CLOUD BASED WEATHER MONITORING

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Abstract—The critical prerequisite for day-to-day operation is intelligent environmental monitoring. The solution to the problem is many. The project proposed gives a solution to these problems. The proposed technology behind the Internet of Things (IoT) is an innovative and powerful way to link things to the internet and through the network worldwide. It is proposed to measures parameters like Temperature, humidity, rain and speed of the using DH11 sensor, Rain sensor sensor respectively. The data is acquired by the controller device. The data obtained is processed and communicated via networking to cloud and it is stored in the cloud. From the system the implemented data can be accessed at any internet available locations in the world. All measured data will be controlled and monitored using LCD 16x2, Android application and using Web application as well.

Keywords: IOT, DHT11 Sensor, Rain Sensor, Cloud, LCD 16x2, Web application, Android app.

I. INTRODUCTION

Monitoring weather condition shows a wide part in every person's life. The influence of environments condition cause several challenges in different fields like agriculture, industry, constructions as well as other fields but the major impact occurs mostly in agriculture and industry. As we all know, agriculture perform major role in India's economy. Over the recent year, smart agriculture is debate topic in the world. The smart word of IoT indicates that the use of minimum parameter produces an improved results. It decreases the use of land, time water and enchantment of crops. The security is one of the important issues in IoT network. In agriculture, before the yield farming process consists of different phases and in that weather plays major role. The farming problem occurs due to heavy rainfall or underflow rainfall. In this situation, an indication of weather condition is important aspect before sowing or reaping the crops. Hence in this situation, monitoring of weather condition will helps the farmer using weather forecasting system. Weather monitoring system deals with detecting and gathering various weather parameters at different locations which can be analyzed or used for weather forecasting. The aim of this system is

achieved by technologies such as Internet of Things (IOT) and Cloud. The idea of internet of things is to connect a device to the internet and to other required connected devices. Using Internet the information from the IOT device can easily be transferred to the cloud and then from the cloud to the end user. Weather Monitoring is an essential practical implementation of the concept of Internet of Things, it involves sensing and recording various weather parameters and using them for alerts, sending notifications, adjusting appliances accordingly and also for long term analysis. Also we will identify and display trends in parameters on LCD 20X4, Android application and Web application in laptop. The devices used for this purpose are used to collect, organize and display information. It is expected that the internet of things is going to transform the world by monitoring and controlling the phenomenon of environment by using sensors/devices which are able to capture, process and transmit weather parameters. Cloud is availability of computer system resources like data storage, computing power without direct active management of user. The data captured is transmitted to the cloud so that the data could be further displayed. Besides this, the system consists of components such as ESP-32 which is a series of low-cost, low-power system on a chip microcontrollers with integrated Wi-Fi and dual-mode Bluetooth; DHT11 is Temperature and humidity sensor which is used for detecting these mentioned parameters; Rain sensor is used to detect the presence of rain and the most important is interfacing of wind speed sensor with ESP-32 microcontroller. So, in this way weather conditions of any location can be monitored from any remote location in the world. A web page is created which can have access to the cloud and display and organize the required results.

II.SYSTEM DESCRIPTION:

1.NODE MCU Microcontroller:

NODE MCU is a IOT module based on ESP8266 Wifi module node MCU uses LUA scripting language and is an open source internet of thing (IOT) platform .This modules has CH340G USB to TTL IC.
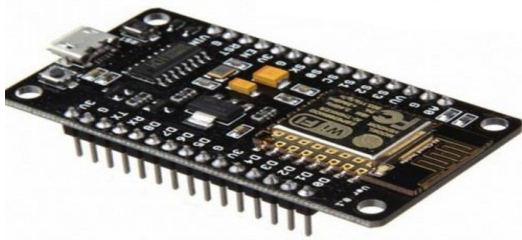

Figure 1.

NODE MCU Microcontroller

2.LCD 16x2

JHD204/JHD629-204A is a 16x2 (16 character, 2 line) Green Alphanumeric LCD Display. Alphanumeric displays are pretty neat. Use them for numbers, use them for letters, or both. They are a good size and brightness for easy reading. The decimal digits aren't connected, so keep that in mind when ordering.
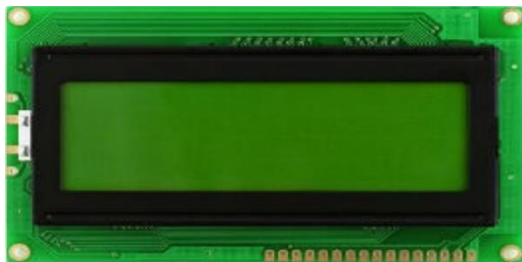

