IOT BASED SMART WEATHER STATION

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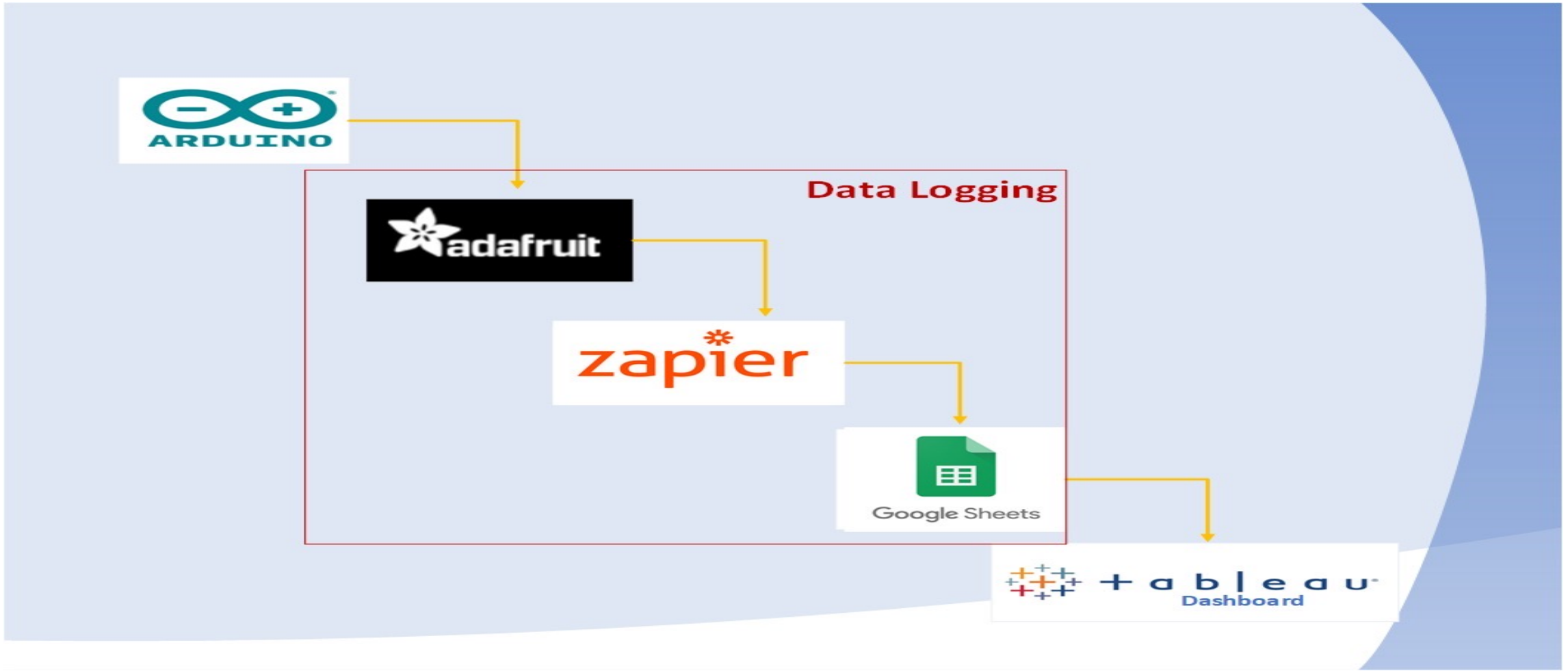
Overview

- A Weather Station is being built by using a number of different sensors, with the platform being an Arduino board. This will provide communications to the sensors, with a power source supplied by WIFI.
- This project involved the use of a variety of different tools and methods for building a dashboard and for logging data.
- On the weather station's LCD display, the temperature inside and outside is shown. I use an OpenWeather API for outside temperature, and for inside temperature/humidity, I use sensors.
- Data Logging : Zapier and google sheet.
- Dashboards: AdaFruit IO and Tableau.

