PROJECT REPORT

ON

IOT LIVE WEATHER STATION MONITORING USING NODEMCU ESP8266

A Sixth semester project submitted for the evaluation of the

6th semester course IOT605(Project VI)

PROJECT REPORT

to be submitted by

Prerna Goyal (1904709)

Nandini Varun (1904706)

Hardik Bandil (1904694)

B.VOC (IOT, 3rd year)

DEPARTMENT OF PHYSICS & COMPUTER SCIENCE

FACULTY OF SCIENCE

DAYALBAGH EDUCATIONAL INSTITUTE

DAYALBAGH

AGRA(UP)-282005

DECLARATION

I hereby declare that the work in this project is our own except for quotations and summaries which have been duly acknowledged. This project has not been accepted for any degree and was not submitted simultaneously for further awards.

Prerna Goyal

Nandini Varun

Hardik Bandil

ACKNOWLEDGEMENT

It gives me immense pleasure to express my deepest sense of gratitude and sincere thanks to my highly respected and esteemed guide Mrs. Vandana Ma'am & Mr. Amarjeet Sir for their valuable guidance, encouragement and help for completing this work. Her useful suggestions for this whole work and co-operative behavior are sincerely acknowledged.

I am grateful to Prof Sanjay Saini Sir, Department of physics and computer science and head of the course for his uniting help at different stages of this course work.

Finally, I am grateful to all my teachers for their constant support and guiding and my dear ones who supported me during the course.

ABSTRACT

Weather station is a device that collects data related to the weather & environment using many types of sensors. Project is based on ESP8266 and we will measure humidity & temperature, pressure, rainfall and upload the data into a web database. When the code is upload, then you will get an IP address of the ESP8266 from the serial monitor and through the same IP you can go to any web browser and display the data in a beautiful HTML page format.

TABLE OF CONTENT

DECLARATION

ACKNOWLEDGEMENT

ABSTRACT

CHAPTER-1 (INTRODUCTION)……..7

A. Introduction
B. Objectives

CHAPTER-2 (METHODOLOGY)…….8

A. Methodology
B. Study of System Components
(I) Introduction
(II) List of Components
- Hardware Design
- Software Design

CHAPTER: 3 (LITERATURE REVIEW) ……..9

CHAPTER: 4 (CIRCUIT DIAGRAM, CODING AND REAL IMAGE OF THE PROJECT) ...14

A. Circuit Diagram
B. Coding
C. Real Image of the Project

CHAPTER:5 (CONCLUSION & FUTURE SCOPE) …….17
REFERENCES……..18

LIST OF FIGURES

Fig 1 NodeMCU 10

Fig 2 DHT11 ….....10

Fig 3 BMP180.....11

Fig 4 Rain Sensor 12

Fig 5 Circuit Diagram 14

Fig 6 Real image of hardware interfacing ….....15

Fig 7 Real image of serial monitor 15

Fig 8 Real image of online website 16

CHAPTER: 1

INTRODUCTION AND OBJECTIVE

A. Introduction

In this project we use many components like NodeMCU (ESP8266), DHT11, BMP180, FC37 Rain sensor, bread board, 4.7k registers and jumper wires. We measure humidity & temperature, pressure of the environment and the rainfalls possibilities with these sensors and connect it with the NodeMCU.

You can see the result of this project by getting the IP of the NodeMCU from the serial monitor and paste it on any web browser then it will show all the results of the sensors in the beautiful widget format.

B. Objectives

The main idea of this project is to measure all these things and show it in the widget format by the small and beautiful HTML page.

CHAPTER: 2

LITERATURE REVIEW

An article published in IEEE and write by Ravi Kishore Kodali and Snehashish mandal said that weather station is an instrument which provide the information about the weather in our surroundings. This device can be measured rain intensity, temperature & humidity and pressure of the surrounding environment. There is various type of prototype present in the market which can detect the same. Four types of sensors are connected with ESP8266 and whenever the value exceed the chosen threshold limit then a SMS, a Tweet message will be generated.

