

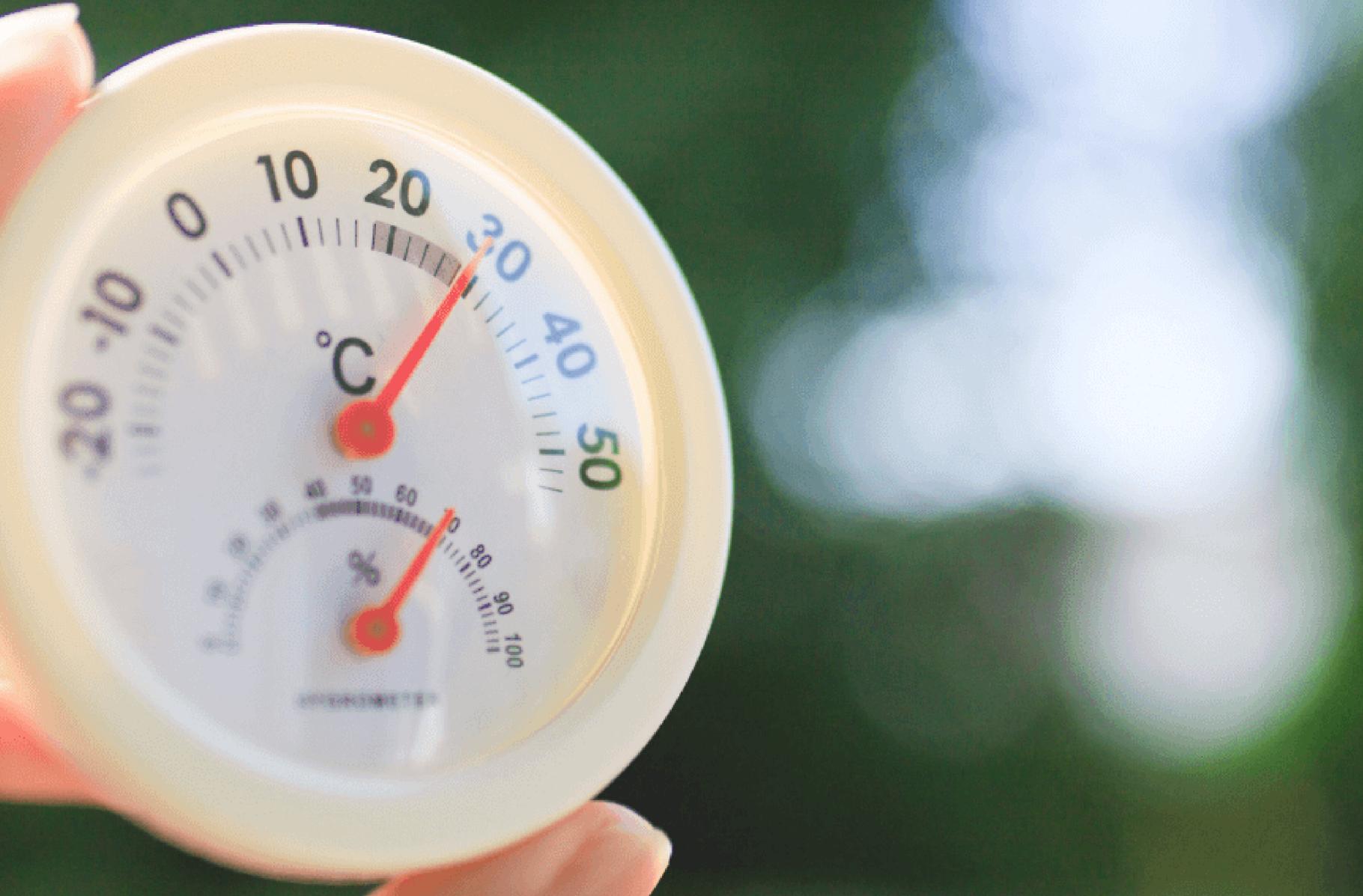
# APPARENT TEMPERATURE MONITORING SYSTEM