Figure 2.LCD 16x2

Specification of JHD204:

- Module Size : - 80.036.0
- VA Size : - 64.016.0
- Character Size : - 2.965.56
- Dot Size :- 0.560.66
- Dot Pitch : - 0.600.70
- Duty Bias :- 1/16 - 1/5

3.DHT11 Sensor

It uses thermistor to measure the surrounding air temperature and a capacitive humidity sensor to measure the moisture content. It sends digital readings on data pin so there is no need to use an Analog to Digital Converter (ADC) chip. It is very easy to use but the only problem with this sensor is that it sends data every 2 seconds. There are lot of resources online on hot to interface DHT11 Sensor to Arduino which will make this sensor easy to interface to any Arduino Board.
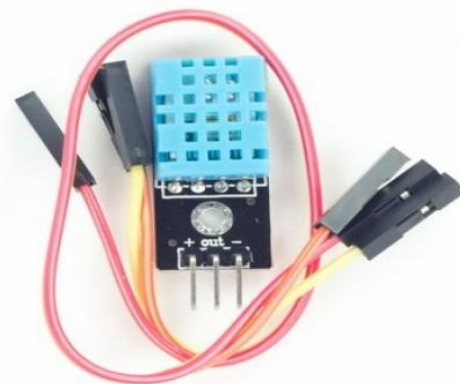

Figure 3. DHT11 Sensor

Features of DHT11 sensor:

- Humidity measurement range : 20%~90%RH
- Humidity measurement error : ±5%RH
- Temperature measurement range : 0~50°C
- Temperature measurement error : ±2°C
- Working voltage : DC5V/3.3V

4.Rain Sensor

It can be used as a switch when raindrop falls through the raining board and also for measuring rainfall intensity. The module features, a rain board and the control board that is separate for more convenience, power indicator LED and an adjustable sensitivity though a potentiometer. The analog output is used in detection of drops in the amount of rainfall. Connected to 5V power supply, the LED will turn on when induction board has no rain drop, and DO output is high. When dropping a little amount

water, DO output is low, the switch indicator will turn on. Brush off the water droplets, and when restored to the initial state, outputs high level.
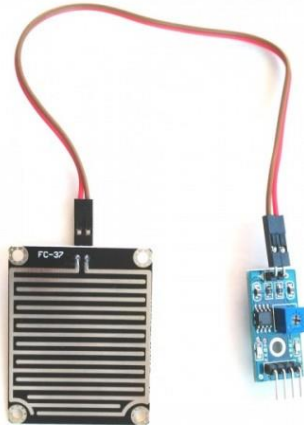

Figure 4.Rain Sensor

Specification of Rain Sensor:
- High quality of RF-04 double sided material.
- Area: 5 cm x 4 cm nickel plate on side.
- Anti-oxidation, anti-conductivity, for long use time.
- Potentiometer adjust the sensitivity;
- Working voltage 5 volts
- Output format : Digital switching output (0 and 1) and analog voltage output AO;
- With bolt holes for easy installation;
- Small board PCB size : 3.2cm x 1.4cm;
- Uses a wide voltage LM393 comparator

III Software requirement
1. Arduino IDE:

The Arduino Uno can be programmed with the Arduino software. Select "Arduino Uno w/ATmega328" from the Tools > Board menu (according to the microcontroller on your board) The ATmega328 on the Arduino Uno comes preburned with a bootloader that allows you to upload new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol.
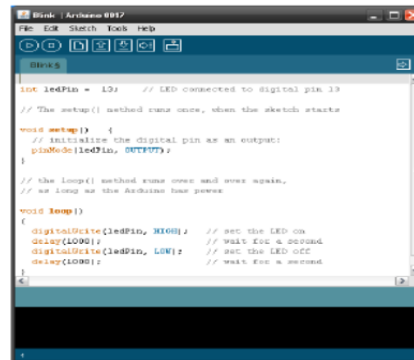

