Weather station monitoring system

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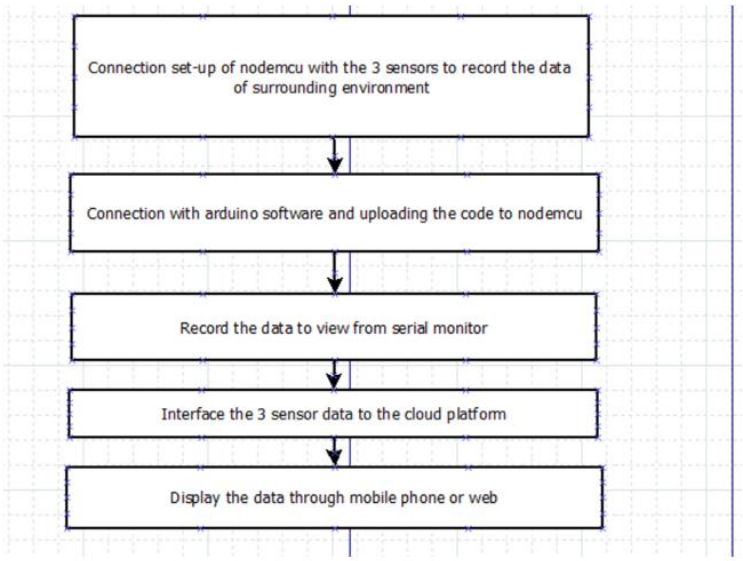
Abstract:

The following project is Weather Monitoring System in which 3 sensors are used for recording the rainfall, atmospheric pressure, temperature and humidity. The Nodemcu and connecting wires are used which are connected to ardunino software and the thingspeak cloud computing is used here to record those value and to show it in the form of graph.

Introduction:

A weather station is a device that uses various sensors to gather information about the surroundings and the weather. There are two different kinds of weather stations: one that has its own sensors, and the other that gets its data from the servers of other weather stations. Weather station sensors may include a thermometer to take temperature readings, a barometer to measure the atmospheric pressure, Hygrometer to measure humidity, rain sensor to measure rainfall, an anemometer to measure wind speed, and more. Weather stations are also called weather centers, personal weather stations, professional weather stations, home weather stations, weather forecaster, and forecasters.

Flowchart:



Components required:

- Nodemcu board x 1
- DHT11 sensor x 1
- BMP180 sensor x 1
- Rain sensor x 1
- Breadboard x 1
- Connecting wires x 12

➢ DHT 11 Humidity and temperature sensor

The DHT11 is a basic, ultra low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air and spits out a digital signal on the data pin. It requires careful timing to grab data. The digital signal is fairly easy to read using any microcontroller.

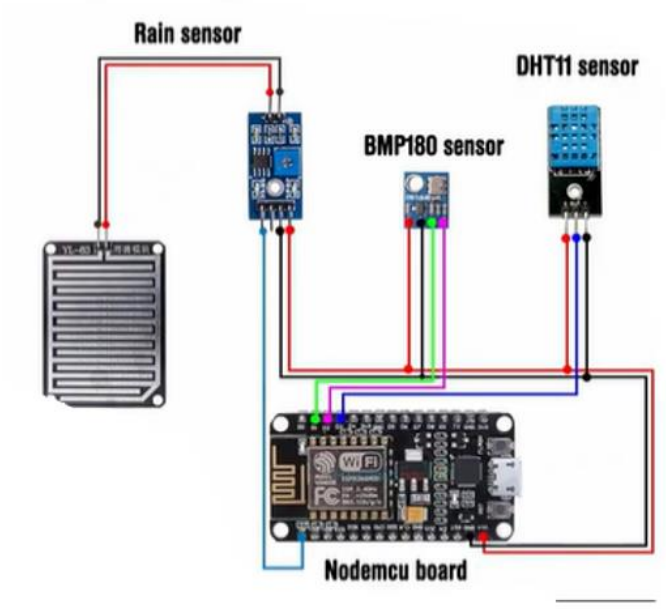
➢ BMP180

The BMP180 is the new digital barometric pressure sensor of Bosch Sensortec, with a very high performance, which enables applications in advanced devices such as smartphones, tablet PCs, and sports devices. It follows the BMP085 and brings many improvements, like the smaller size and the expansion of digital interfaces.