Group ID - 56



# INTRODUCTION

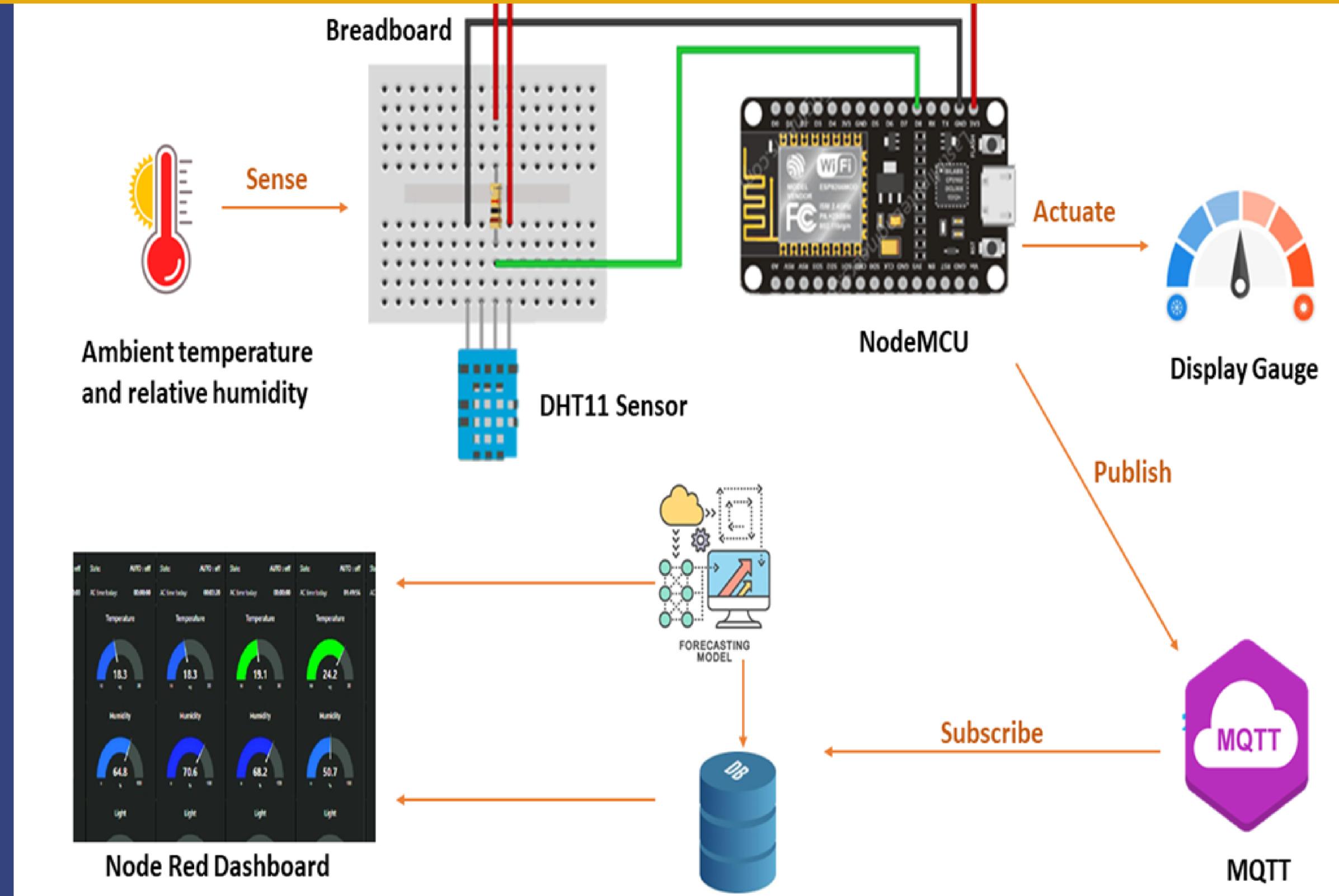


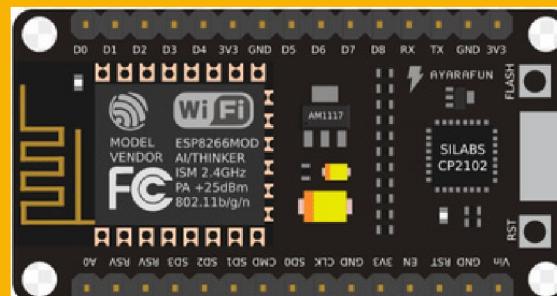
## An IoT system using a NodeMCU esp8266 Development Board

This system consists of two main components

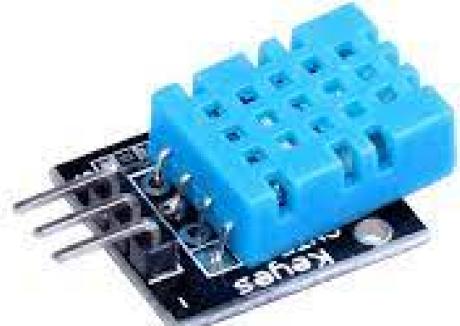
- An IoT system that can indicate if the current heat index of an environment is healthy.
- A dashboard with visualizations for real time heat index monitoring and predictions for past and future humidity values .