Figure 5.Arduino IDE

2.OrCAD:
OrCAD is a proprietary software tool suite used primarily for electronic design automation (EDA). The software is used mainly by electronic design engineers and electronic technicians to create electronic schematics and electronic prints for manufacturing printed circuit boards. The name OrCAD is a portmanteau, reflecting the company and its software's origins: Oregon + CAD. OrCAD PCB Designer is a printed circuit board designer application, and part of the OrCAD circuit design suite. PCB Designer includes various automation features for PCB design, board-level analysis and design rule checks (DRC). The PCB design may be accomplished by manually tracing PCB tracks, or using the Auto-Router provided. Such designs may include curved PCB tracks, geometric shapes, and ground planes. PCB Designer integrates with OrCAD Capture, using the component information system (CIS) to store information about a certain circuit symbol and its matching PCB footprint.
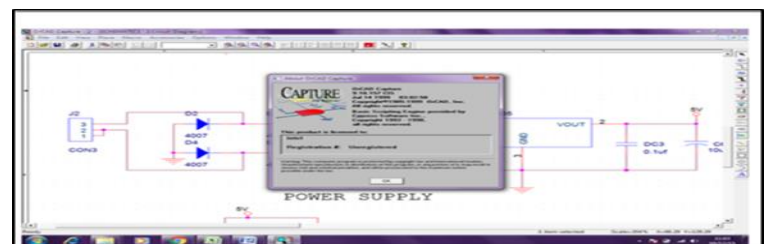

Figure 6.OrCAD

3.Altium
Altium Limited is an Australian owned public software company that provides PC-based electronics design software for engineers. Founded in Tasmania, Australia 1985, Altium now has regional headquarters in Australia, China, United States, Europe, and Japan, with resellers in all other major markets. The company was known as "Protel" until 2001.
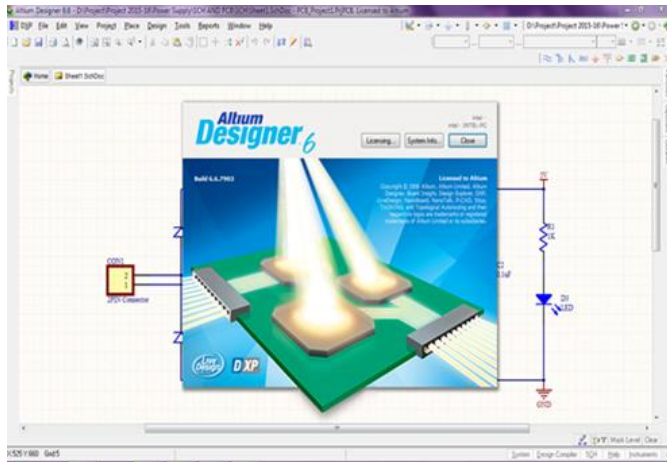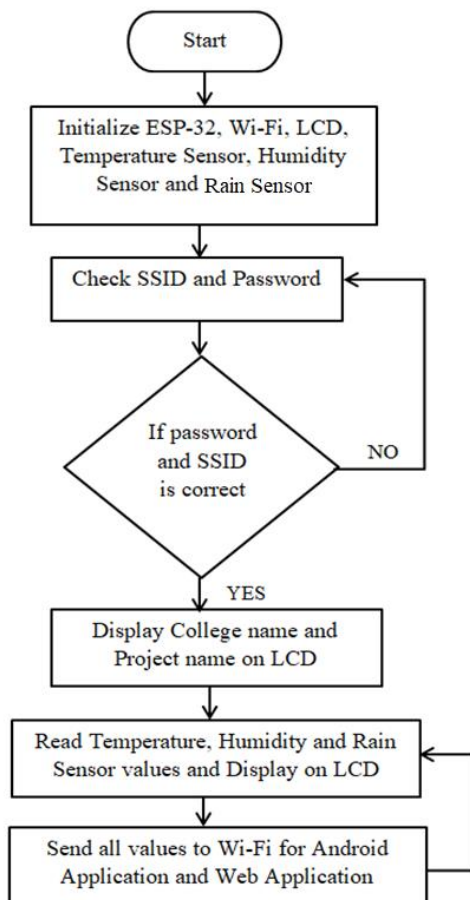
Figure 7.Altium

IV.Flowchart

V.Code

char ssid[] = "Microworld";//Enter your WIFI name

char pass[] = "Microworld123";//Enter your WIFI password

#define DHTPIN D5 //D5 pin of Node MCU 14

#define DHTTYPE DHT11

DHT dht(DHTPIN, DHTTYPE);

float h , t,rs;

#define relay 2 // Relay pin 15

int sensorValue;

int value = 200;

int val11;

float val2;

float per;

BLYNK_WRITE(V0) {

 digitalWrite(D0, param.asInt());

}

void sendSensor()

{

 h = dht.readHumidity();

 t = dht.readTemperature(); // or rs=sensorValue;//add

 Blynk.virtualWrite(V1, t);

 Blynk.virtualWrite(V2, h);