Goals

- Collect local indoor weather data (inside a residence/commercial unit)
  - Temperatures, humidity, atmospheric pressure and light data.
  - DHT11 (temperature and humidity combined sensor)
  - Light intensity Sensor
  - BMP180(3μA pressure sensor)
- Collect external Weather data from OpenWeatherMap API.
- Build dashboard for monitoring trends and seasonality in weather data based on time.

Data Logging



Weather Station Diagram

Module Name:
OLED Display

Type:
LCD Display

Connections:

VCC (OLED)-> Postive Bus (Breadboard)
GND (OLED) -> Negative Bus (Breadboard)
SDA (OLED) -> D2 (ESP8266)
SCL (OLED) -> D1 (ESP8266)

Module Name:
BH1750

Type:
Digital Light Sensor

Connections:

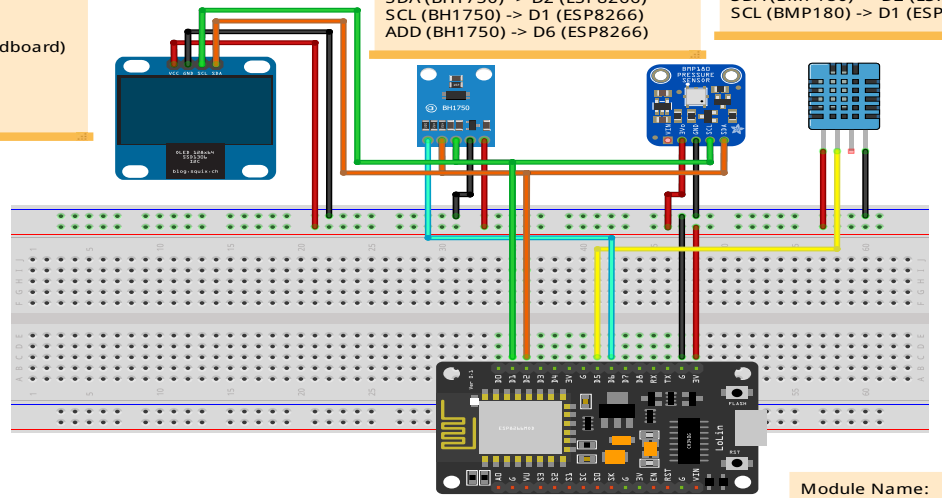
VCC (BH1750)-> Postive Bus (Breadboard)
GND (BH1750) -> Negative Bus (Breadboard)
SDA (BH1750) -> D2 (ESP8266)
SCL (BH1750) -> D1 (ESP8266)
ADD (BH1750) -> D6 (ESP8266)

Module Name:
BMP180

Type:
Air Pressure Sensor

Connections:

VCC (BMP180)-> Postive Bus (Breadboard)
GND (BMP180) -> Negative Bus (Breadboard)
SDA (BMP180) -> D2 (ESP8266)
SCL (BMP180) -> D1 (ESP8266)



Module Name:
DHT11

Type:
Temperature & Humidity Sensor

Connections:

