Final Project

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1 Objective

The objective is to develop an evaporating cooling system, commonly known as a swamp cooler. In arid, warm regions, evaporating coolers offer a more energy-efficient option compared to traditional air conditioners. The process involves drawing in outside air through a water-soaked pad, where the evaporation of water cools and adds humidity to the air. It's important to note that these systems are not effective in humid climates due to their reliance on evaporation.

2 Specifications

The project involves the design and assembly of an evaporative cooler system utilizing an Arduino Mega 2560. The components include a DHT11 temperature and humidity sensor, a water level sensor, four push buttons, a liquid crystal display (LCD), a fan motor powered by an additional supply and L293D IC, and four LEDs (green, red, yellow, and blue). The cooler operates by monitoring water levels in a cup, issuing an alert if levels become too low. It also tracks current air temperature and humidity, displaying results on the LCD. The system controls the fan motor, system enable/disable, and records the time/date of motor activation/deactivation. Constraints involve switch button limits for the vent.

The DHT11 sensor, utilizing a capacitive humidity sensor and thermistor for temperature, sends a digital signal to the data pin. DHT_PIN is defined as 7, and DHT_TYPE as DHT11. The DHT.h library, along with readTemperature() and readHumidity() functions, records and displays values. The temperature reading transitions between idle and running states.

The water level sensor monitors liquid presence, changing states based on adc_read() results from the defined WATER_LEVEL pin. If the value falls below WATER_THRESHOLD, an error state is triggered.

Four push buttons serve distinct purposes. BUTTON_ON_OFF toggles between system states, while BUTTON_RESET resets the system to idle. Two buttons control the vent direction, with BUTTON_STEPPER_UP and BUTTON_STEPPER_DOWN, limited by switch button settings.

The LCD displays air temperature and humidity using the LiquidCrystal.h library. DS1307 ensures time accuracy. The LCD, defined as lcd, displays an "Error: low water" message during low water levels.

The fan motor, defined by MOTOR_PIN, operates with the L293D IC chip, activating only when appropriate conditions are met. The motor transitions between disabled, idle, and running states.

Four LEDs indicate different system states. The green LED lights up during idle, yellow indicates a disabled system, blue signifies running conditions, and red signals an error state. Individual colors and pins are defined, and power is supplied through the turnLEDOn() function.

