# WALCHAND COLLEGE OF ENGINEERING, SANGLI

(Government-Aided Autonomous Institute)


## Department of Electronics Engineering

## Third Year B. Tech. Project Report

# *"IOT BASED WEATHER MONITORING SYSTEM"*

**Submitted By**

Sagar Bhimashankar Sutar : 2020BTEEN00208

Ramkrushna Suresh Shinde : 2020BTEEN00207

Dashrath Prakash Mole : 2019BTEEN00004

**Under the guidance of**

***Prof. Tamhankar.S.G.***

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# Abstract:

In todays world real time monitoring of weather is been very important as humans can plan their day to day activities according to the environmental parameters. There is already system available for weather update and forecasting but it does not map, measures the actual on field parameters .The developed solution will remove this problem as these solution measures actual on field parameters .The developed solution will monitor live weather parameters such as temperature, humidity, rainfall and intensity of light of any region where it is installed, and send that data to nodemcu controller and nodemcu processes this data and displays on lcd as well as send this data to live blynk server so that any client can access it. This system is based on client server based model where the circuit node side will acts as a server and any mobile application will acts as a client.And this stored data can be used for further processing such as weather forecasting.

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# 1. Introduction:

In todays world monitoring weather parameters is very important part of life particularly for agriculture, industry and construction sites. But agriculture and industries have major affect of environment on it. As farming consists of various steps and that need to be taken by considering environmental conditions. IOT reduces the efforts to be taken by human. IOT network has lots of security trends. In agriculture not only live weather monitoring but also weather forecasting is also important now a days that system of forecasting is also available but our solution will provide more robustness and accuracy as it collects actual on field data. This system will be also helpful for collection of weather data of greenhouse AS well as construction sites also works in open environment and that needs planning according to the environmental condition.

# 2. Literature Survey:

- in publication [1] author written about the implementation of weather monitoring system and also various challenges he faced during the development . In which author also written about report creation of weather monitoring.

- In report [2] author elaborated about IOT based weather data collection system in which author used different sensors for data collection of different parameters also author added the feature of SMS based alert system.

- In paper [3] author developed a system in which he used the oled display along with microcontroller and sensors to display the live values and author used wi-fi enabled board esp8266.