}

void setup() {

 Serial.begin(9600);

 pinMode(D0, OUTPUT);

  digitalWrite(D0, HIGH); //add

 pinMode(relay,OUTPUT);

 lcd.begin();

 lcd.backlight();

 welcome();

```
}
void welcome()
{
  lcd.clear();
  lcd.setCursor(0,0);
  lcd.print("Conecting ...   "); // You can make spaces using well... spaces
  lcd.setCursor(0, 1); // Or setting the cursor in the desired position.
  lcd.print("Cloud Plz Wait..");
  delay(3000);
  lcd.backlight();
  lcd.clear(); //Iot based air pollution monitoring system for smart city


  lcd.setCursor(0,0);
  lcd.print(" Welcome to   "); // You can make spaces using well... spaces
  lcd.setCursor(0, 1); // Or setting the cursor in the desired position.
  lcd.print("KKWAGH  Poly        ");//KKWAGH Polytechnic
  delay(3000);
  lcd.clear();



  lcd.setCursor(0,0);
  lcd.print("Cloud Based    "); // Cloud based weather monitering using iot
  lcd.setCursor(0, 1); // Or setting the cursor in the desired position.
  lcd.print(" Weather        ");
  delay(3000);
  lcd.clear();


  lcd.setCursor(0,0);
  lcd.print(" Monitering    "); // You can make spaces using well... spaces
  lcd.setCursor(0, 1); // Or setting the cursor in the desired position.
  lcd.print(" using IOT      ");
  delay(3000);
  lcd.clear();
```

```
—

—
}

void loop() {
  Blynk.run();
  h = dht.readHumidity();
  t = dht.readTemperature();

  —
  Display_Value();
  read_sensor_MQ135();
}
void read_sensor_MQ135()
{
sensorValue = analogRead(0);        // read analog input pin 0
sensorValue = sensorValue + 1090;//calibration
Serial.print("Rain  =");
Serial.print(sensorValue, DEC);             // prints the value read
Serial.println(" PPM");
lcd.setCursor(0,2);
lcd.setCursor(0,2);
lcd.print("Rain  = ");
lcd.setCursor(9,2);
lcd.print(sensorValue,DEC);
rs=sensorValue;//add
Blynk.virtualWrite(V3, sensorValue);
delay(3000);                    // wait 100ms for next reading
lcd.clear();

—
}
void Display_Value()
{

—
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("Temp = "); // You can make spaces using well... spaces Temperature = humidity
  lcd.setCursor(8, 0);
  value =t;
```

```
   Serial.print(" ");
   Serial.print(value);
   lcd.print(value);
   lcd.setCursor(13, 0);
   lcd.print(" C ");
   lcd.setCursor(0, 1); // Or setting the cursor in the
desired position.
   lcd.print("Hum  = ");
   lcd.setCursor(8, 1);
   value =h;
   Serial.print(" ");
   Serial.print(value);
   lcd.print(value);
   lcd.setCursor(13, 1);
   lcd.print(" % ");
   delay(2000);
   lcd.clear();
   if (t>=30)
   {
      digitalWrite(D0, LOW);  //add
   }
   else
   {
      digitalWrite(D0, HIGH);  //add
   }
}
```
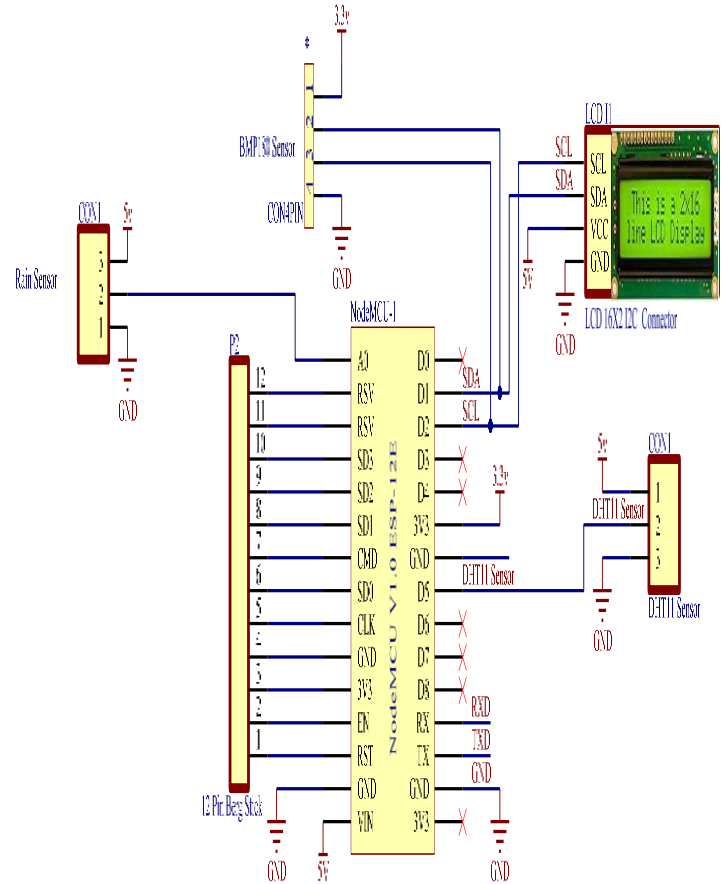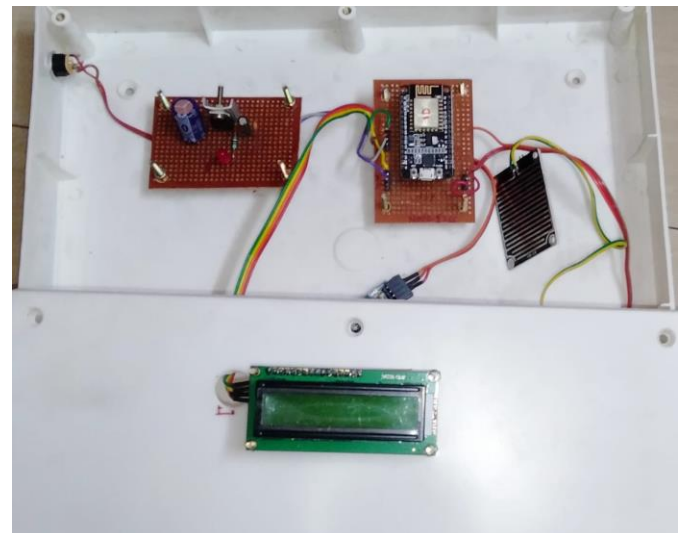

