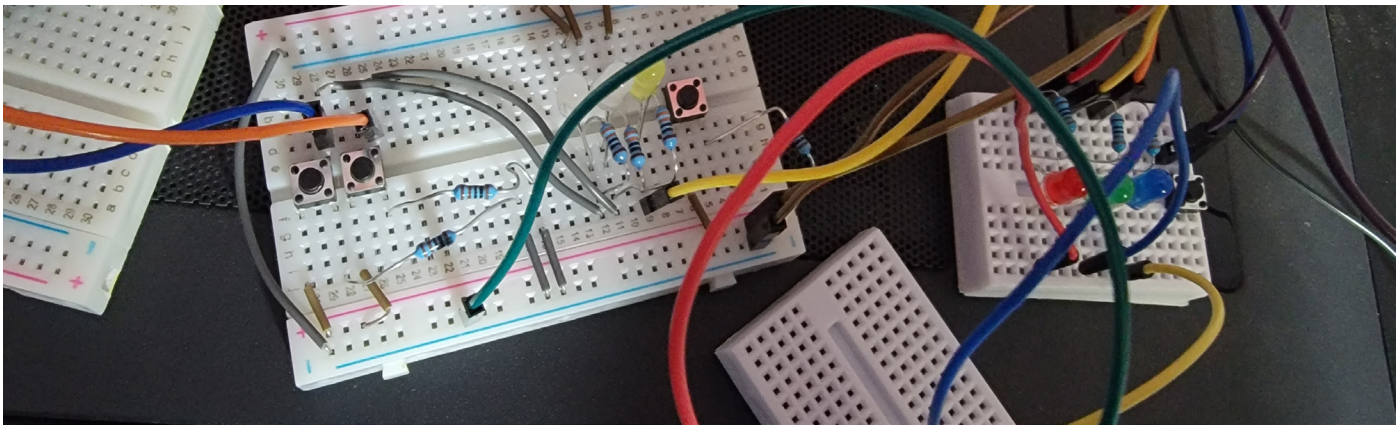
Full Machine OverView



Clock 1307 plus fan motor and circuit board

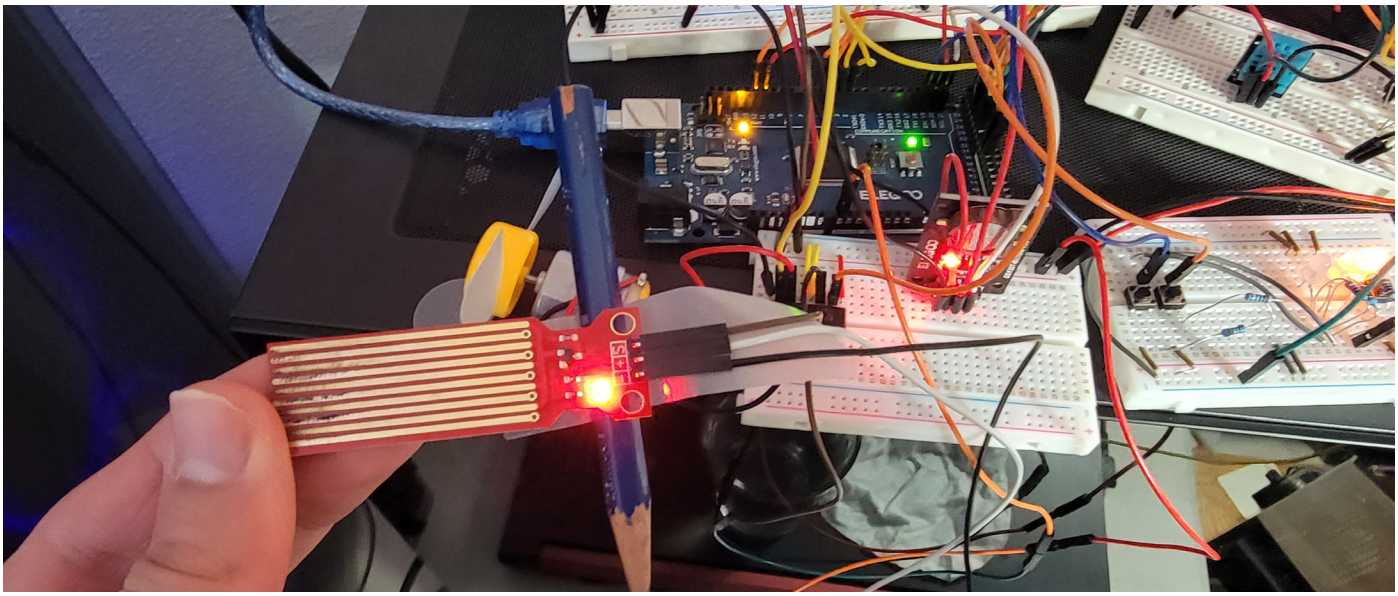