# Overall Architecture Diagram

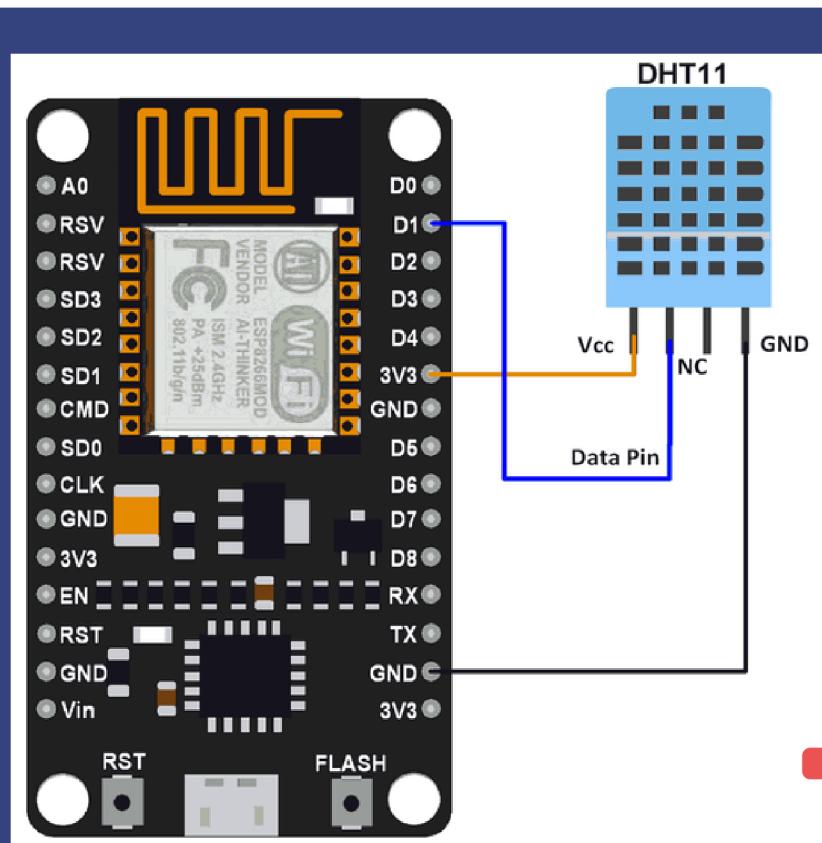




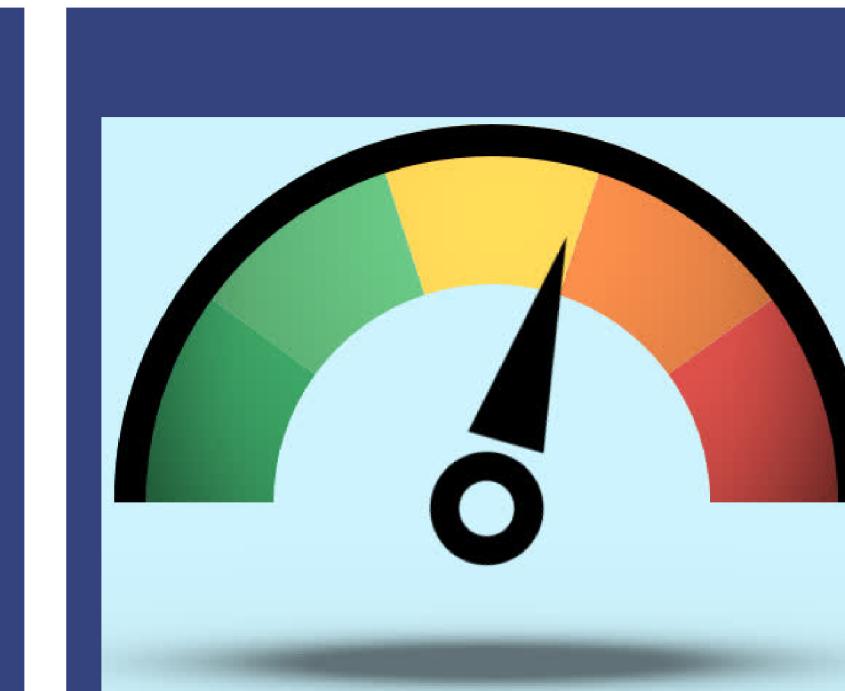
A NodeMCU development board will act as the center point which will carry out all the tasks



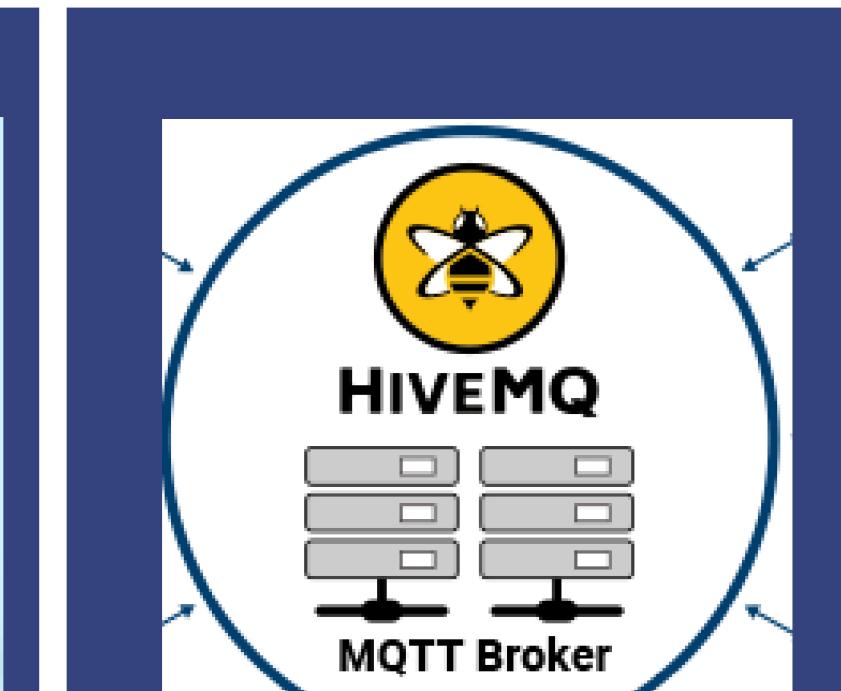
The DHT 11 sensor will be used to get the input for the monitoring system



Temperature and Humidity read by the sensor and will be sent to the NodeMCU through the connected breadboard



Based on the reading of the sensor the axel of the actuator will be moved on the gauge

