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Self-Sustained Solar Powered IoT Based Weather Monitoring System

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ABSTRACT: Weather monitoring system is a device that provides us with precise information on the weather in our immediate surroundings. This device essentially keeps track of several weather variables such as temperature, humidity, and prediction of rainfall. Weather monitoring can be done in a variety of ways which is collect the data and deliver it to a central station through wires. This paper proposed a self-sustained solar powered wireless weather monitoring system is designed by few basic components such as Node-MCU, DHT11 sensor, BMP180 sensor and Rain sensor which monitors the weather without the use of human labor or interaction. It captures physical phenomena that may be observed in the environment, such as temperature, humidity, pressure and rain prediction range. The paper presents prototype model design of IoT based weather monitoring system by using Thingspeak and results are compared with Blynk app based IoT model.

KEYWORDS*:* Blynk app, Node-MCU, Solar Power, Thingspeak, Weather station

I.INTRODUCTION

Weather phenomena have been studied as a method for monitoring weather changes since ancient Greece. Aristotle attempted to explain atmospheric phenomena in a philosophical and speculative manner in his work Meteorological. The thermometer was invented in late 1600, the barometer in 1643, and the hygrometer (for measuring humidity) in the late 1700s, although the first weather instruments were invented at the end of the sixteenth century. Weather measurement got more scientific and reliable as more technologies were developed such as Weather balloon, Weather Radar, Automatic Weather Stations (AWS), Real Time Data Transmission for Weather Monitoring System and finally the method that is use till today is Weather Satellite.

The proposed work is to collect remote weather parameter such as temperature and humidity and send them using an IOT module with the help of solar power supply. The corresponding sensors are connected to the Node MCU. The board is attached and the sensors begin to work after the code is uploaded. The Node-MCU board sends those values to the concern IoT analytics platform. Thingspeak and Blynk app was employed to understand the application of IoT in weather monitoring.

II. BLOCK DIAGRAM & DESCRIPTION OF MATERIALS

The proposed work has two prototype models to learn more about the different IOT platforms. In Thingspeak module temperature & Humidity, Atmospheric pressure and rain predictions were sensed by DHT11, BMP180 and rain sensor modules. The another module is designed by Blynk app. In this module instead of pressure sensor, light-dependent resistor (LDR) employed for sensing the light intensity and I2C module used as display unit. Figure 1 shows the detail of self-sustained solar power supply unit.

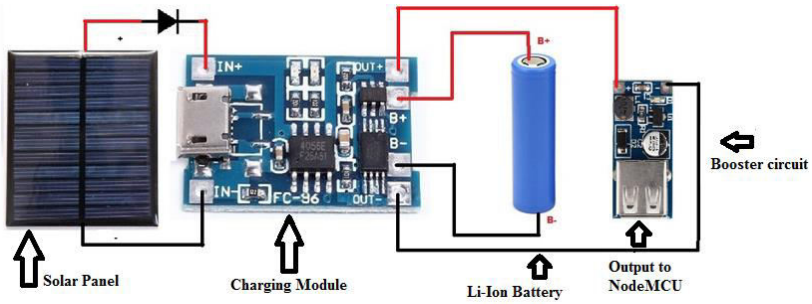

Fig. 1 Solar Panel Power Supply Unit

The node MCU is powered by Solar panel (6V,100Ma). Li-ion battery is charged by the TP4056 charging module. The TP4056 is a familiar Lithium-Ion battery charger controller IC. Which provide a constant current – constant voltage

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charging for a single cell 3.7V Li-Ion Battery. It comes with an 8-pin SOP package, which can be assembled with some external components to build a complete charging module. The output from the 18650 battery is 3.7V to 4V which can't be used to power the NodeMCU as it requires 5v to power up. So the output of the TP4056 Li-Ion charger is connected to a (0.9-5) V DC-DC step-up Booster circuit to boost the voltage to 5V.

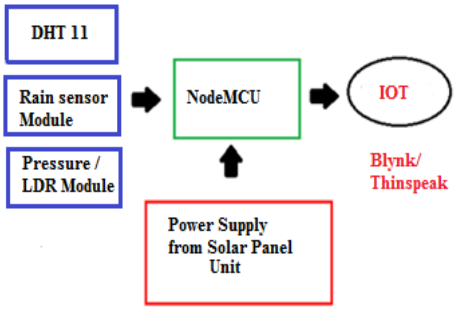

Fig 2. Overall Block diagram of the Weather Monitoring System

Figure 3 and Figure 4 represents the connection diagrams of weather monitoring system by using Thingspeak and weather monitoring using Blynk app respectively.