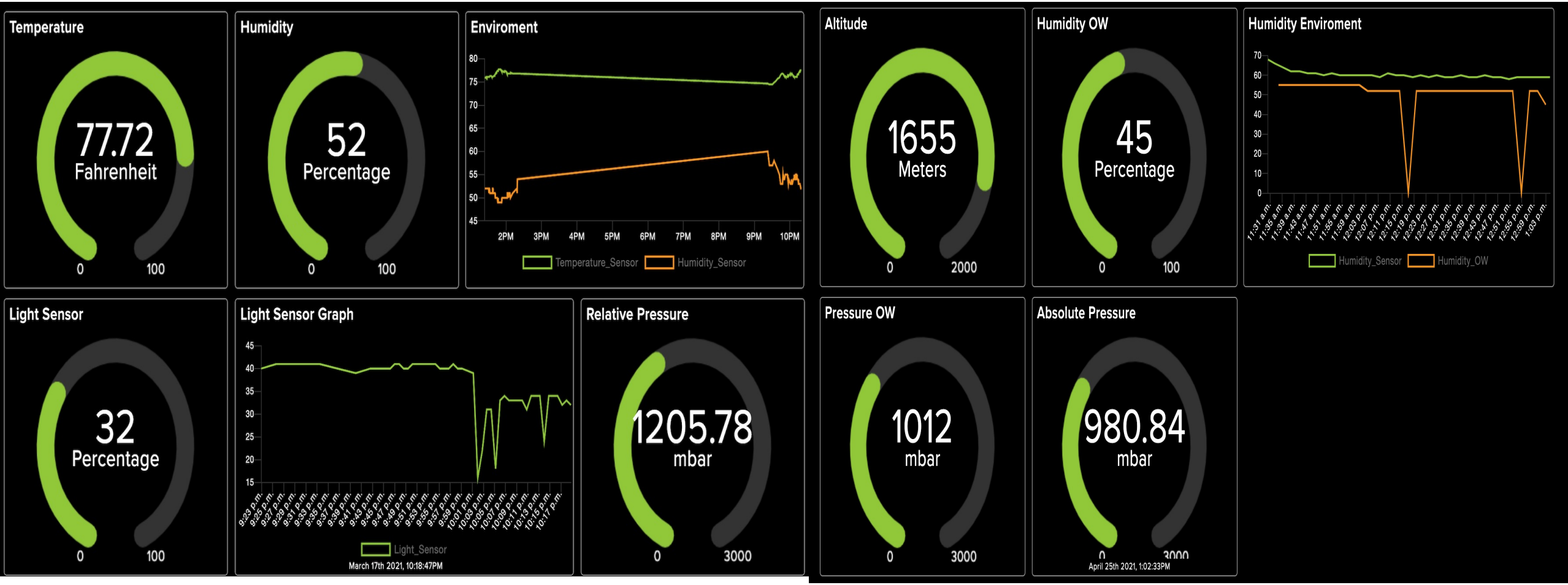
VCC (DHT11)-> Postive Bus (Breadboard)
GND (DHT11) -> Negative Bus (Breadboard)
Data (DHT11) -> D5 (ESP8266)