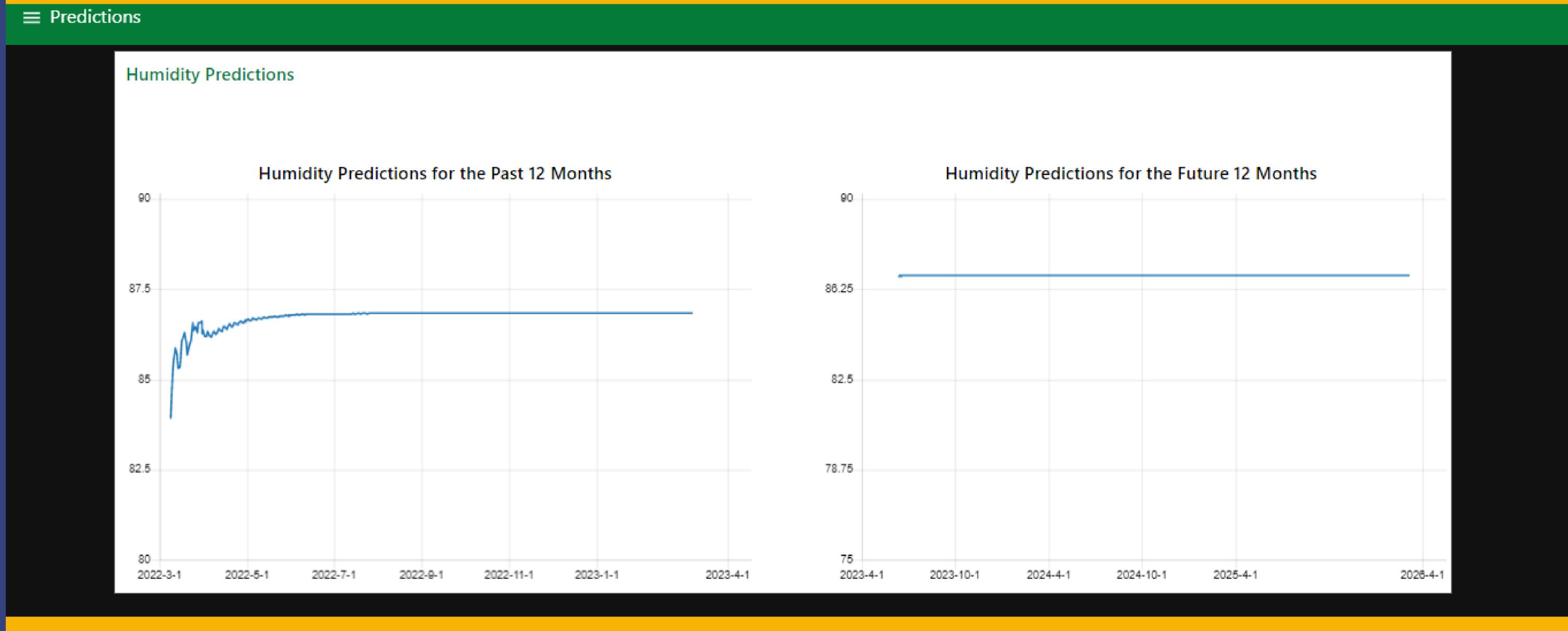


Afterwards, the NodeMCU will act as a publisher and will publish the data through a cloud hosted broker.



The captured data will be stored in cloud and used for visualizations

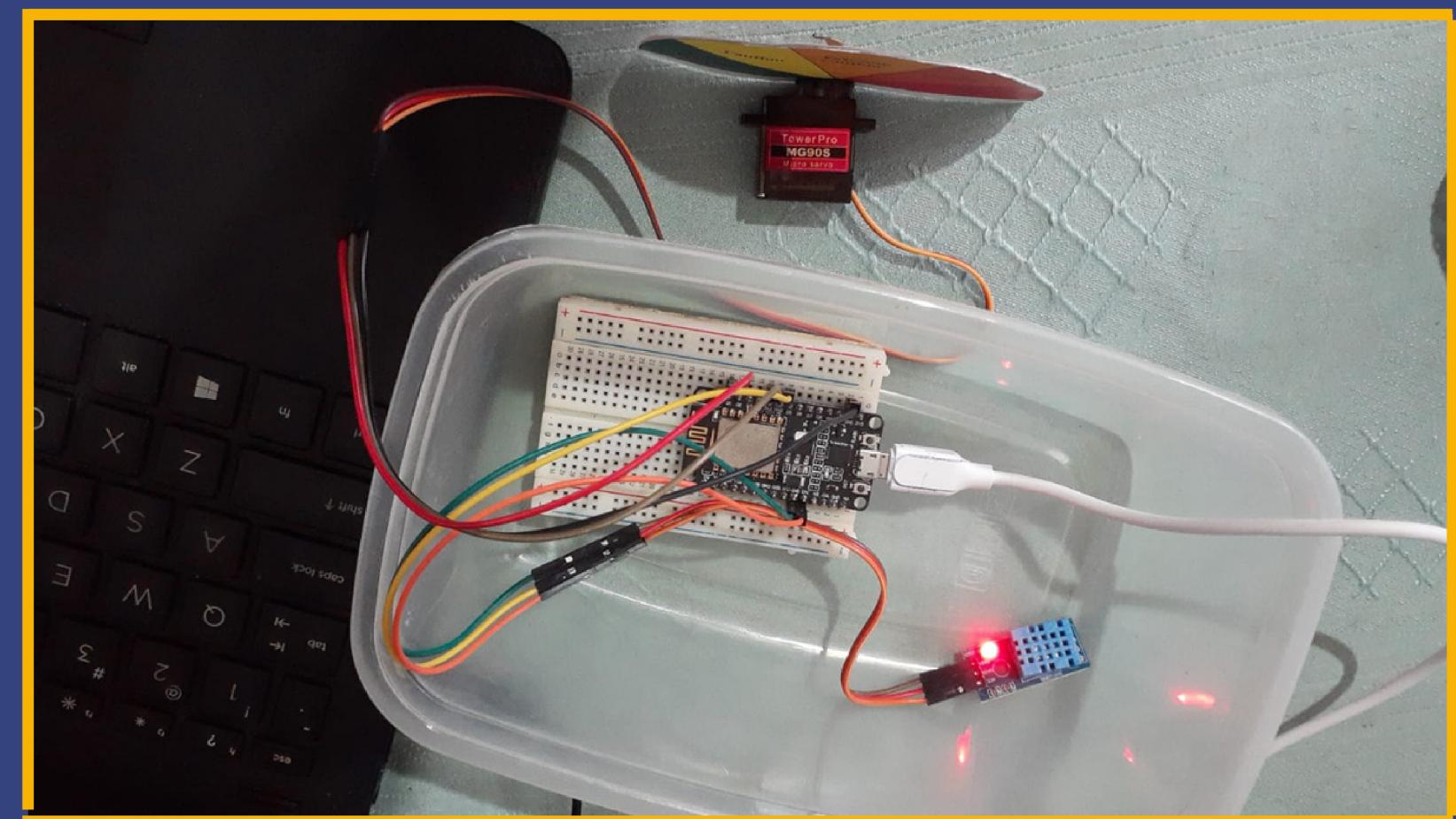
The data of past 12 months along with prediction values for 12 months ahead will be visualized in the dashboard



