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IOT BASED WEATHER MONITORING SYSTEM FOR AGRICULTURE

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Abstract— **The IoT Technology provided in this paper 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 IoT Technology provided in this paper 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.**

Keywords— **IOT, sensors weather monitoring, agriculture.**

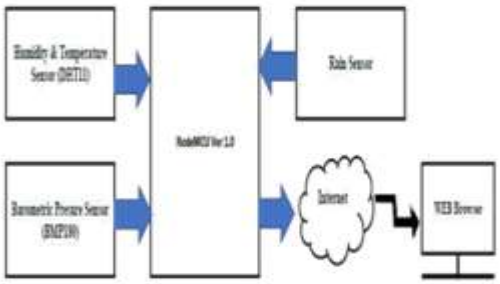
I. INTRODUCTION

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 SHAPE * MERGEFORMAT application. we are well known today most mobile units running on android os, and many peoples 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, bmp180 barometric pressure sensor and fc37 rain sensor with nodemcu esp8266-12e wi-fi module.ii. proposed algorithm

II. PROBLEM STATEMENT

The IoT Technology provided in this paper 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 system proposed in this paper is an advanced solution for monitoring the weather conditions at a particular place and make the information visible anywhere in the world. The technology behind this is Internet of Things (IoT), which is an advanced and efficient solution for connecting the things to the internet and to connect the entire world of things in a network. Here things might be whatever like electronic gadgets, sensors and automotive electronic equipment. The system deals with monitoring and controlling the environmental conditions like temperature, relative humidity and CO level with sensors and sends the information to the web page and then plot the sensor data as graphical statistics. The data updated from the implemented system can be accessible in the internet from anywhere in the world.

III. DESIGN & DEVELOPMENT



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DESCRIPTION**:**

- We have used ESP8266 NodeMCU to build many IoT projects before. The block diagram above shows the working of this IoT based Weather Monitoring system using the NodeMCU and IoT Platform.
- The Bmp 180 sensor is used to detect Barometric Pressure and a rain sensor is used to detect the rain expanding the scope of operation.
- The DHT 11 Sensor will be used to gives us to very precise value of humidity and temperature
- The raw data from the BMP 180 sensor, DHT 11 and rain sensor is fed to the NodeMCU, where it is processed and sent to Thing Speak for graphical monitoring and critical alerts

ESP8266 NODE MCU:

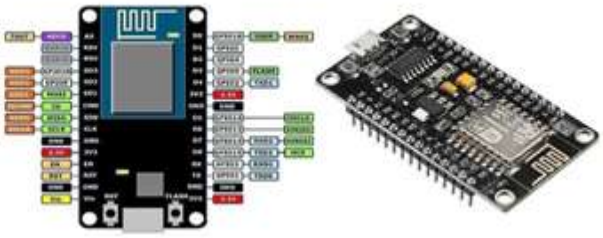

Fig 1.2

A Node MCU is a modern microcontroller piece that had been created by Arduino Enterprises. This piece works as Arduino with requirements irrespective of AVR processors that excite Arduino IDE C++ compilers to compile the whole packet. Thanks to the features implemented by the ESP team, the package is considered to be a complete kit intended to reduce the specific sectors that are required to be linked to various roles of the perform. The term ' Core ' has been given to the software group which is needed to debug the Arduino C++ headers using MCU language. The innovation of the ESP8266 module contributes to the creation of robust and complete systems as opposed to the design methodology that developed the Arduino core under the hegemony of the ESP8266 Wi-Fi based on GitHub ESP8266 core website. This module is a platform for machine learning, incorporating between ESP8266 and NodeMCU. The unit shown in operates under the control of networks 802.11n and 802.11b. This means it can be used as an access point AP and Wi-Fi system or both together simultaneously.