# 3. Circuit Design:

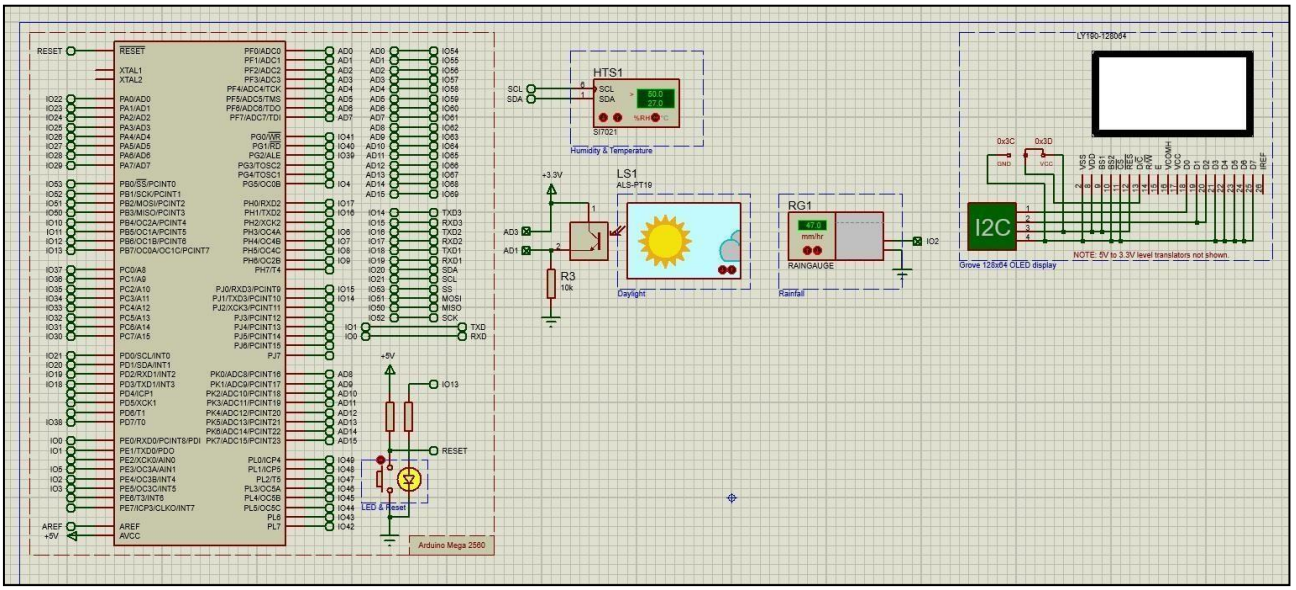



**Fig . CircuitDiagram.**

## 3.2. Block Diagram:

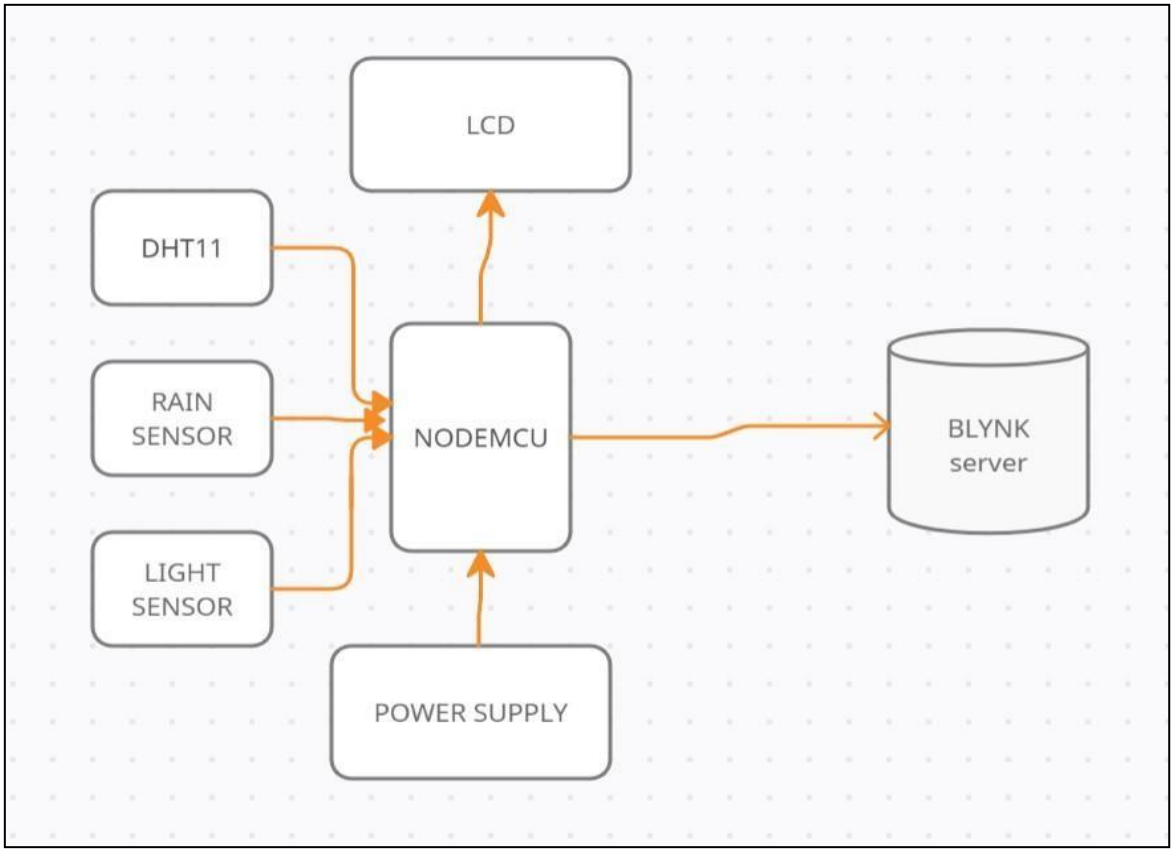


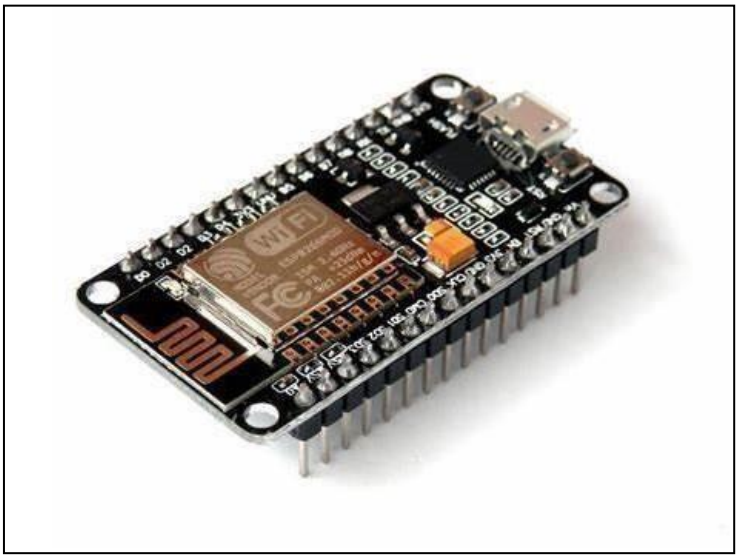

**Fig: Block Diagram**

## 4. Components Used:

| SR.NO | COMPONENT | QUANTITY |
|---|---|---|
| 1. | Nodemcu | 01 |
| 2. | DHT11 | 01 |
| 3. | Rainfall Sensor | 01 |
| 4. | LDR Sensor | 01 |
| 5. | Battery | 01 |
| 6. | Connecting Wires | - |
| 7. | Male Header | - |
| 8. | Female Header | - |

# 5. Component Description:-

## 5.1. NodeMCU ESP8266:



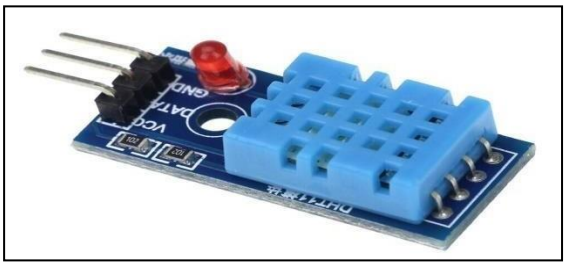
### 5.1.1. NodeMCU ESP8266 Specifications & Features:

1. Microcontroller: Tensilica 32-bit RISC CPU Xtensa LX106.
2. Operating Voltage: 3.3V.
3. Input Voltage: 7-12V.
4. Digital I/O Pins (DIO): 16.
5. Analog Input Pins (ADC): 1.
6. UARTs: 1.
7. SPIs: 1.
8. I2Cs: 1.
9. Flash Memory: 4 MB.
10. SRAM: 64 KB.
11. Clock Speed: 80 MHz.
12. PCB Antenna.

### 5.1.2. PIN Description:

| Pin Category | Name | Description |
|---|---|---|
| Power | Micro-USB, 3.3V, GND, Vin | **Micro-USB:** NodeMCU can be powered through the USB port<br>**3.3V:** Regulated 3.3V can be supplied to this pin to power the board<br>**GND:** Ground pins<br>**Vin:** External Power Supply |
| Control Pins | EN, RST | The pin and the button resets the microcontroller |
| Analog Pin | A0 | Used to measure analog voltage in the range of 0-3.3V |
| GPIO Pins | GPIO1 to GPIO16 | NodeMCU has 16 general purpose input-output pins on its board |
| SPI Pins | SD1, CMD, SD0, CLK | NodeMCU has four pins available for SPI communication. |
| UART Pins | TXD0, RXD0, TXD2, RXD2 | NodeMCU has two UART interfaces, UART0 (RXD0 & TXD0) and UART1 (RXD1 & TXD1). UART1 is used to upload the firmware/program. |
| I2C Pins | | NodeMCU has I2C functionality support but due to the internal functionality of these pins, you have to find which pin is I2C. |