# Components

- ⚙ Sensor - DHT11 Temperature and Relative Humidity sensor
- ⚙ Actuator - MG90S Micro Servo Motor
- ⚙ Microcontroller - NODEMCU ESP8266
- ⚙ Jumper wires
- ⚙ Breadboard
- ⚙ Micro USB Cable
- ⚙ Resistors

# Overall Hardware Implementation



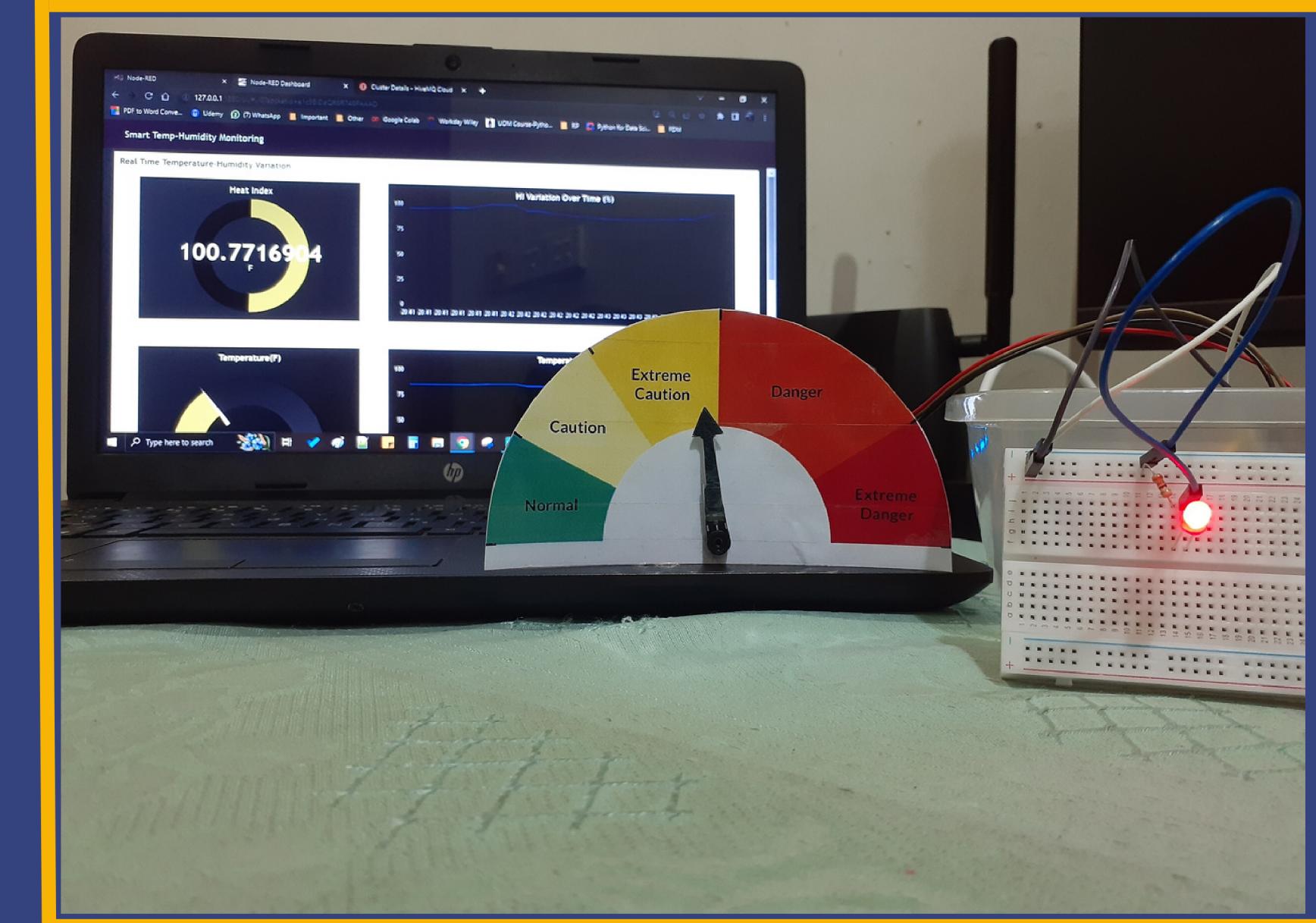
# Heat Index

$$HI = -42.379 + 2.04901523*T + 10.14333127*RH - .22475541*T*RH - .00683783*T*T - .05481717*RH*RH + .00122874*T*T*RH + .00085282*T*RH*RH - .00000199*T*T*RH*RH$$

There is direct relationship between the air temperature and relative humidity and the heat index, meaning as the air temperature and relative humidity increase (decrease), the heat index increases (decreases).