Vent Controls and main controls

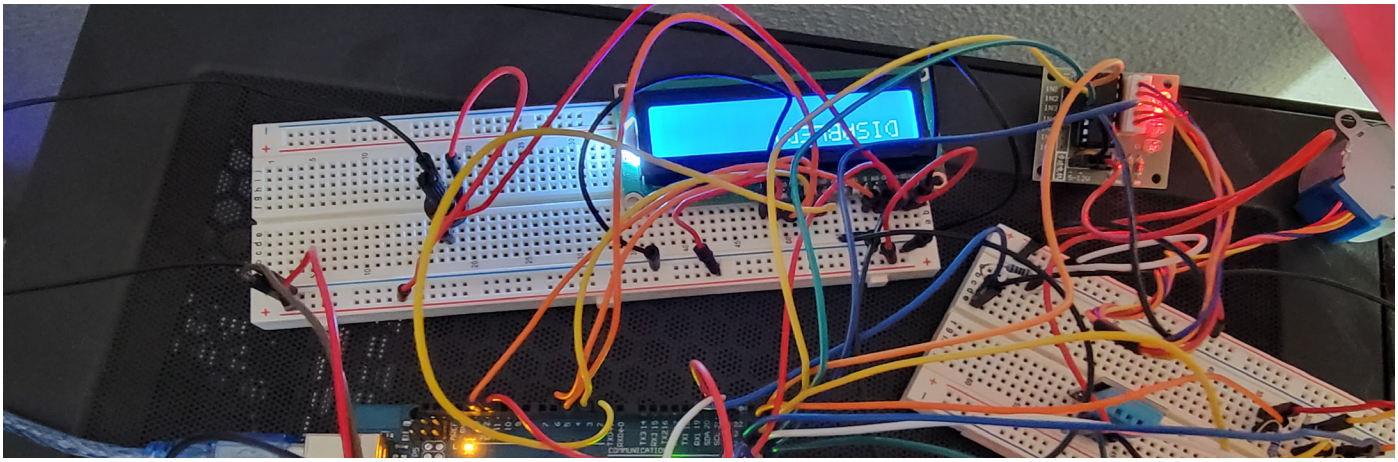


Final Project Images & Boards Continued.

