

# IOT based Real Time Weather Prediction System using NODEMCU 12-E ESP266 and Lab View

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**Abstract-** The IoT Technology provided in this project is a good option for surveillance the weather data at a particular region and make the data visible anywhere in the world. The idea behind this is Electronic sensors connected to the Public Internet by using IoT technology. The data fetched from the embedded system can be accessible over the Internet from anywhere in the world. In some area, it will be challenging to check and monitor the vital weather parameter through wires and analogue devices during some weather hazards. To resolve this problem here, electronic sensors are used to review and monitor the weather parameters. The project is implemented using Node MCU ESP-8266 with WiFi inbuilt used for TCP/ IP protocol in the smart phone for wireless remote monitoring. A Integrated TCP/IP protocol stack is used for transmitting and receiving sensor information. Depending on a status of weather information to the wireless remote location. The NodeMCU-12E controls the entire weather Prediction system peripherals and status on a Blynk app / web page or mobile application. In this way, a secure, flexible, trust-able and economical system is developed to solve above mentioned weather parameters. The module is implemented using Laboratory Virtual Instrument Engineering Workbench (LabVIEW).

**Keywords-** IOT, Node mcu, DHT11 sensor, BMP280 sensor, Rain sensor, LABVIEW,

## I. INTRODUCTION

A weather station is a technology that collects data related to the weather & environment using different electronics sensors. There are two types of weather station, one who is having their sensors and the second type of weather station is where we pull data from the weather station servers. In this project, we are designed by our weather station. We all know that a weather station is not a single device, but it is a combination of many small tools to form a larger system. It contains various sensors and gadgets that work together but in specific ways to transmit proper and accurate data of the weather parameters. It is quite tricky to uses of WEB server based weather station to non-technical peoples, so we are providing web server-based user interface as well as Android application. We are well known today most mobile units running on Android OS, and many people's are well known to use the android phone. So, our application is beneficial for such purpose This device is all about IoT based Live Weather data Monitoring Using Nodemcu ESP8266. We will interface DHT11 Humidity & Temperature Sensor, BMP280 Barometric Pressure Sensor

and FC37 Rain Sensor with NodeMCU ESP8266-12E wi-fi Module.

## II. LITERATURE SURVEY

1. Ravi Kiran Varma et.al [2] Raspberry pi hardware board is an economical internet of things (IOT) hardware platform that can be used for wide variety of application. This paper discusses the hardware, software platforms and implementation details of an IOT application for environmental monitoring and control using raspberry pi 3 Model B. The DHT11 is used to monitor temperature and humidity to further control the air conditioning system, The FC-37 is used to detect the rainfall and further control the sprinkling system. The MQ135 sensor is used to detect the presence of hazardous gasses in the environment. DJANGO web technology platform is used to design a dash board for monitoring and controlling the things. MYSQL data base is used to log the sensor and fusion charts are used to display the trends in the graphical form.

2. Chaw Myat Nwe et.al [3] The proposed system is an advanced solution for monitoring the weather condition at the particular place and makes the information visible anywhere in the world. The technology behind this is the internet of things (IOT). The system deals with the monitoring the environmental condition like temperature, humidity with respect to its measured time with a microcontroller interfaced with sensors and GSM module to sends the information wirelessly to remote server and then plot the sensor data as the graphical statistics

3. Loan-madlin Neagu et.al [4] has proposed the sustainable smart cities a frog computing frame work for a smart urban transport network in this paper ,a frog computing frame work for smart urban transport is developed. The proposed framework is adapted to the smart city concept it uses collaborative multitude of the end user clients to carry out a substantial amount of communication and computation it can be adapted for specific situation of smart cities in Romania

4. Shauofeng hou, et.al [5] has described intelligent window system for the obtaining weather information based on internet. A smart electric push pull window composed of a actuator a control system a data acquisition system, a data processing system a weather website and a window the system can collect real-time weather

information such as temperature and relative humidity PM 2.5 wind speed and cloudy or cloudy on the internet through a data acquisition system.