Classification	Heat Index	Effect on the body
Caution	80°F - 90°F	Fatigue possible with prolonged exposure and/or physical activity
Extreme Caution	90°F - 103°F	Heat stroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity
Danger	103°F - 124°F	Heat cramps or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity
Extreme Danger	125°F or higher	Heat stroke highly likely

# Display Gauge



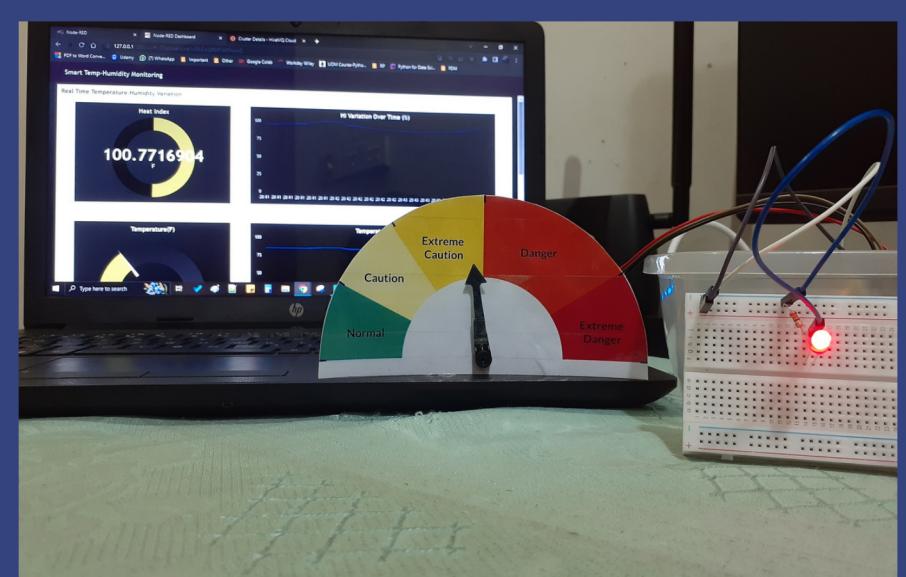
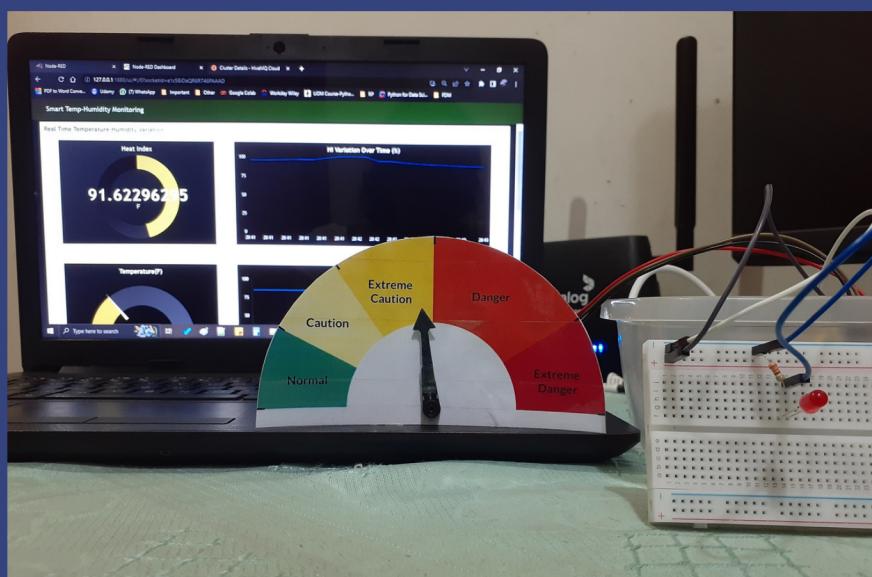
**The display gauge is built to show the heat index categories according to a specific scale**

**Normal will be below 80°F, Caution between 80°F and 90°F, Extreme Caution between 90°F and 103°F, Danger between 103°F and 124°F, and Extreme Danger at 125°F or higher.**