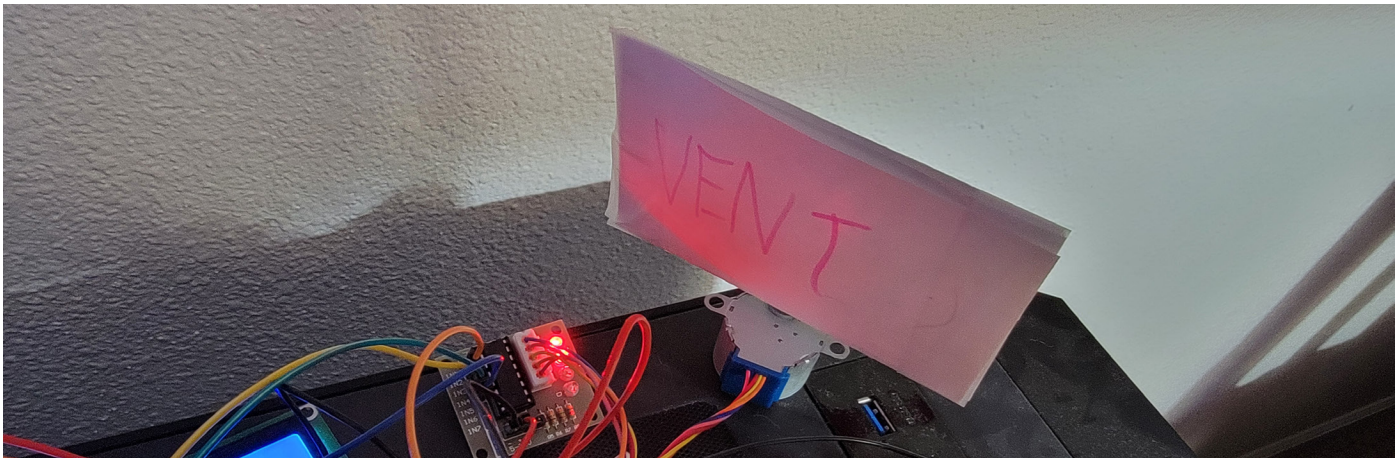
Sensor



LCD Screen

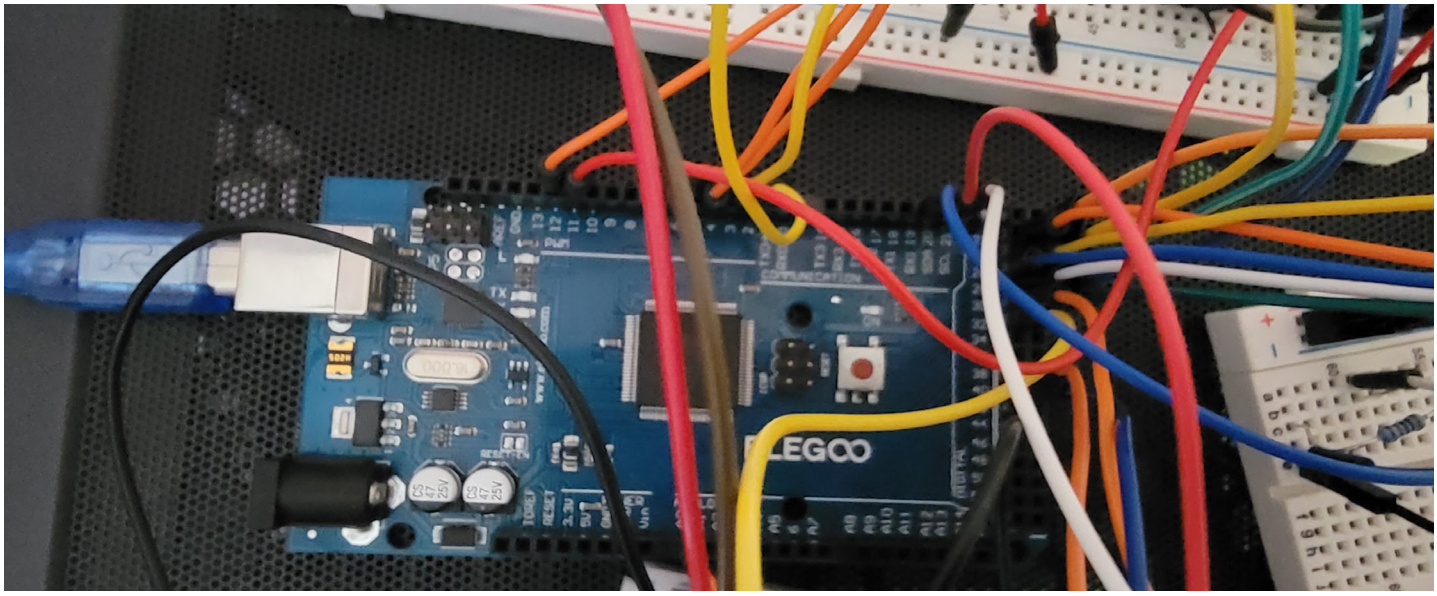


Vent/Stepper Motor

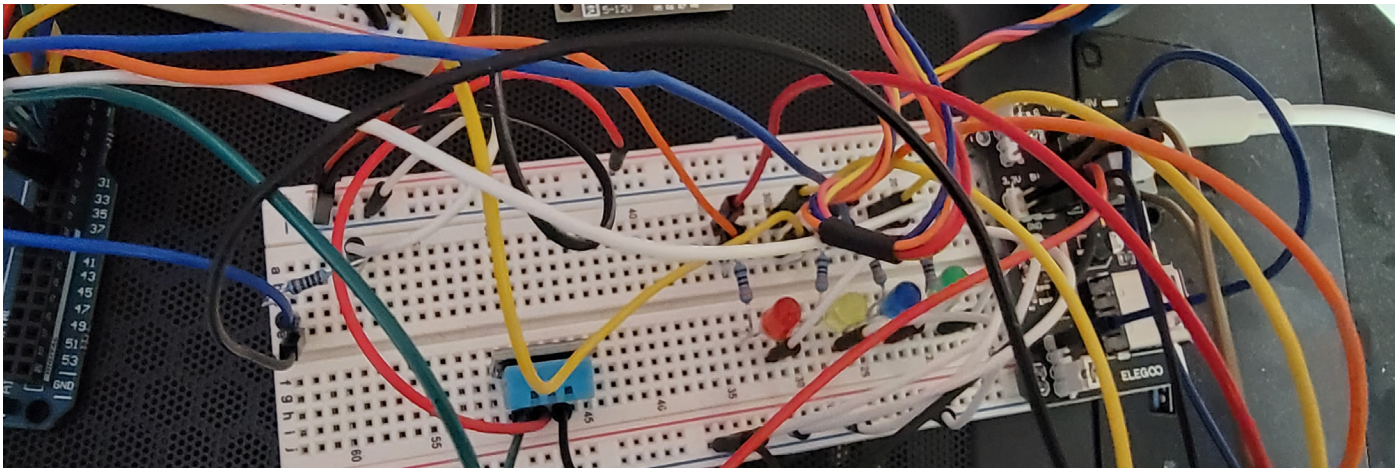


Final Project Images & Boards Continued.

Arduino

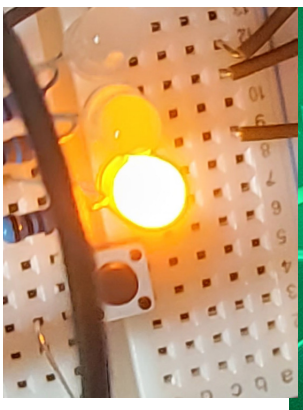


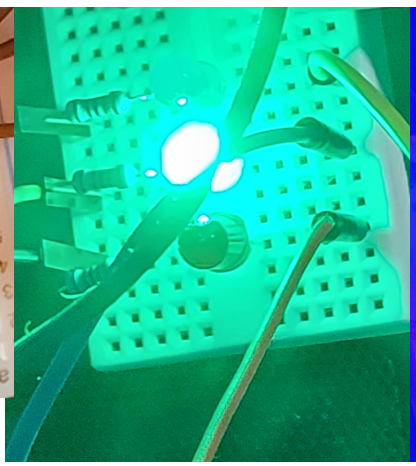
Center Broad

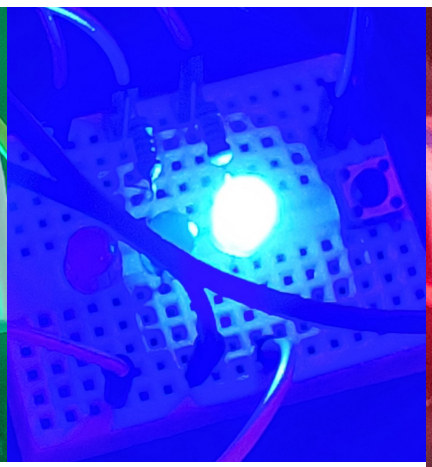


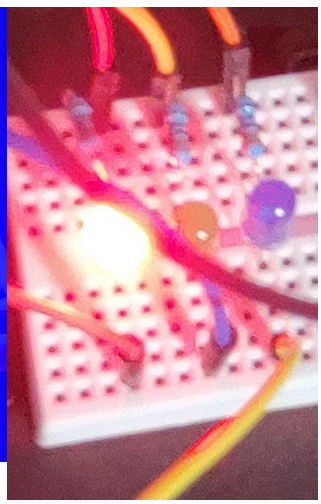
States:

Disable Idle Running Error









Specification Sheets

Arduino
https://ww1.microchip.com/downloads/en/devicedoc/atmel-2549-8-bit-avr-microcontroller-atmega640-1280-1281-2560-2561_datasheet.pdf

Clock 1307
https://www.analog.com/media/en/technical-documentation/data-sheets/ds1307.pdf

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

Stepper Motor
https://pages.pbclinear.com/rs/909-BFY-775/images/Data-Sheet-Stepper-Motor-Support.pdf

LCD Display

https://circuitdigest.com/article/16x2-lcd-display-module-pinout-datasheet