## 5.2. DHT11-Temperature and Humidity Sensor:



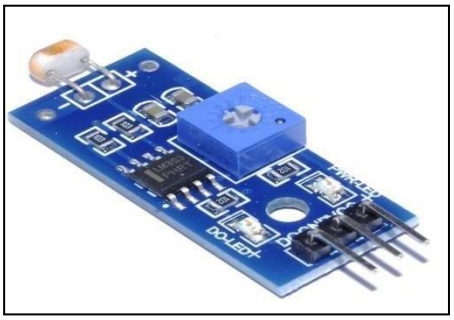
### 5.2.1. DHT11 Specification:

1. Operating Voltage: 3.5V to 5.5V
2. Operating current: 0.3mA (measuring) 60uA (standby)
3. Output: Serial data
4. Temperature Range: 0°C to 50°C
5. Humidity Range: 20% to 90%
6. Resolution: Temperature and Humidity both are 16-bit
7. Accuracy: ±1°C and ±1%

### 5.2.2. Pin Description

| No: | Pin Name | Description |
|---|---|---|
| 1 | VCC | Power supply 3.5V to 5.5V |
| 2 | Data | Outputs both Temperature and Humidity through serial Data |
| 3 | NC | No Connection and hence not used |
| 4 | Ground | Connected to the ground of the circuit |

## 5.3 LDR Sensor:



### 5.3.1 LDR Specifications

**Light Resistance :** 50-100KΩ
**Rated Power** **:** 200W
**Diameter** **:** 3-20mm

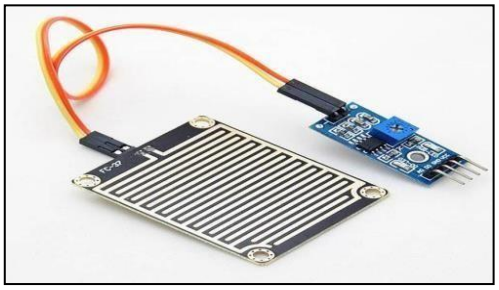
### 5.3.2. Pin Description

**GND:** use to provide ground to sensor

**VCC:** use to provide power to sensor

**SIG:** use to provide analog output to devices

## 5.4 Rainfall Sensor:



### 5.4.1 Specifications:

- Operating Voltage: 3.3V to 5V
- Operating current: 15mA
- Output type : Analog output voltage and digital switching voltage
- Comparator chip

### 5.4.3. Pin Description:

- GND **:** Ground (-) supply.
- VCC **:** +5 v supply**.**
- D0 **:** Digital Output
- A0 **:** Analog Output(range 0 to 1024)

# 6. Working:-

- ## Temperature and humidity monitoring:

Temperature and humidity is measured using DHT11 which has temperature measurement range from 0°C to 50°C and has accuracy of ±1%. And DHT11 works on 3.5v to 5.5 v. And measured temperature is displayed on lcd as well as its being send to blynk cloud for live monitoring.

- ## Rainfall monitoring:

Amount of rainfall is measured with the help of rain sensor plate. There are copper traces on plate of rain sensor whose resistance changes according to the amount of water present on surface. And voltage divider circuit is used to convert change in resistance to changing voltage.