**The NodeMCU will control the servo motor to move the axel based on the calculated heat index reading**

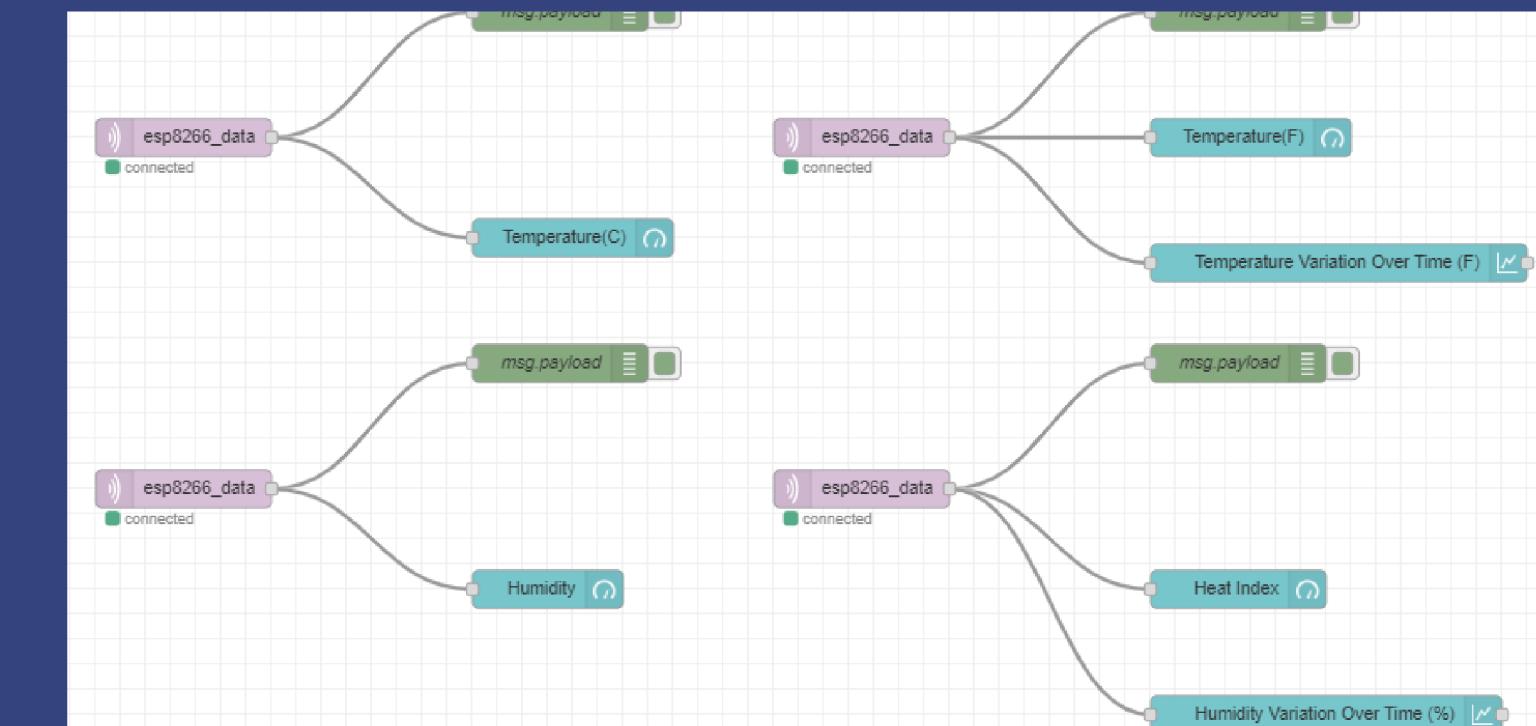
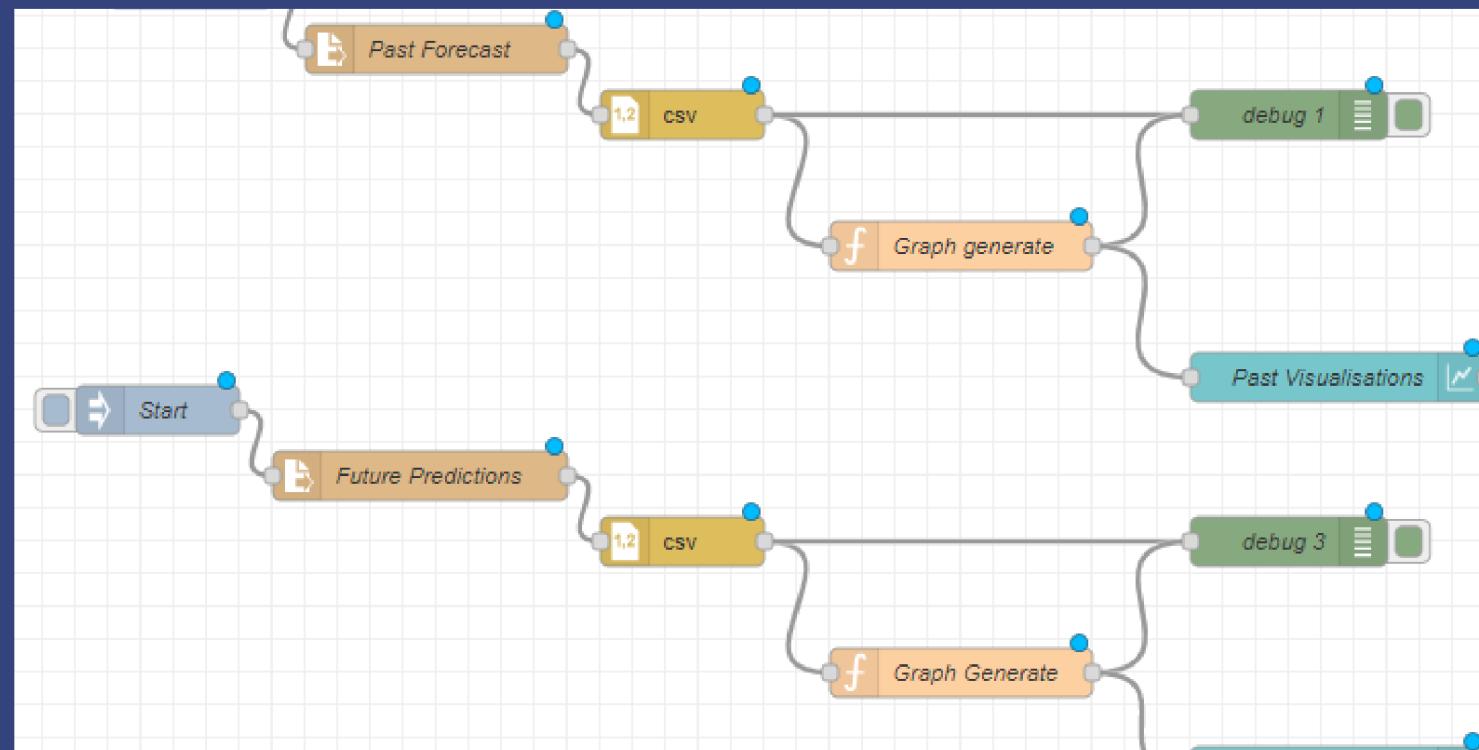
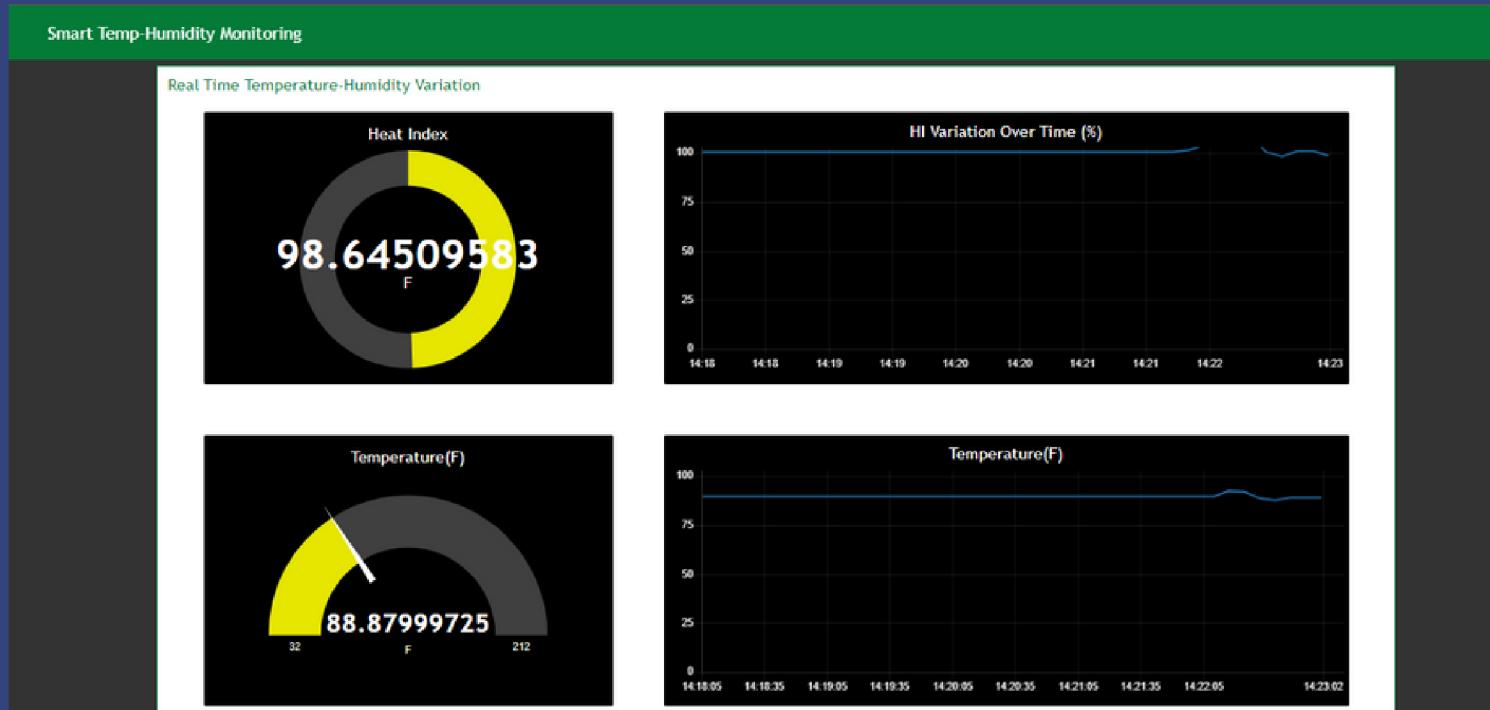
**A SG90 micro servo motor is used for this purpose.**