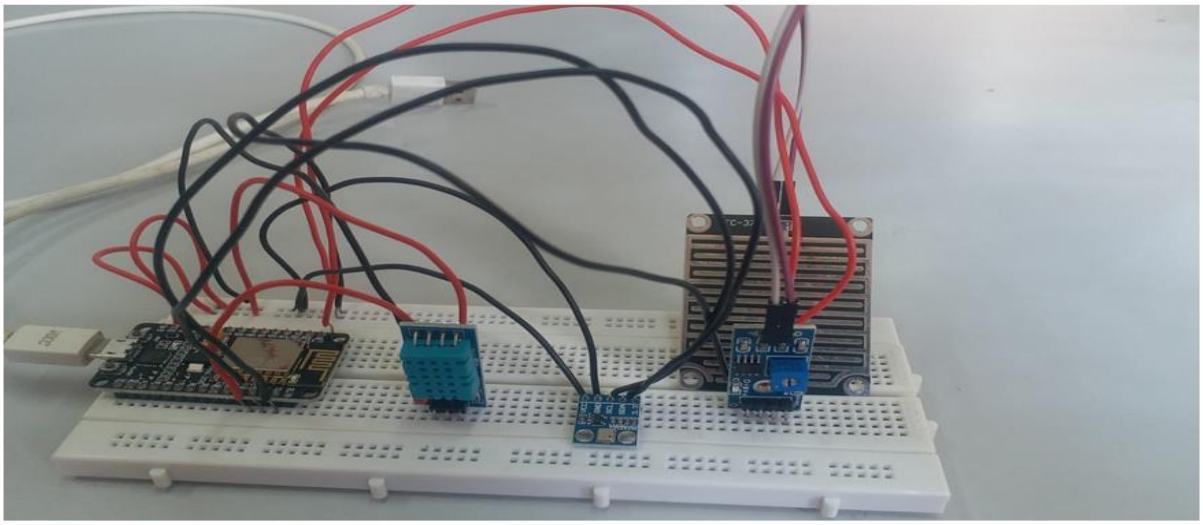
➢ Rain sensor

The rain sensor detects water that completes the circuits on its sensor boards' printed leads. The sensor board acts as a variable resistor that will change from 100k ohms when wet to 2M ohms when dry. In short, the wetter the board the more current that will be conducted.

Circuit diagram:



Set-up:



Code section:

NodeMCU 1.0 (ESP-12E Mod...

weather_monitoring_thingspeak.ino

```
/*Weather monitoring system with thingspeak.
*/

#include <SFE_BMP180.h>
#include <Wire.h>
#include <ESP8266WiFi.h>
#include "DHT.h"

String apiKey = "CXSMUJGZHT9ROSPI";
//const char *ssid =  "Blueberry";
//const char *pass =  "rhythmnblues";
const char *ssid =  "student";
const char *pass =  "student123";
const char* server = "api.thingspeak.com";


DHT dht(D3, DHT11);
SFE_BMP180 bmp;
double T, P;
char status;
WiFiClient client;
```

Serial monitor :

```
78    postStr += String(h);
```

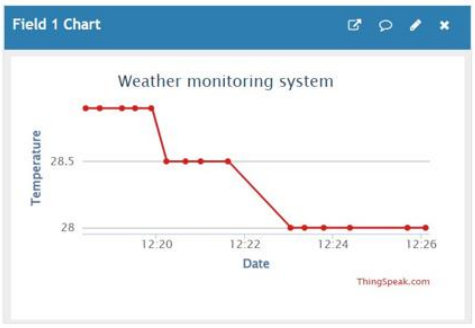
Output Serial Monitor ×

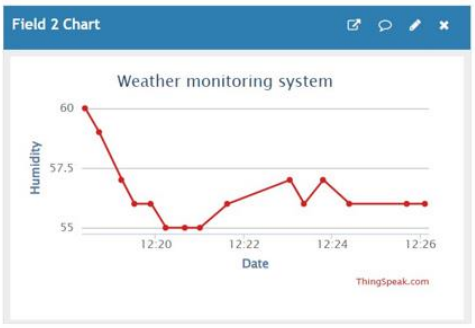
Message (Enter to send message to 'NodeMCU 1.0 (ESP-12E Module)'

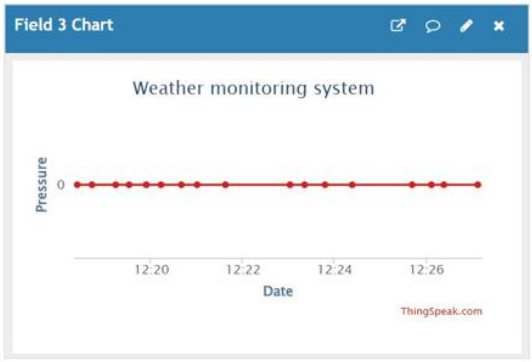
```
absolute pressure: 0.00mb
Rain100
Temperature: 28.00
Humidity: 56.00
absolute pressure: 0.00mb
Rain100
Temperature: 28.00
Humidity: 56.00
absolute pressure: 0.00mb
Rain100
Temperature: 28.00
Humidity: 56.00
absolute pressure: 0.00mb
Rain100
Temperature: 28.00
Humidity: 56.00
absolute pressure: 0.00mb
Rain100
Temperature: 28.00
Humidity: 56.00
absolute pressure: 0.00mb
```

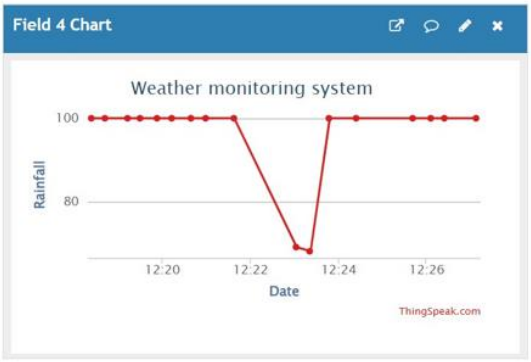
Connection with IOT cloud:

Thingspeak is used for the connection and the displaying of the data which was recorded by the Arduino software. The api-key which was generated in the thingspeak while creating the channel should be used in the Arduino code section for connection and displaying the data in the form of the graphs.









Conclusion:

3 sensors are being used for the set-up of the weather monitoring system and the connection is done with the help of node-mcu. The output generated by the sensors are displayed in serial monitor which can be further be feed in the iot cloud services.

References:

https://thingspeak.com/channels/1919955

https://www.bing.com/ck/a?!&&p=6a1491ad1ce639b4JmltdHM9MTY2NzY5MjgwMCZpZ3VpZD0yNGRkNTdjYy00Njc5LTY3MTAtM2NkMC00NWVkNDdjYjY2NzYmaW5zaWQ9NTE5Nw&ptn=3&hsh=3&fclid=24dd57cc-4679-6710-3cd0-45ed47cb6676&psq=sci-hub&u=a1aHR0cHM6Ly93d3cuc2NpLWh1Yi5zdC8&ntb=1