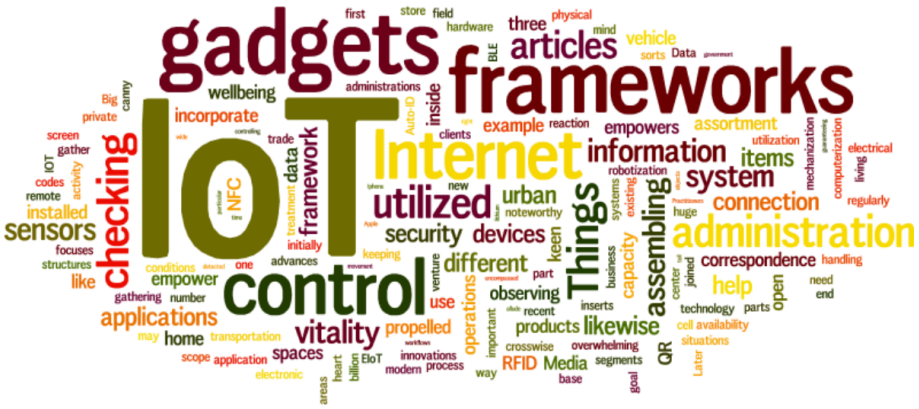

Project Report for IoT

IoT Weather Station Using NodeMCU

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Main Objective

- IoT Weather Station using Node MCU: Monitoring Humidity,Temperature and Pressure over Internet

Context

Humidity, Temperature and Pressure are three basic parameters to build any Weather Station and to measure environmental conditions.In this project, we will measure Humidity, Temperature and Pressure parameters and display them on the web server, which makes it a IoT based Weather Station where the weather conditions can be monitored from anywhere using the Internet.

In this NodeMCU Weather Station we will use our NodeMCU in Station mode and will make a web server for weather monitoring.

Required Components

1. NodeMCU
2. DHT11 sensor
3. BMP180 sensor
4. Breadboard
5. Jumper Wires

Implemented Attributes:

DHT11 sensor

DHT11 is a low-cost digital sensor for sensing temperature and humidity. This sensor can be easily interfaced with any micro-controller such as Arduino, Raspberry Pi etc... to measure humidity and temperature instantaneously.

DHT11 humidity and temperature sensor is available as a sensor and as a module. The difference between this sensor and module is the pull-up resistor and a power-on LED. DHT11 is a relative humidity sensor. To measure the surrounding air this sensor uses a thermistor and a capacitive humidity sensor.

The temperature range of DHT11 is from 0 to 50 degree Celsius with a 2-degree accuracy. Humidity range of this sensor is from 20 to 80% with 5% accuracy. The sampling rate of this sensor is 1Hz .i.e. it gives one reading for every second. DHT11 is small in size with operating voltage from 3 to 5 volts. The maximum current used while measuring is 2.5mA.