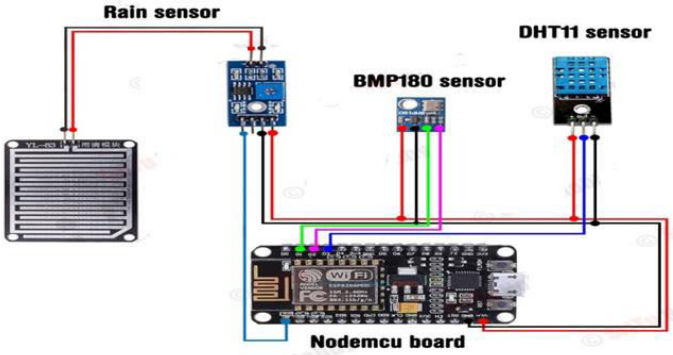

Fig. 3 Weather Monitoring System using Thingspeak

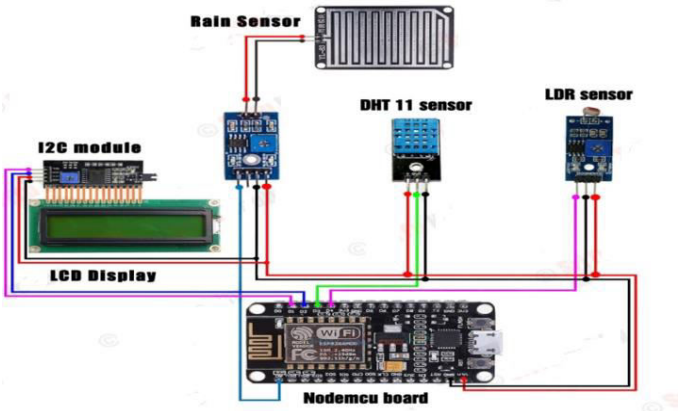

Fig. 4 Weather Monitoring System using Blynk app Module

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III. RESULT AND DISCUSSION

In this section the Results obtained from Thingspeak module is explained in the beginning. Further Blynk app based module results are detailed.

Thingspeak based weather monitoring system

The specific fields of Thingspeak platform is need to enter initially. when a proper connection is established with the server device, the detected data will be automatically transferred to the web server. The web page provides data on temperature, humidity, pressure, and rain level fluctuations in the region where the embedded monitoring system is installed. The data collected will be saved in the cloud. The data stored in the cloud can be used for parameter analysis and continuous monitoring. In every field, the X-axis indicates the Date. However, the first filed in Y-axis indicate the Temperature and in the second graph the Y-axis Indicate the Humidity likewise that in third and fourth graph the Y-axis will be depend upon the parameter that we want to measure.

Fig. 5 Sample results of Weather Monitoring System using Thingspeak Module

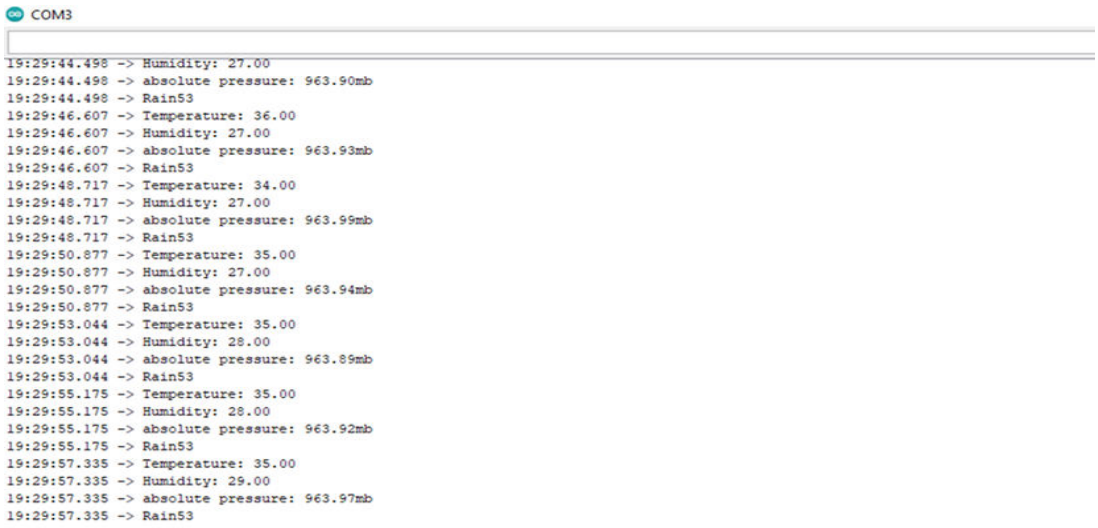

Fig. 6 *Arduino Serial monitor result*

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Blynkapp based weather monitoring system