VI.EXPERIMENTAL SETUP

Figure 8. Result and Photo of Model

Figure 9: Interfacing of LCD, Rain sensor, DHT11 Sensor with Node MCU

Figure 9. shows the connection diagram for 5V DC supply as per discussed in the previous chapter as well. We are using 12V adaptor and its output will be given to LM7805 Voltage regulator IC which gives us regulated 5V supply for whole operation of the project.

We will need to develop a PCB for Node MCU so that we can interface it with different modules as LCD 16X2, Rain sensor, DHT11 Sensor, Relay as shown in Figure 9

VII. Block diagram
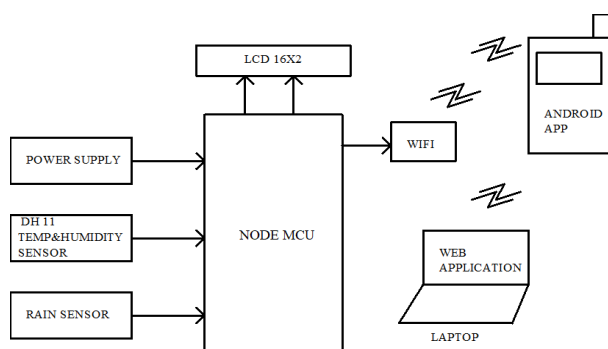
VII.Working

Weather monitoring system deals with detecting and gathering various weather parameters at different locations which can be analyzed or used for weather forecasting. The aim of this system is achieved by technologies such as Internet of Things (IOT) and Cloud. The idea of internet of things is to connect a device to the internet and to other required connected devices. Using Internet the information from the IOT device can easily be transferred to the cloud and then from the cloud to the end user. Weather Monitoring is an essential practical implementation of the concept of Internet of Things, it involves sensing and recording various weather parameters and using them for alerts, sending notifications, adjusting appliances accordingly and also for long term analysis. Also we will identify and display trends in parameters on LCD 16x2, Android application and Web application in laptop. The devices used for this purpose are used to collect, organize and display information. It is expected that the internet of things is going to transform the world by monitoring and controlling the phenomenon of environment by using sensors/devices which are able to capture, process and transmit weather parameters. Cloud is availability of computer system resources like data storage, computing power without direct active management of user. The data captured is transmitted to the cloud so that the data could be further displayed. Besides this, the system consists of components such as ESP-32 which is a series

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IX.FUTURE SCOPE

In future work, we can also add GPS devices in the design so that location of the surrounding will also be mailed or messaged to user along with the surrounding parameters such as temperature, humidity, pressure, light intensity etc. we add various other sensors for measure various parameter related to weather like solar radiation, visibility etc.

X.CONCLUSION

The proposed system work is based on Cloud with IoT technology which is observed different environmental information using multiple sensors. The main aim of our system is that everyone case use it freely, capturing multiple data from multiple sensors and send all data to webpage as well as on android application. It is very helpful for farmers to collects environmental data making an interpretation for the farmers as well as it is important for making another decision such as industrial work purpose or transportation.

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