5. Febus reidj G cruz eta. l[6] has proposed the network flood prediction system with rain gauge ,temperature humidity pressure sensor ,ultrasonic sensor, soil moisture sensor and anemometer. Located near the pacific ocean, Philippines is along in one of the places regarded as a typhoon belt having an average of 19 to 20 tropical cyclones occurring every year. These tropical cyclones leave a devastating effect especially to properties, infrastructures and lives of the people. The development of a system that can predict the flood level based on different weather parameters such as ambient temperature, relative humidity, barometric pressure and wind speed.

6. Cong zheng Han eta.l [7] has proposed the rainfall monitoring based on next generation millimeter wave backhaul technology in a dense urban environment. High-resolution and accurate rainfall monitoring is the great importance to many applications, including meteorology, Hydrology, and flood monitoring in recent years, microwave backhaul links from wireless communication has been suggested for rainfall monitoring purposes, complementing the exiting monitoring systems .with the advances in microwave technology, new microwave backhaul solutions have been proposed and applied for 5G networks.

7. T Dhineesh, eta.[8] has proposed the paper in order to regulate the irrigation of water, some smart devices like raspberry pi based control is used to save the water. The water is fed to the land by analyzing the soil moisture level and the water updates through the wifi module. Whenever the soil moisture level detected as less than the threshold value then the raspberry pi opens the electromagnetic valve. Water is irrigated through the drip irrigation to save the water. Various sensors like a co2 sensors , so2 sensors, light intensity sensors which as the LDR circuit are used for the environmental monitoring of that particular area

### III. PROBLEM STATEMENT

Limited way for user to know about weather such as the temperature ,humidity and pressure.

User can 't be alerted of the strong winds, heat waves or any other weather-related emergency. Difficulty in the making weather forecasts without data.

### IV. METHODOLOGY

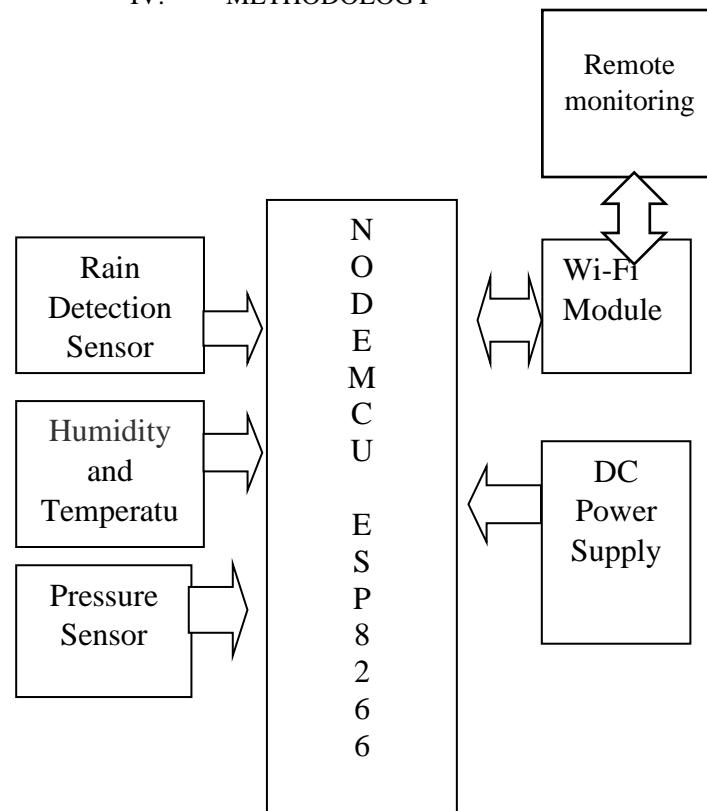


Fig.1. Block Diagram of Proposed Work

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. DHT11 module features a humidity and temperature complex with a calibrated digital signal output means DHT11 sensor module is a combined module for sensing humidity and temperature which gives a calibrated digital output signal. DHT11 gives us very precise value of humidity and temperature and ensures high reliability and long term stability. It is a barometric pressure sensor and it works with an I2C interface. This sensor measures the absolute pressure of the air around it. The pressure value depends on both the weather and altitude. It depends on how you interpret the data, and can easily monitor changes in the weather, measure the altitude, or any other tasks that require an accurate pressure reading.DHT11 module features a humidity and temperature complex with a calibrated digital signal output means DHT11 sensor module is a combined module for sensing humidity and temperature which gives a calibrated digital output signal. DHT11 gives us very precise value of humidity and temperature and ensures high reliability and long term stability It is a barometric pressure sensor and it works with an I2C interface. This sensor measures the absolute pressure of the air around it. The pressure value depends on both the weather and altitude. It depends on how you interpret the data, and can easily monitor changes in the weather, measure the altitude, or any other tasks that require an accurate pressure reading.BMP 280 Pressure