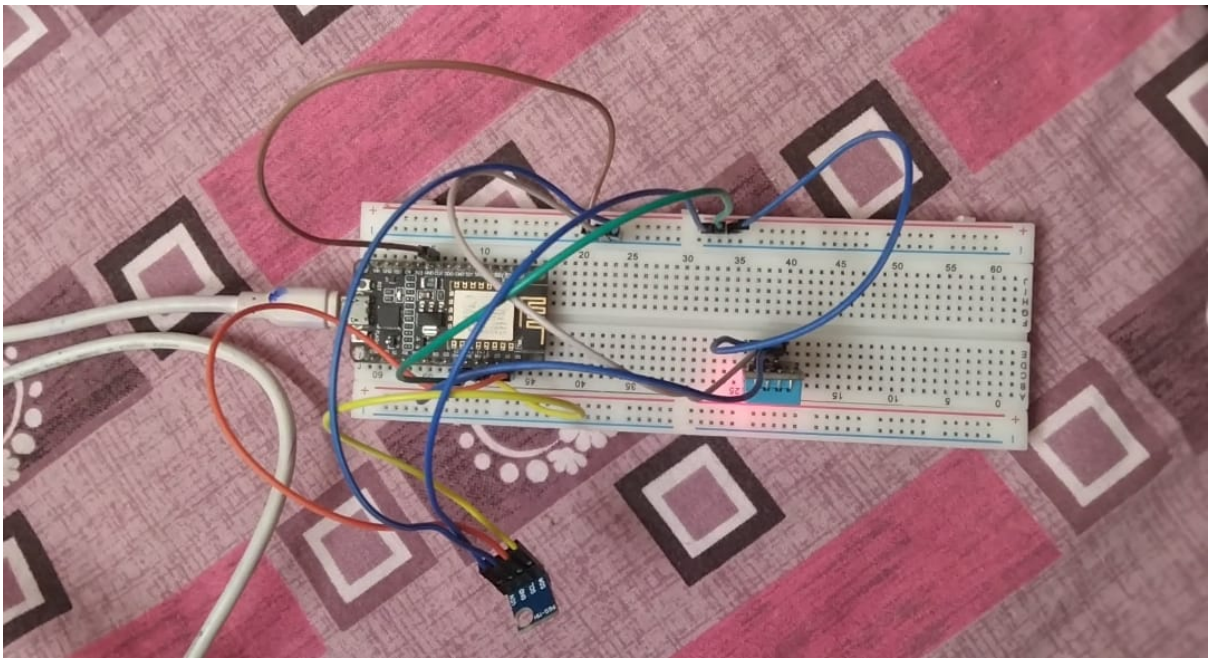
BMP180 sensor

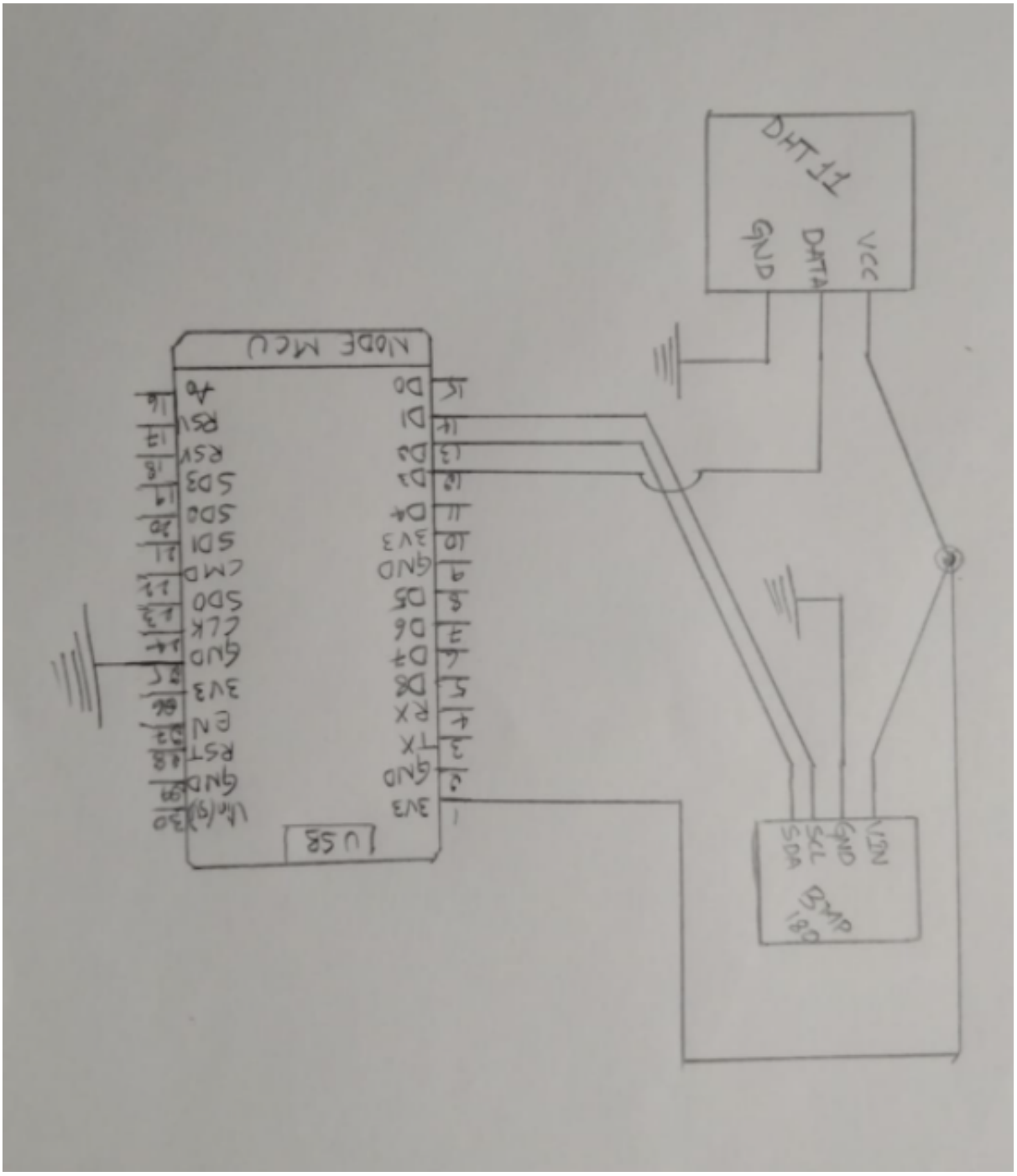
BMP180 is one of sensor of BMP XXX series. They are all designed to measure Barometric Pressure or Atmospheric pressure. BMP180 is a high precision sensor designed for consumer applications. Barometric Pressure is nothing but weight of air applied on everything. The air has weight and wherever there is air its pressure is felt. BMP180 sensor senses that pressure and provides that information in digital output. Also the temperature affects the pressure and so we need temperature compensated pressure reading. To compensate, the BM180 also has good temperature sensor.