3 Pictures of The Project

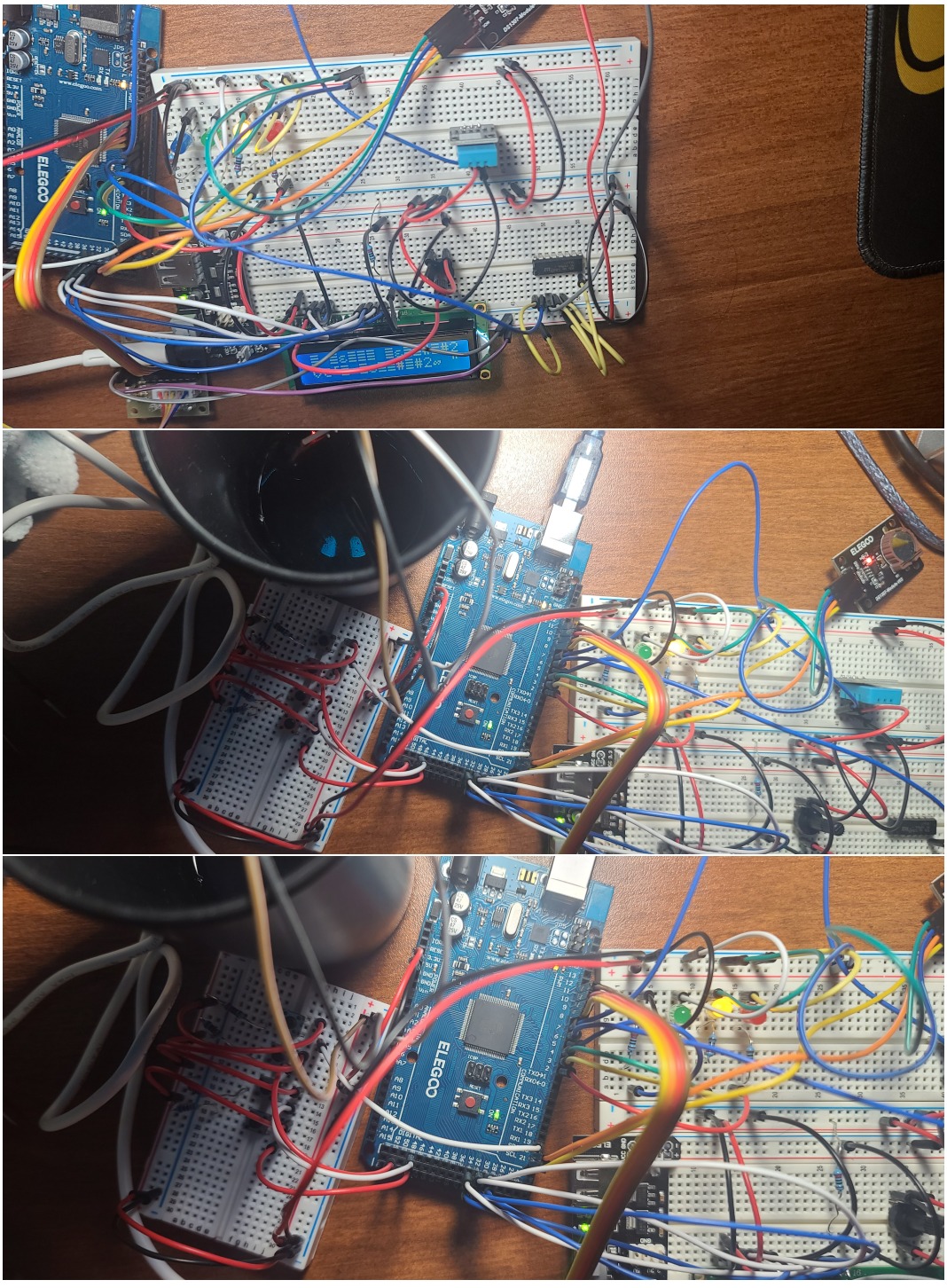

Figure 1: Breadboard

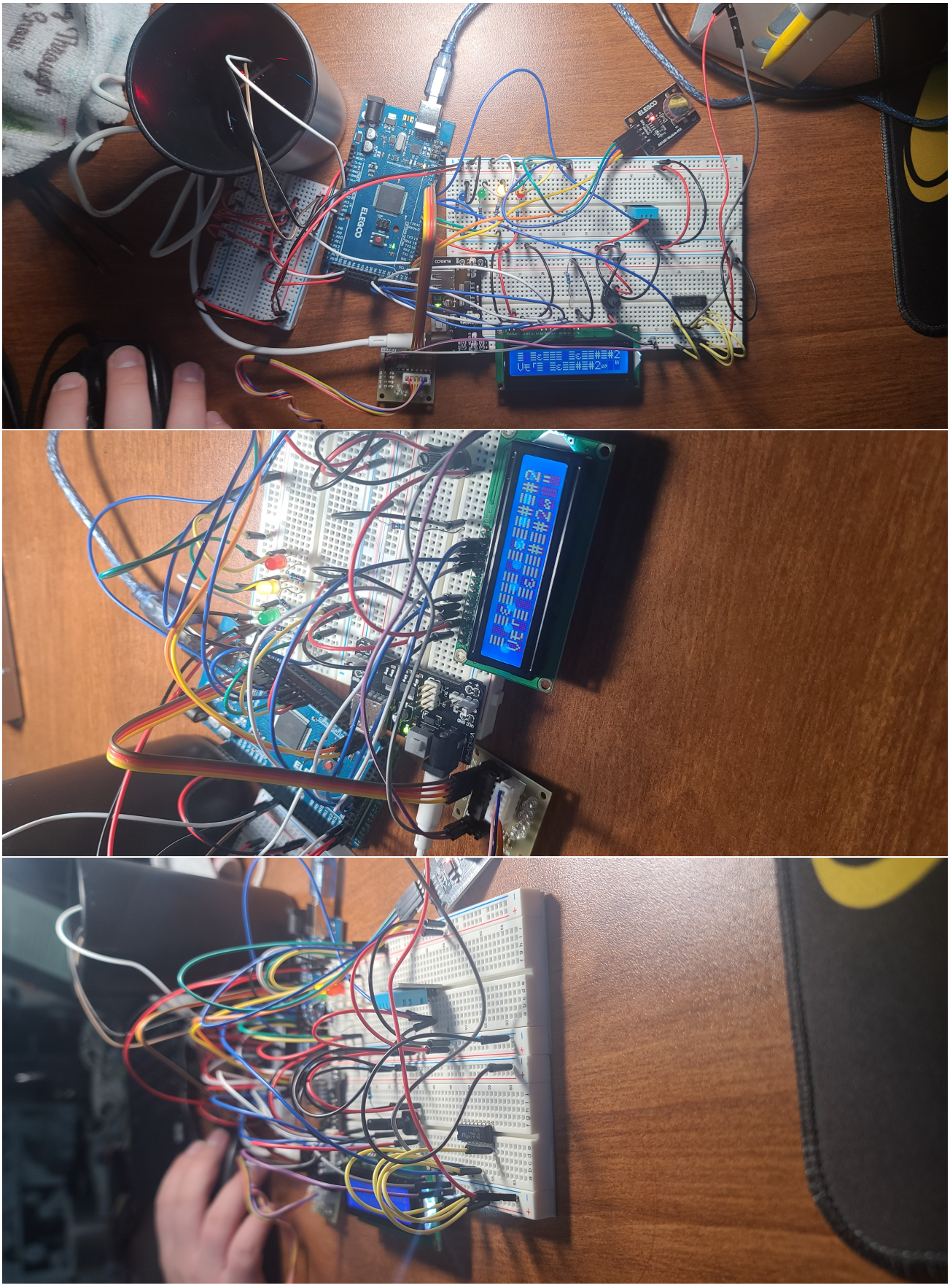

Figure 2: Breadboard

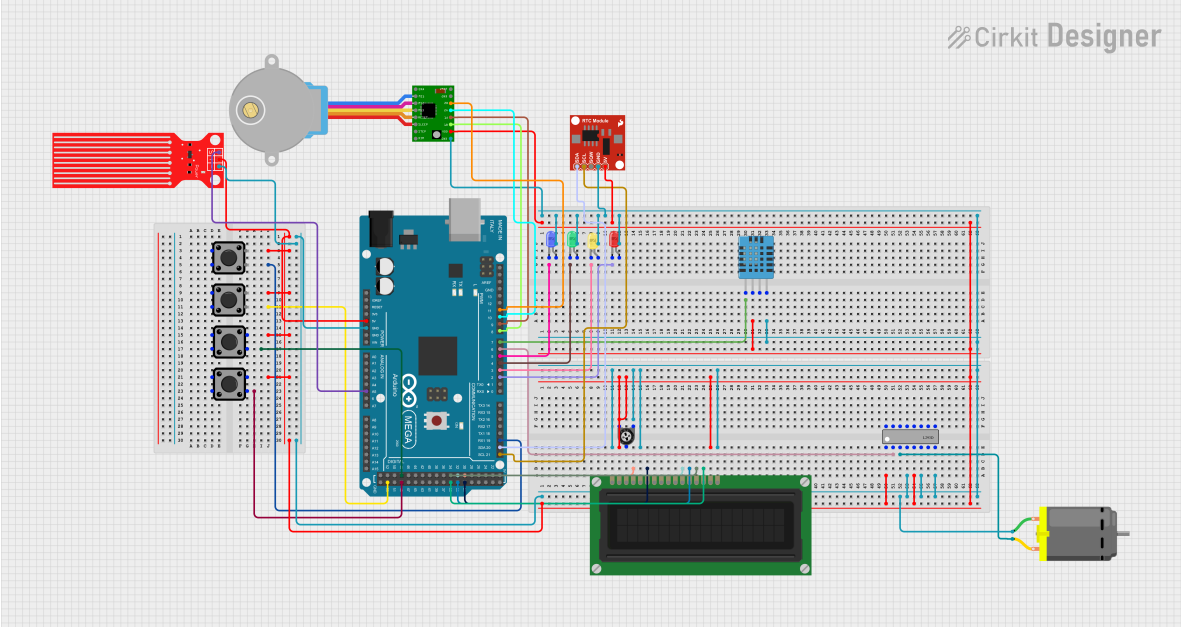

Figure 3: Technical Drawing

4 Links

GitHub Repo: https://github.com/Contaldi-Quinn-1104/CPE-301
Video: https://youtu.be/Y-Wf7CsvS44

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Specifications
AtMega2560: https://docs.arduino.cc/hardware/mega-2560
Water Sensor: https://curtocircuito.com.br/datasheet/sensor/nivel_de_agua_analogico.pdf
Lcd: https://quartzcomponents.com/products/16x2-lcd-display-module-green
DHT11 Sensor: https://components101.com/sensors/dht11-temperature-sensor
Stepper Motor: https://components101.com/motors/28byj-48-stepper-motor
Motor: https://components101.com/motors/toy-dc-motor
Clock: https://lastminuteengineers.com/ds1307-rtc-arduino-tutorial/
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