Sensor .It is a barometric pressure sensor and it works with an I2C interface. This sensor measures the absolute pressure of the air around it. The pressure value depends on both the weather and altitude. It depends on how you interpret the data, and can easily monitor changes in the weather, measure the altitude, or any other tasks that require an accurate pressure reading. Rain sensors are used in the detection of water beyond what a humidity sensor can detect. 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.

#### V. WORKING PRINCIPLE

This project is all about IoT based Live Weather Station Monitoring using NODEMCU ESP266 We will interface DHT11 Humidity and temperature sensor,BMP280 Barometric pressure, and rainfall and upload the data to a web server to the smart phone via WiFi module inbuilt in NodeMCU ESP8266.

A Integrated TCP/IP protocol stack is used for transmitting and receiving sensor information. Depending on a status of weather information to the wireless remote location. The NodeMCU-12E controls the entire weather Prediction system peripherals and status on a Blynk app / web page or mobile application. In this way, a secure, flexible, trustable and economical system is developed to solve above mentioned weather parameters. Also, you can check whether data through anywhere using Internet as we hosted this server publicly. We developed an android application for easy access to our weather monitoring system

#### VI. SYSTEM REQUIREMENTS

##### 1. NODEMCU



Fig.2. NODEMCU

NodeMCU is an integrated chip that provides full internet connectivity to the embedded circuit in which it is present. It can be programmed through USB port using Arduino IDE. It has a total of 30 pins in which 9 pins are digital pins while 1 pin is analog pin. It is a tool that is employed for Wi-Fi networking. It has low power consumption. In this project it has been employed as the main microcontroller owing to its inbuilt Wi-Fi connecting capacity which can be exploited to transmit real-time monitored sensor data to web and mobile interfaces.

#### 2. Temperature and humidity sensor

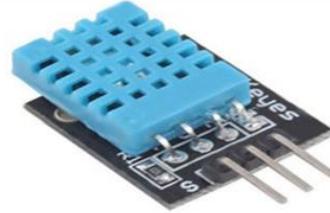


Fig.3 . Temperature and Humidity Sensor

DHT11 module features a humidity and temperature complex with a calibrated digital signal output means DHT11 sensor module is a combined module for sensing humidity and temperature which gives a calibrated digital output signal. DHT11 gives us very precise value of humidity and temperature and ensures high reliability and long term stability.

#### 1. BMP280 Sensor

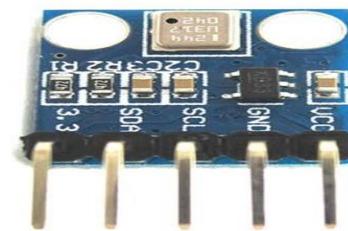


Fig.4.BMP280 Sensor

BMP 280 Pressure Sensor:It is a barometric pressure sensor and it works with an I2C interface. This sensor measures the absolute pressure of the air around it. The pressure value depends on both the weather and altitude. It depends on how you interpret the data, and can easily monitor changes in the weather, measure the altitude, or any other tasks that require an accurate pressure reading.

#### 2. Rain Sensor

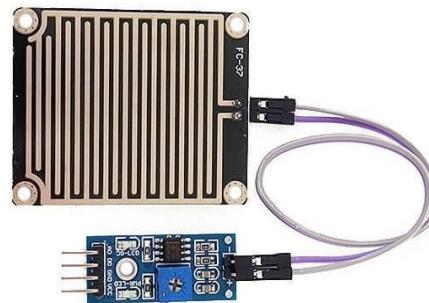


Fig.5.Rain Sensor

Rain sensors are used in the detection of water beyond what a humidity sensor can detect.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

## Software Requirement

- Lab View and Arduino software (OS)
- Embedded C

## VII SCOPE OF THE PROJECT

The scope is important to set a boundary on what is covering in the project. Thus weather station using internet of things is focused on getting data about weather like temperature, humidity, and pressure.