The Pressure range of BMP180 sensor is from 300 to 1100hPa with a high relative accurancy of ±0.12hPa. The Pressure conversion time of this sensor is 5msec.Operating Voltage is 1.3 to 3.6 volts.The maximum current used while measuring is 1mA.

Circuit Diagram

Circuit diagram for NodeMCU Weather Station is given below:





Connections in the circuit are:

1. SCL of BMP180 to SCL of Nodemcu (pin D1)
2. SDA of BPM180 to SDA of Nodemcu (pin D2)
3. Data pin of DHT11 to D3 of Nodemcu (GPIO 0)
4. Vcc of BMP180 and DHT11 to 3.3v of Nodemcu
5. GND of BPM180 and DHT11 to GND of Nodemcu

Code and Explanation

We will use Arduino IDE to program ESP12.So we need ESP8266 board files. For the coding part, we need four libraries ESP8266WiFi, DHT (for DHT sensor), SFE_BMP180 (for BMP180) and Wire(for I2C).We install them from include library in **sketch menu**

Then we initialize variables and make instances for DHT, BMP180, Wi-Fi name, Wi-Fi password and some other variables used in the code. Define Pin for DHT sensor, we are using GPIO 0 (D3) here. Value of altitude variable depends on your location.

The code for getting altitude is given in the examples of BMP180 library.

Next, we declare an object of WifiServer library, so we can access its functions. The argument for the instance formed will be port number(default port for HTTP is 80) where the server is listening.

In Void setup() function, we will initialize the baud rate , dht sensor and BMP180 using **.begin()** function then connect the module with the Wi-Fi using **WiFi.begin(ssid, password);** function.

In void loop() function, we will get the temperature in Celsius and Fahrenheit and store this data in different variables using **dht.read()** function. Then we will get the pressure using **pressure.sealevel();** function, it has two arguments namely sea level pressure and altitude. Pressure will be in millibar. Then, print this data on serial monitor.

Now design our web page using html and send each line using **client.println();** fuction.We can decorate the page using CSS to style the text and background.

We will make division using ¡div¿ tag for each parameter i.e. Pressure, Temp and Humidity and will define different properties for these parameters.

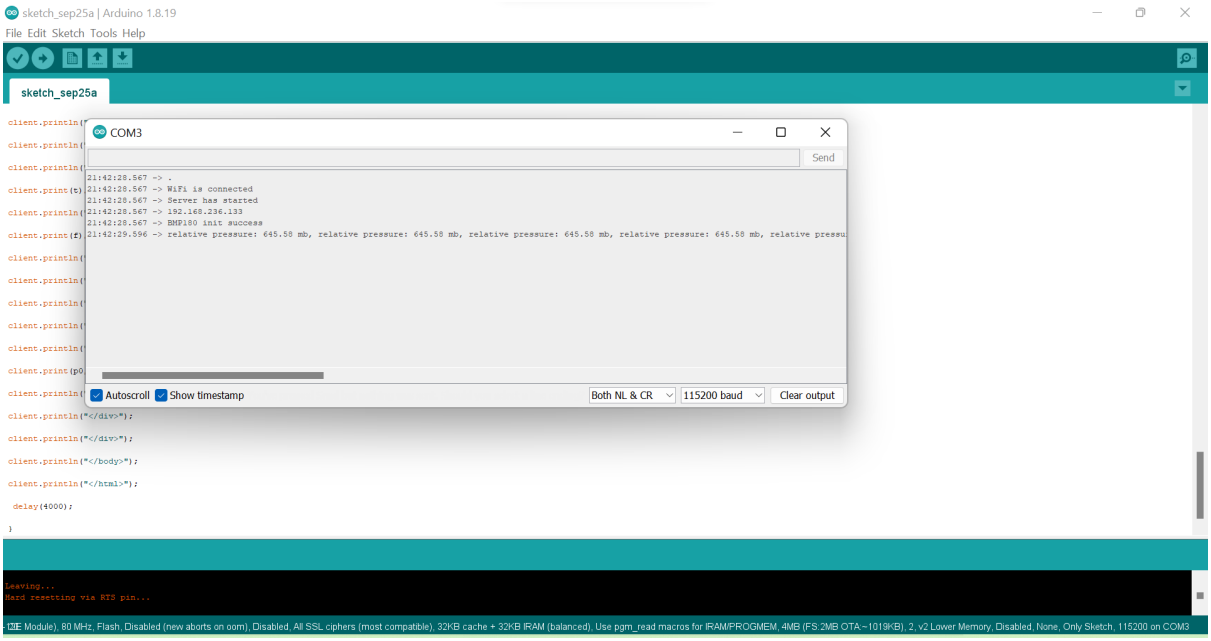
Finally close the html and body tag.