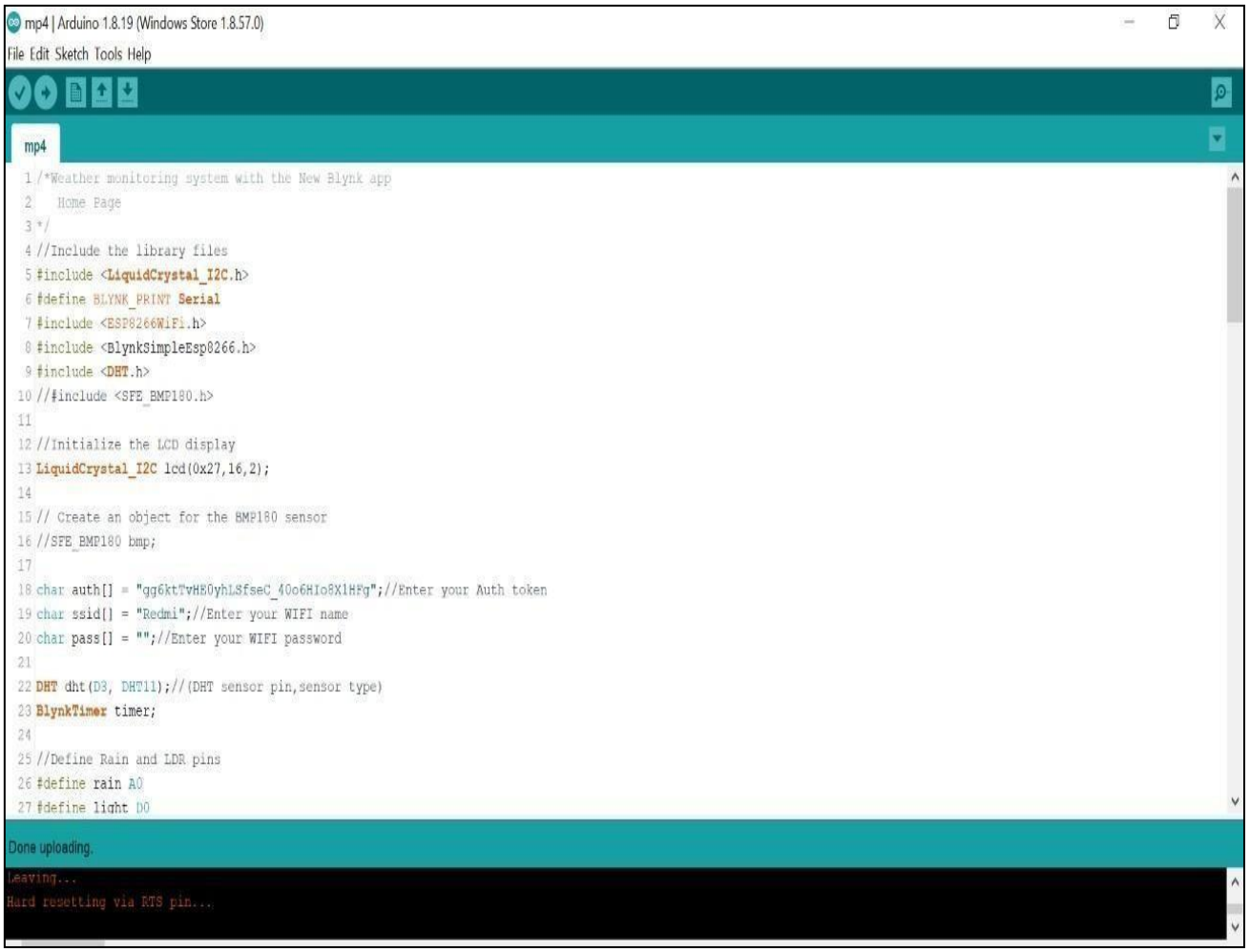
- ## Light intensity monitoring:

The amount of light is measured using LDR sensor. Which also works on same principle as rain plate. According to the amount of light fashed on LDR its resistance changes accordingly.

- ## Sending data to blynk server:

As nodemcu gets data from all sensors it connects to blynk server through mobile hotspot and sends all data to server with provided delay provided in program.