1. user can see the data of temperature, humidity, and pressure.
2. system collects weather data from weather station, save the real time data and send the data to local server.

## VIII RESULTS AND DISCUSSION

After detection the data from different sensor device, which are positioned in particular area of interest. The sensed data will be automatically sent to the web server, when a proper connection is recognized with server device, the web server page which will allow us to monitor and control the system. Entering IP address of server which is placed for monitoring we will get equivalent web page. The web page gives the information of the weather parameters in that particular region, where the monitoring system is placed.

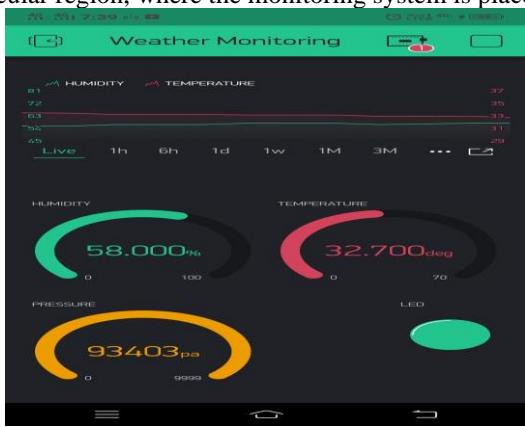


Fig.6 . Output of the Blynk app

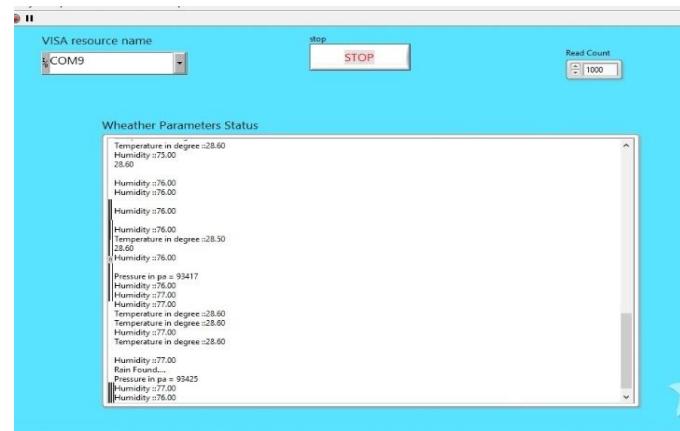


Fig 7: Output of the Labview

## IX CONCLUSION

To make this idea, genuine need to take help of electronic sensor devices which are needed to place in the environment. 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 presented in this paper. A Integrated TCP/IP protocol stack is used for transmitting and receiving sensor.

## X . REFERENCE

- [1] "Munandaret all.(2018) proposed a weather monitoring system by using automatic weather station".
- [2] "Antony Jerome, et all.(2017) published a LABVIEW system using NI my Rio module for Auto home application".
- [3] Khalid Isa 2017 IEEE 7th international conference on underwater system technology theory and application (USYS).
- [4] Ravi kiran varma p, "An IOT application for environmental monitoring and control using raspberry-pi" was proposed at July 2017.
- [5] chaw Myat new, "A smart weather monitoring system using internet of things" was published at July 2018.
- [6] loan- Madalin Neagu, "Sustainable smart cities: A frog computing framework for a smart urban transport network" Arad- economic series 28(4), 68-80, 2018.
- [7] shuofeng Hou, "Intelligent window system for obtaining weather information based on internet" was described at 2018.
- [8] Febus Reidj G Curz , "Network Flood prediction system with rain gauge, temperature humidity pressure sensor, ultrasonic sensor, soil moisture sensor and Anemometer" was proposed at 2019.
- [9] Cong zheng han, "Rainfall monitoring based on next- generation millimeter-wave backhaul technologies in a dense urban environment" proposed in remote sensing 12(6), 1045, 2020.
- [10] T Dhineesh, "Analysis of the IOT based wireless sensors for environmental monitoring in agriculture". Proposed at 2019.
- [11] Anitha M. Bhagat, "IOT based weather monitoring and reporting system project". Proposed at 2019.
- [12] Ali, lin, "Neural network (ANN) is best suited in weather forecasting". Proposed at 2013.