Testing

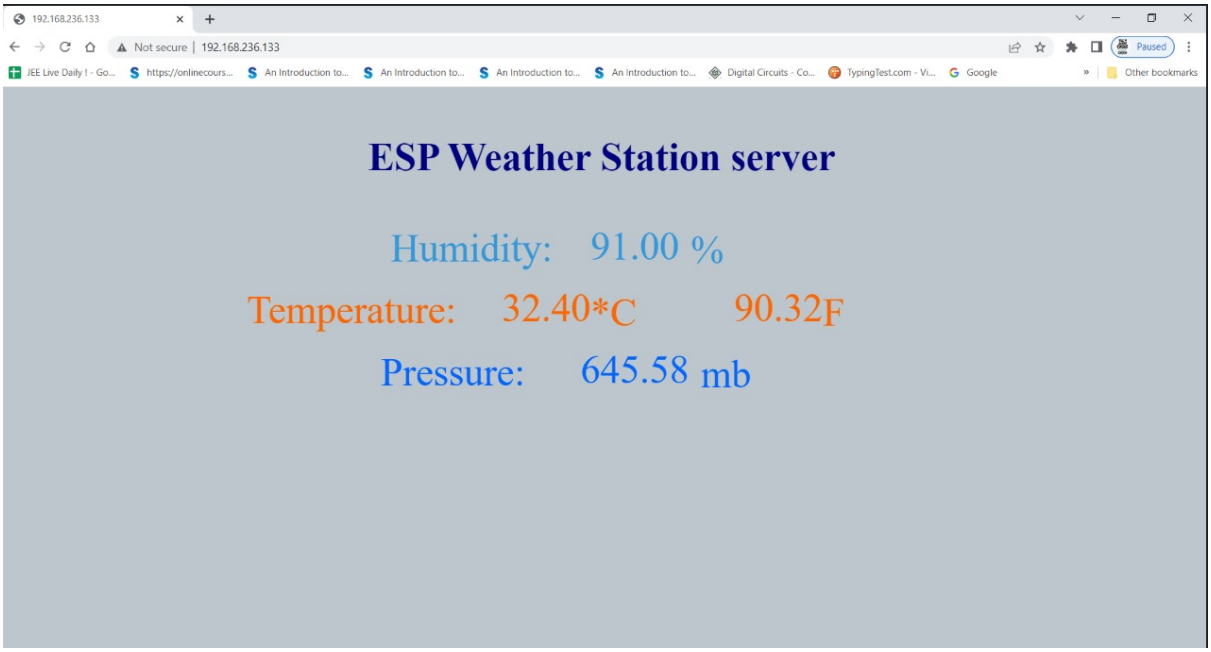
Connect the NodeMCU with the laptop and choose the board and port correctly and hit upload button. Make sure your laptop or Smartphone share same Wi-Fi network as the NodeMCU. After uploading the code, open the serial monitor. Make the baud rate of serial monitor as 115200. You will see the IP address in the monitor, just copy this IP and paste it in the browser.

Sample OUTPUT

In serial monitor, you will see IP address and also relative pressure.



Now enter the IP address in browser and search. Here you will get temperature, Humidity and pressure values.



Thank you