Module Name:
ESP8266 NodeMCU

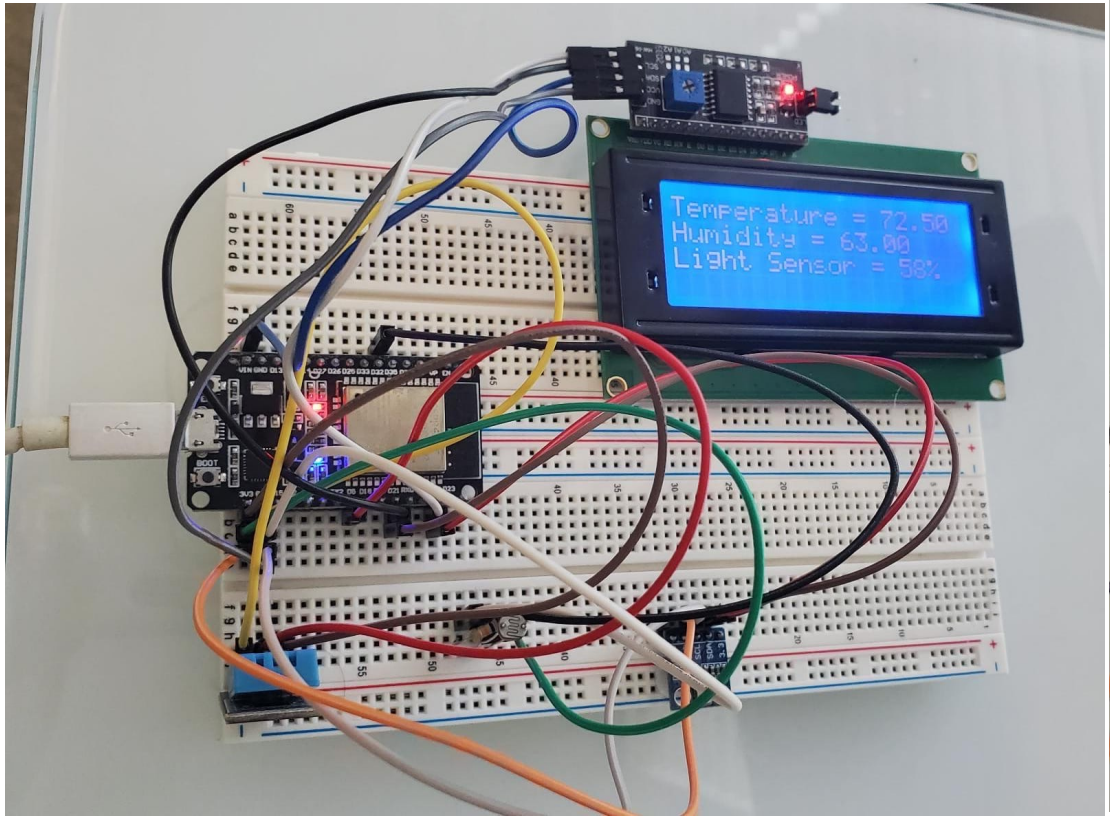
Type:
Wifi based Controller

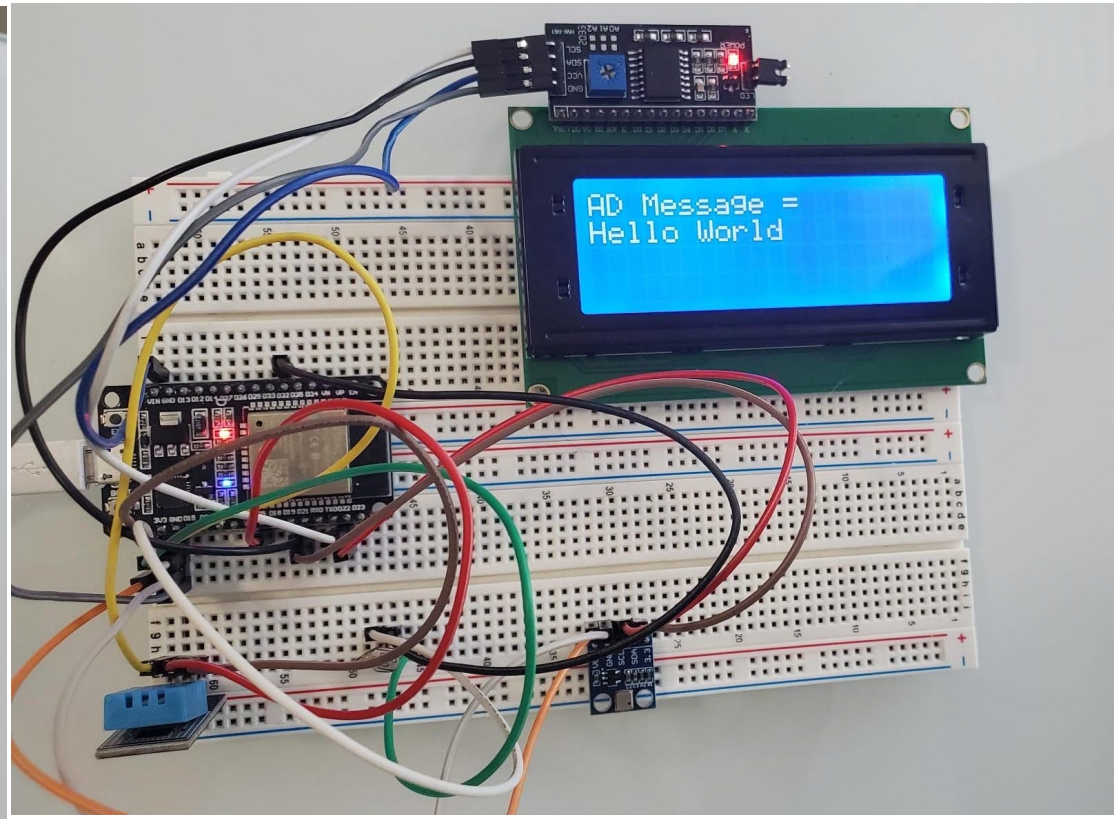
fritzing

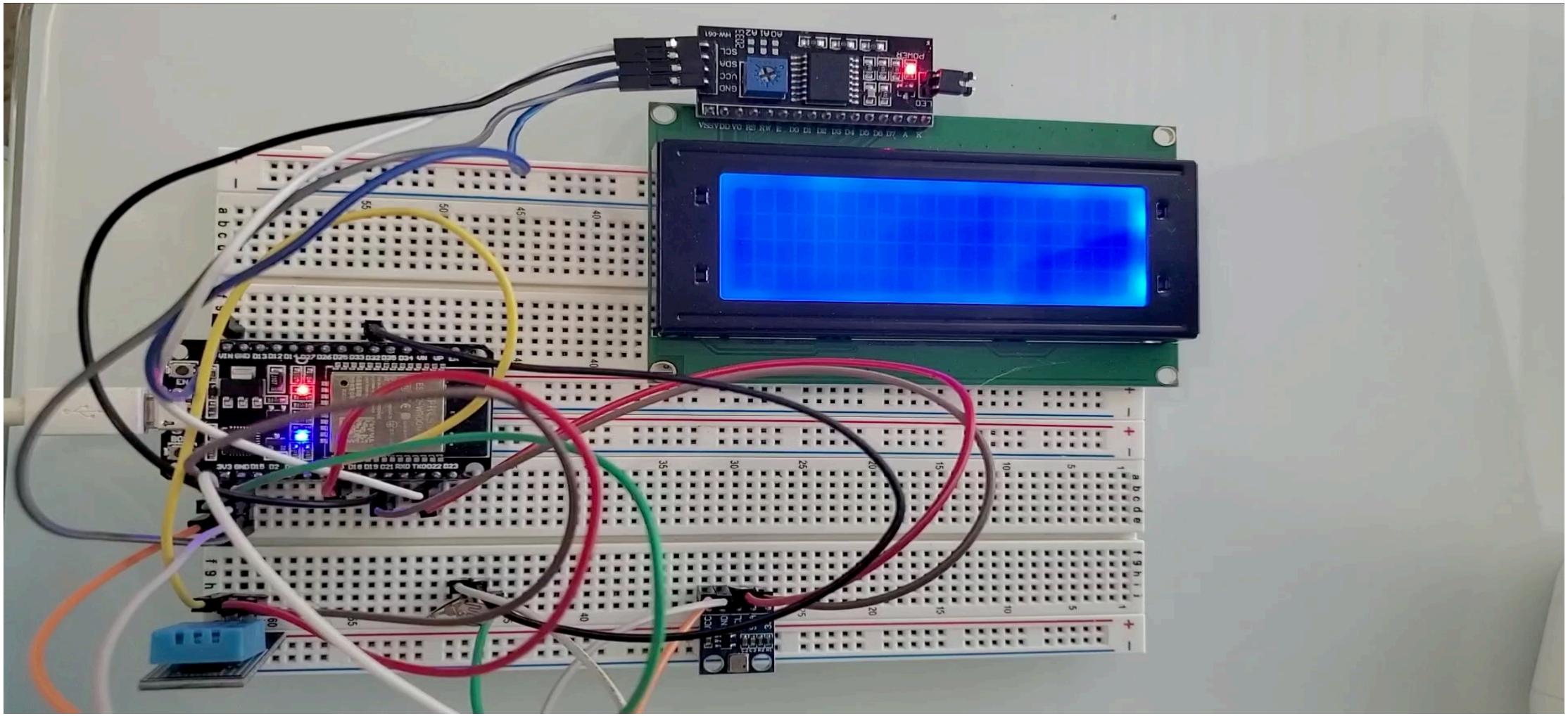
AdaFruit IO Dashboard



Final Weather Station Model






GND
VCC
SDA
SCL
POWER
LCD

Key Learnings

- How to work with microcontrollers, Breadboard and sensor devices
- How data is collected through IOT devices, sent to a remote server, and used to build different applications.
- Learned to use application like Adafruit, Fritzing, Zapier and Tableau and OpenWeatherAPI.

Next Steps

- Additional sensors.
- Machine learning and deep learning models.
- Remove Zapper and Google Sheets. Instead build a Data pipeline to process and store the weather data directly into a database.

Questions?