TEMPERATURE – HUMIDITY SENSOR (DHT11):

Fig 1.3

The Temperature-Humidity sensor known as DHT11 detects and controls temperature and humidity degrees in a single distinctive configuration. The DHT11 sensor describes the temperature (T) and humidity (H) forms which are handled in a complex manner using optical signal output adjustment. The sensor promises outstanding flexibility and excellent long-term reliability, owing to the private digital signal processing in the sensing devices. This unit involves a resistive humidity circuit alongside with an NTC temperature pad connected to an 8bit high-performance microcontroller used to provide excellent efficiency, quick response, anti interference functionality and cost benefit-effectiveness The DHT11 sensor tests both (T) and (H) in this project and transmits the readings via the ESP8266 board to the Net Pie network platform. The unit consists of three pins identified by Vcc, data, and Gnd. it has to be mentioned that the system exhibits excellent innovations especially when connected to any digital pin in the microcontroller. As shown in the VCC pin must be supplied by 5 V of ESP8266 MCU, the data and the Gnd are connected to the digital pin GPIO2 (D4) and the Gnd pin of the Node MCU respectively.

Rain Drop Sensor (FC 37) **:**

Fig 1.4

This type of sensor detects the presence of rain due to the variation in the conductivity of the sensor when it comes into contact with water. There are several similar sensor models, such as the FC-37 and the YL83.Constructively they are simple sensors. There are two contacts, connected to conductive tracks interlocked with each other at a small distance, without contact between them. When water is deposited on the surface, both conductors are placed in electrical contact, which can be detected by a sensor. Both models are shipped with a standard

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measurement plate with the LM393 comparator, which allows the reading to be obtained both as an analog value and digitally when a certain threshold is exceeded, which is regulated through a potentiometer located on the plate itself. Analog values measured range from 0 for a fully soaked plate to 1023 for a completely dry plate

Barometric Pressure Sensor (BMP 180) **:**
A bmp180 sensor is a printed circuit board which includes a high precision absolute barometric / atmospheric pressure sensor.

Fig 1.5

(atmospheric pressure is the force per unit area that air exerts on Earth's surface), it has a measurement range between 300 and 1100 (Pascal) and an error margin of 0.03, it also has a temperature sensor and by means of software it allows calculating the altitude with respect to the sea. The pressure sensor is based on piezo-resistive technology with high efficiency, linearity and long duration, it has a power range of between 1.8 volts and 3.6 volts dc (direct current), so if we are going to use it With a micro controller running at 5 volts, we will need level adapters on the SDA (data line) and SCL (clock line) pins of the I2C bus. I currently have the model on the left and the central one, both are the same, except that the central module has an integrated 3.3 volt source, it can be powered at 5 volts on the pin marked Vcc. But it can also be powered with 3.3 volts on the pin marked 3.3 volts.

POWER BUDGET ANALYSIS:
NODEMCU ESP8266 has a working voltage is 3 V to 3.3 V, and the operating current is 12mA. Raindrop Sensor has a working voltage is 3.3 V to 5 V, and operating current is 15mA. So, this sensor will be going to work on 3.3 V. DHT 11 Sensor has a working voltage is 5 V, and operating current is 15mA. So, this sensor will be going to work on 3.3 V. BMP180 Sensor has a working voltage is 5 V, and operating current is 15mA. So, this sensor will be going to work on 3.3 V.

Now, all sensors are working on 3.3 V. Hence, total voltage is;

$$V = 3.3 + 3.3 + 3.3 + 3.3$$

$$V = 13.2 \text{ V}$$

10% more of total voltage = $13.2 + \left(13.2 \times \frac{10}{100} \right) = 14.52$ V
Required Current is 12mA+15mA+15mA = 42mA for operating all the components.

∴ Power Consumption = $42 \times 10^{-3} \times 14.52 = 0.609$ watt

Calculation : DHT 11:
Temperature:
5V = 25 deg.
Humidity: (Density of Water Vapour / Density of water vapour at saturation) x100%