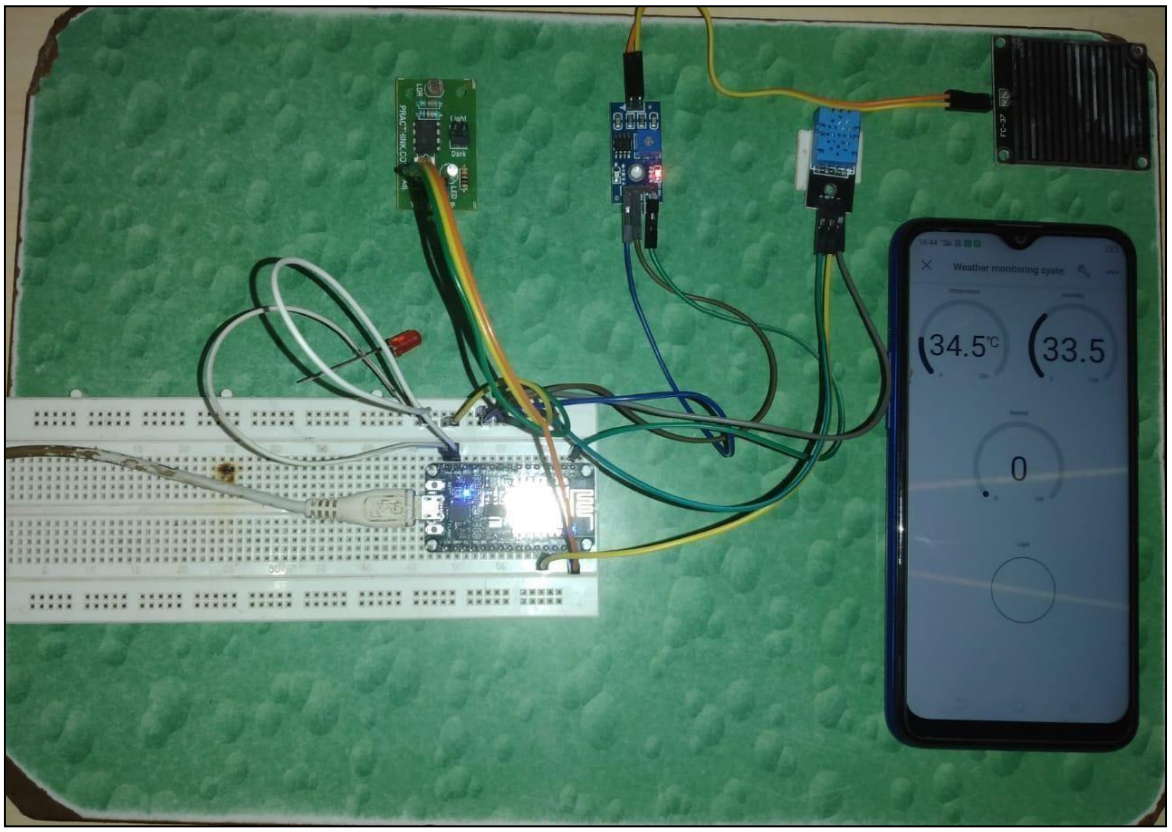
## 7. Source Code:




## 8. Merits:

1. Simple and secure
2. Data can be accessed from remote location.
3. Fast response.
4. It improves the quality of life and planning of activities.

# 9. Hardware Design:




**Final Result**

# 10. Conclusion & Future Enhancements:

## 10.1. Conclusion:

The weather monitoring system has been experimentally proven to work satisfactorily by measuring temperature ,humidity, light intensity and rainfall on different areas. People could access the information through blynk app. And system also shown accurate outputs on display.

## 10.2. Future Scope:

By adding barometric pressure sensor in project we can also monitor the amount of pressure the air have. And according to that rain forecasting can also be possible As air pressure having crucial role on rainfall. Anemometer can be added to monitor flow and speed of air in the environment. Stored Database can be used for training different machine learning algorithm. Solar plate can be added to make the entire system solar based.

# 11 . References:

## 11.1 Papers:-

[1] Ravi Kishore Kodali and Snehashish Mandal "IoT Based Weather System" 2016 International Conference on Control, Instrumentation, Communication and Computational Technologies (ICCICCT) 978-1-5090- 5240-0/16/$31.00, IEEE, (2016)

[2] Ravi Kishore Kodali and Archana Sahu "An IoT based Weather Information Prototype Using WeMos" 2016 2nd International Conference on Contemporary Computing and Informatics (ic3i), 978- 1-5090-5256- 1/16/$31.00, IEEE, (2016)

## 11.2 Websites:

1. https://how2electronics.com/iot-live-weather-System-monitoring-using-nodemcu-esp8266/
2. https://srituhobby.com/iot-based-weather-monitoring-system-using-nodemcu-and-thingspeak/