In another article the same weather station was implemented with the help of NodeMCU and Raspberry pi. In this, IOT server send all the data through the remote VPS using internet and application runs 24*7 for collect all the data in to database. The main aim to use raspberry pi is that they want to deploy a scalable weather station for faster data, privacy and safety with the end product (published in IEEE and write by Debashish Mohapatra, Bidyadhar Subudhi…).

CHAPTER: 3

METHODOLOGY (SYSTEM STUDY, HARDWARE AND SOFTWARE DESIGN)

A. Methodology

The circuit of the project is divided into three parts. There is an input stage that composed by the sensors, a DHT11 sensor for measuring the temperature & humidity, a BMP180 sensor for measure the pressure, a Rain sensor for detect the rainfall possibilities and finally a program embedded software that is in the NodeMCU.

B. STUDY OF SYSTEM COMPONENTS

(I) INTRODUCTION

When designing electronic circuits (or diagrams), a good knowledge of the components to be used is necessary. Concerning this project, to reach the stated goal and objectives which is to build a IOT live weather station monitoring, we must first study some key components.

(II) LIST OF COMPONENTS

This project is constituted by the following named components:

- **Hardware Design**
  - **NodeMCU (ESP8266) Theory**

NodeMCU is an open source IOT platform. It has many inbuilt features like Wi-Fi & more and provides many functionalities for different kind of work. It has different pins like GPIO, RX, TX etc.

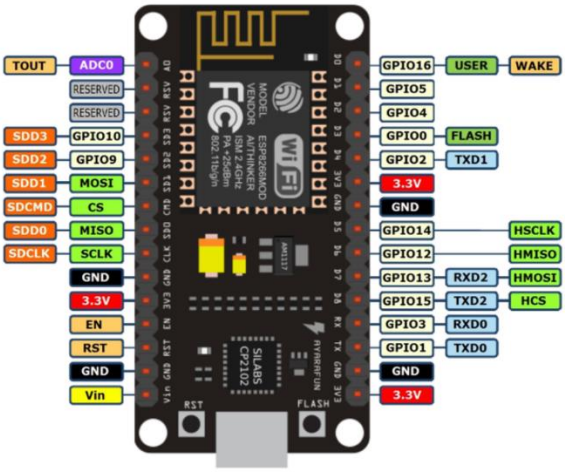

Fig 1

- **DHT11 Humidity & Temperature Sensor:**

DHT11 is an ultra-low-cost sensor which can measure the temperature and humidity of the surroundings. It is very simple to use but require careful time to gather the data. Some dht has 3 pins and some has 4. In our project we are using 3 pin DHT11. First pin is GND, second is DATA pin and last one is VCC.

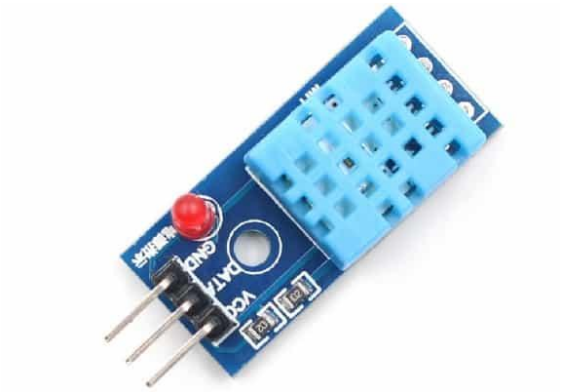

Fig 2

- **BMP180 Barometric Pressure Sensor:**

This is new digital sensor which has a very high performance. It can enable applications in advanced devices such as smartphones, tablet PCs. It can detect the pressure in the range between 300-1100 hPa. The sensor has 4 pins. The sensor is easy to use.

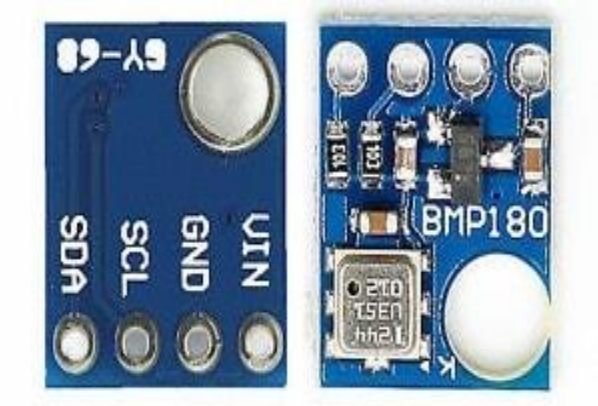

Fig 3

- **Rain Sensor:**

This sensor is used to detect the chances of rain in the environment. This is basically work on as much the board wetter the more current will be generated and the chances of correct prediction will increase.