IV. CIRCUIT DIAGRAM

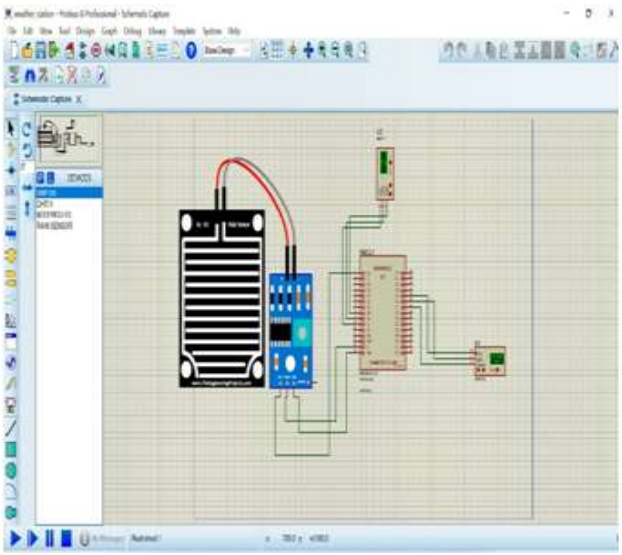
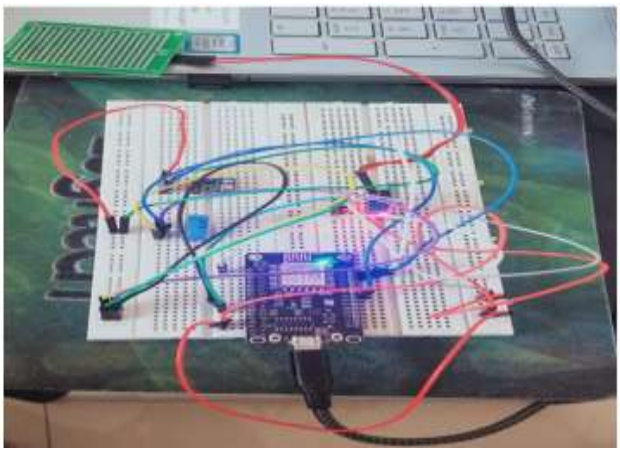


Fig 1.6



Hardware layout fig 1.7

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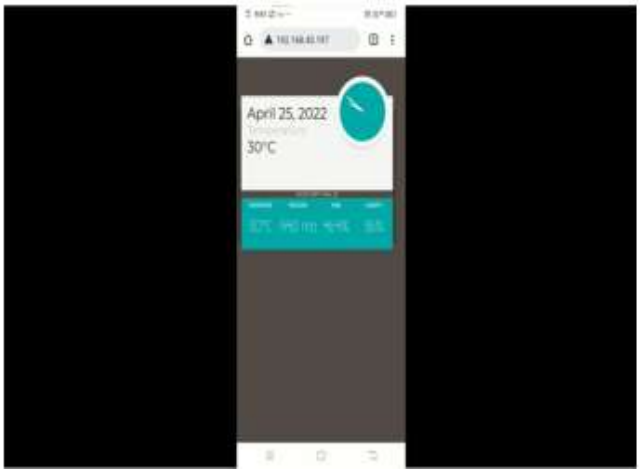

V. CONCLUSION:

This paper presents an innovative and dependable concept of a low-cost simple weather monitoring and controlling system. The system operates under IoT technology supervision which effectively optimizes remote areas. The creativity of this revolutionary weather station allows monitoring and controlling of the web server-based climate conditions using the ESP8266 node MCU microcontroller. The outputs of the measurements employed are meant to be shown via the NET PI web server as adjustable gauges. In terms of network connectivity, the devices can be turned ON or OFF at any moment and anywhere. The complete dependence on the webserver control system and the applicability of the local IP given by the ESP8266 means that the design's cost is inexpensive. The system contributes to being applicable in two fields. The first contribution is extremely useful to businesses and other organizations that are tasked with preparing and handling their operations based on weather situations; such as high-priority transport systems, airways, and forestry, etc. The second contribution is specifically designed to control locations regarding the changes in user interface status based on information generated by improvements in output due to weather disturbances; such as monitoring residences, stores, hospitals, universities, and smart vehicles.

VI. FUTURE SCOPE:

The proposed IoT based weather station can be modified to incorporate many more features. We can add an OLED display to display the surrounding parameters into it. We can also add a GPS module in the design so that the location of the surrounding will also be mailed or messaged to the user along with the surrounding parameters, like, temperature, humidity, pressure, light intensity etc. It can also be modified such that whenever a message or email is sent from a particular phone number or email id to the server, all the environmental parameters of the device along with its location will be delivered to that phone or email id. This device can also be used to monitor a particular room or place whose environmental parameters are required to be monitored continuously

5.2 ADVANTAGES:

- Data are available on the Web Browser.
- Prior weather alert or weather data can be possible.
- Useful for the agriculture sector as a system is very cheaper.
- It can be affordable to Farmer.

By making an extensive network of this device, we can fetch realtime data f weather from a different location that can be available for free help purpose

5.3 DISADVANTAGES:

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 parameter

VII. REFERENCES:

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