**The motor is programmed to move its axel based on the sensor reading**



**The LED will light up as a notification when the heat index exceeds 95°F**

# Node Red Dashboard



# Summary

## Temperature and Humidity Guage

Displays the current temperature received from the sensor

## Past and Future prediction data visualization

Past and Future predictions were stored in a CSV file and it is retrieved from the CSV to the node-red dashboard and transformed using the function node and displayed the predictions using charts

## Temperature and Humidity gauge visualization based on user selection

The captured data will be stored in the cloud and used for visualizations

**GitHub Link:** [https://github.com/Data-Science-Program/iotbda-assignment-2023-2023\\_56\\_team/tree/main](https://github.com/Data-Science-Program/iotbda-assignment-2023-2023_56_team/tree/main)

**Video Link:** [https://www.canva.com/design/DAFiliMpI3Q/OxpfRYzrbLSxez2zc0WnmQ/watch?utm\\_content=DAFiliMpI3Q&utm\\_campaign=designshare&utm\\_medium=link&utm\\_source=publishsharelink](https://www.canva.com/design/DAFiliMpI3Q/OxpfRYzrbLSxez2zc0WnmQ/watch?utm_content=DAFiliMpI3Q&utm_campaign=designshare&utm_medium=link&utm_source=publishsharelink)