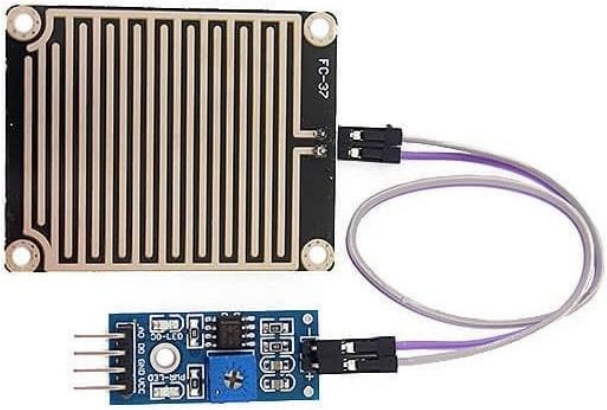

Fig 4

- **Jumper Wires**
- **Breadboard**
- **4.7k Registers**

- **Software Design**

The Arduino IDE environment is used for coding as a software part.

- **Arduino IDE Theory**

This IDE is an open-source software. It is basically used for writing, compiling &uploading the codes. This is very simple and easy to use software for everyone like a non-technical person can also understand it easily and work on it.

The features of Arduino IDE can be work in all operating systems like Windows, Mac, Linux etc. Arduino IDE contains two parts: editor and compiler. This IDE supports C & C++ languages.

CHAPTER: 4

CIRCUIT DIAGRAM, CODING AND REAL IMAGE OF THE PROJECT

A. CIRCUIT DIAGRAM

The circuit diagram of proposed system is shown below:

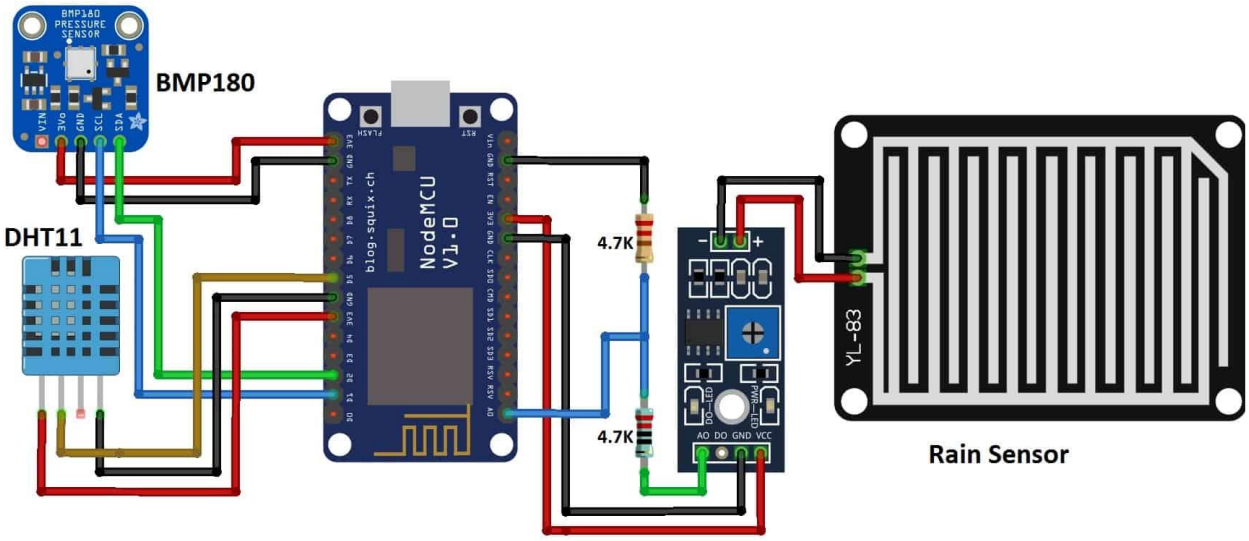

Fig 5

B. REAL IMAGE OF THE PROJECT

The real image of the project is shown below:

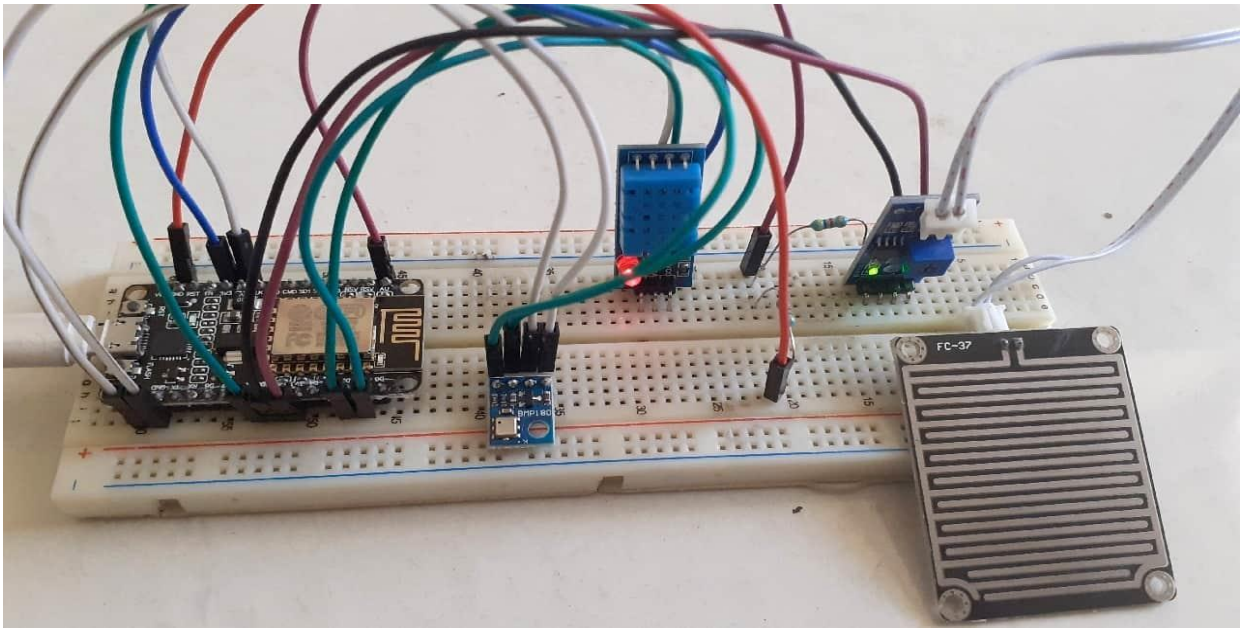

Fig 6

COM6

```
.......
Connected to Alexahome
IP address: 192.168.43.185
HTTP server started
temperature: 30.98 deg C, 87.77 deg F
absolute pressure: 970.94 mb, 28.68 inHg
relative (sea-level) pressure: 1185.85 mb, 35.02 inHg
computed altitude: 1655 meters, 5430 feet
H:31.00
T:31.00
R:266
```

Fig 7

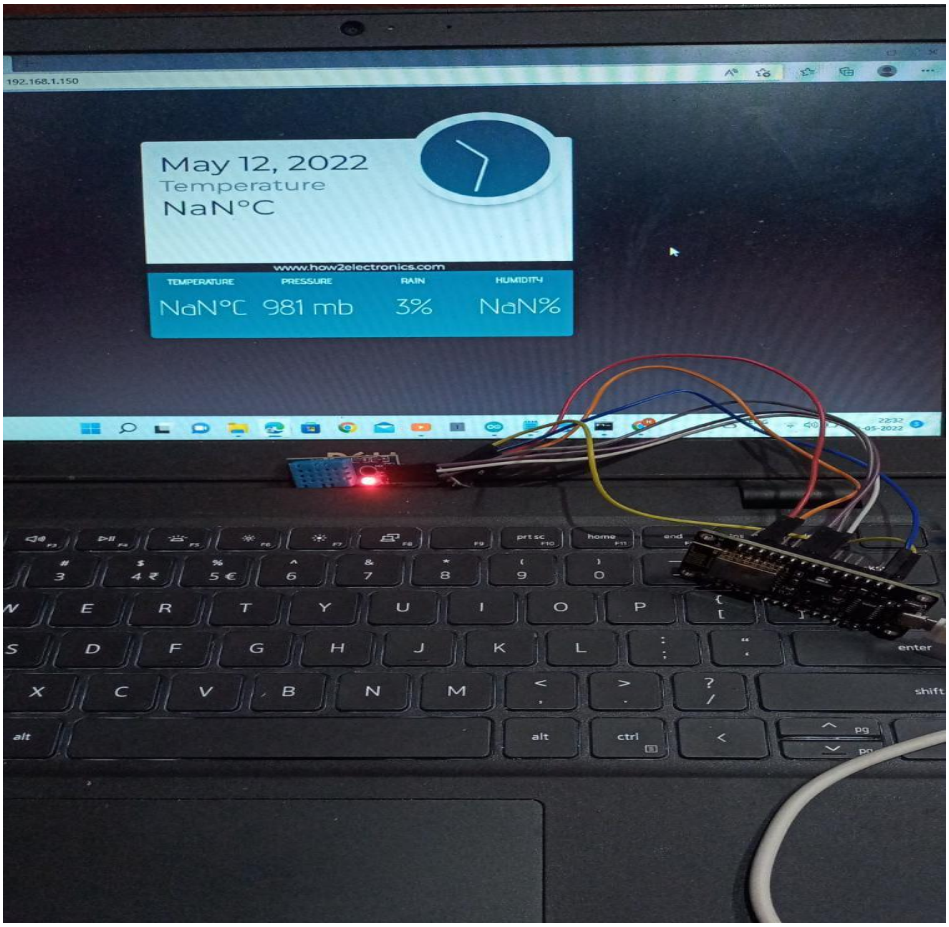
192.168.1.150
May 12, 2022
Temperature
NaN°C
www.how2electronics.com
TEMPERATURE
PRESSURE
RAIN
HUMIDITY
NaN°C
981 mb
3%
NaN%

Fig 8

CHAPTER: 5
CONCLUSION & FUTURE SCOPE

A. Conclusion

By using this sensor, we can stream real-time data over the web server using ESP8266. We also required one dedicated public IP to available this server over the open Internet. The excellent and low-cost weather are monitoring real-time system.

B. Future Scope

With the available time and resources, the objective of the project was met. The project is able to be implemented on a much larger scale.

There are many ideas to improve this project and make it more reliable and helpful like we can add more sensor with this like Ultrasonic sensor, PIR sensor, Soil moisture and many more and check all these value on the HTML page.

REFERENCES

- https://how2electronics.com/iot-live-weather-station-monitoring-using-nodemcu-esp8266/
- https://www.circuitschools.com/live-weather-station-using-nodemcu-esp8266-with-dashboard-iot/
- https://circuitdigest.com/microcontroller-projects/esp12-nodemcu-based-iot-weather-station
- https://github.com/Kanishk-K-U/Live-Weather-Station
- https://srituhobby.com/iot-based-weather-monitoring-system-using-nodemcu-and-blynk/
- https://ieeexplore.ieee.org/abstract/document/7988038/?casa_token=vb4byhHpfa0AAAAA:2FQtECI7Ii0p3Y7g3-qmSajGVoY4Q5d2ce2CFl5rIUMJ7tpVtnpa__tjcl4tY92ZnQWhChsXXoE
- https://ieeexplore.ieee.org/abstract/document/9171156/?casa_token=dFFANyFN_wkAAAAA:j-kj6-MAtqFuAQng8FByvRH05O1gIx0AgkpwC8b5ob1tmu-JWBtEeQHsey5sRnjd1jP0VBfF8hE
- https://ieeexplore.ieee.org/abstract/document/9669101/?casa_token=WEoXL-goQSoAAAAA:g9PrRtSH9-NknxG2T7W8ifeZtYJq_4kbnpeH1aA-6IhBkGgoiirVSXHf02kMP_GNxGRfFgtLfkg