The Blynk App is a well-thought-out interface creator. It is compatible with both iOS and Android devices. In Blynk app based weather monitoring system the I2C modules is used as the display unit in addition. After, sign up for this app click the “New project” button. After that, give your project a name and choose a device and connection type. Then select "Confirm" from the drop-down menu. Let's bring this widget together one by one. To do so, give the Gauge widgets names like Temperature, Humidity, Light, and Rainfall. Set the PINs to V0, V1, V2 and V3 and set the display values 0 to 100. This widget can be customized to your satisfaction.

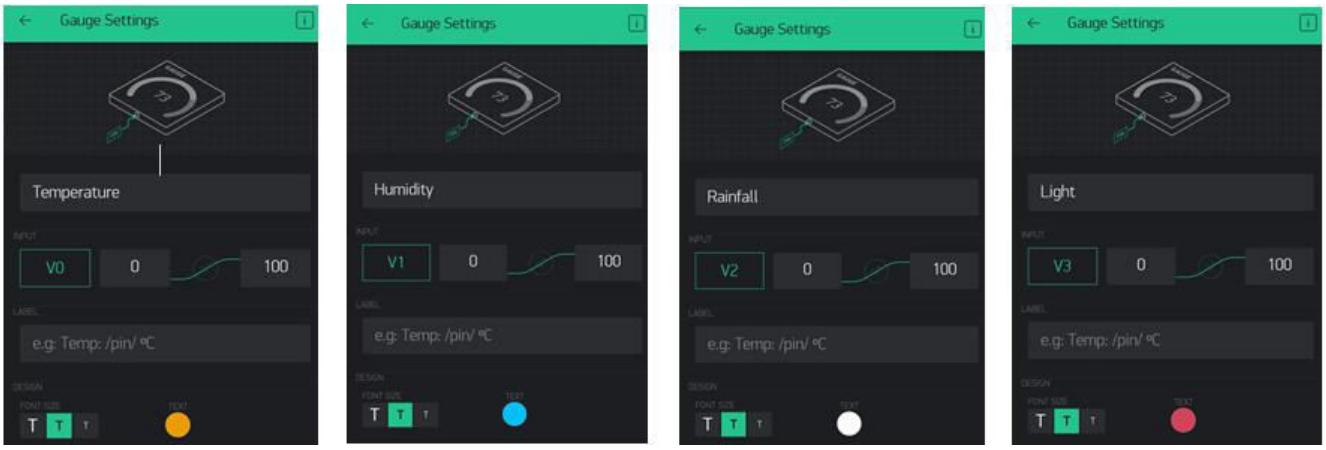

Fig. 7 Set up the gauge and customizing in Blynk app

Fig. 8 Testing of Rain level sensor

Fig. 9 Testing of Temperature and humidity sensor

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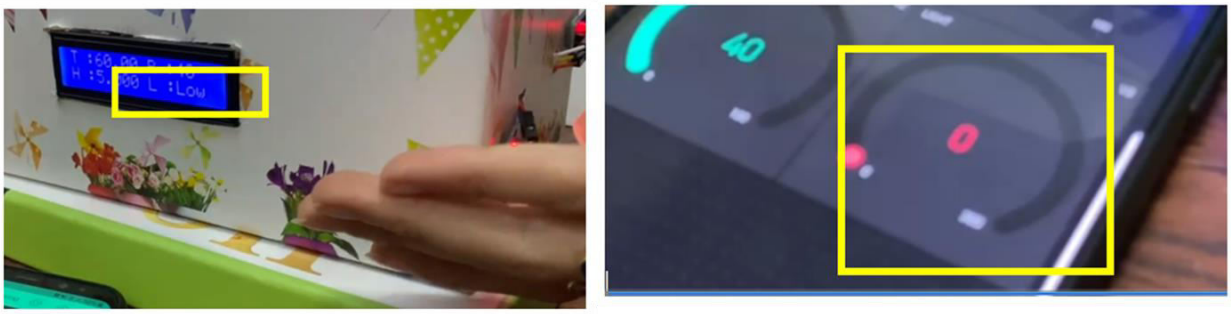


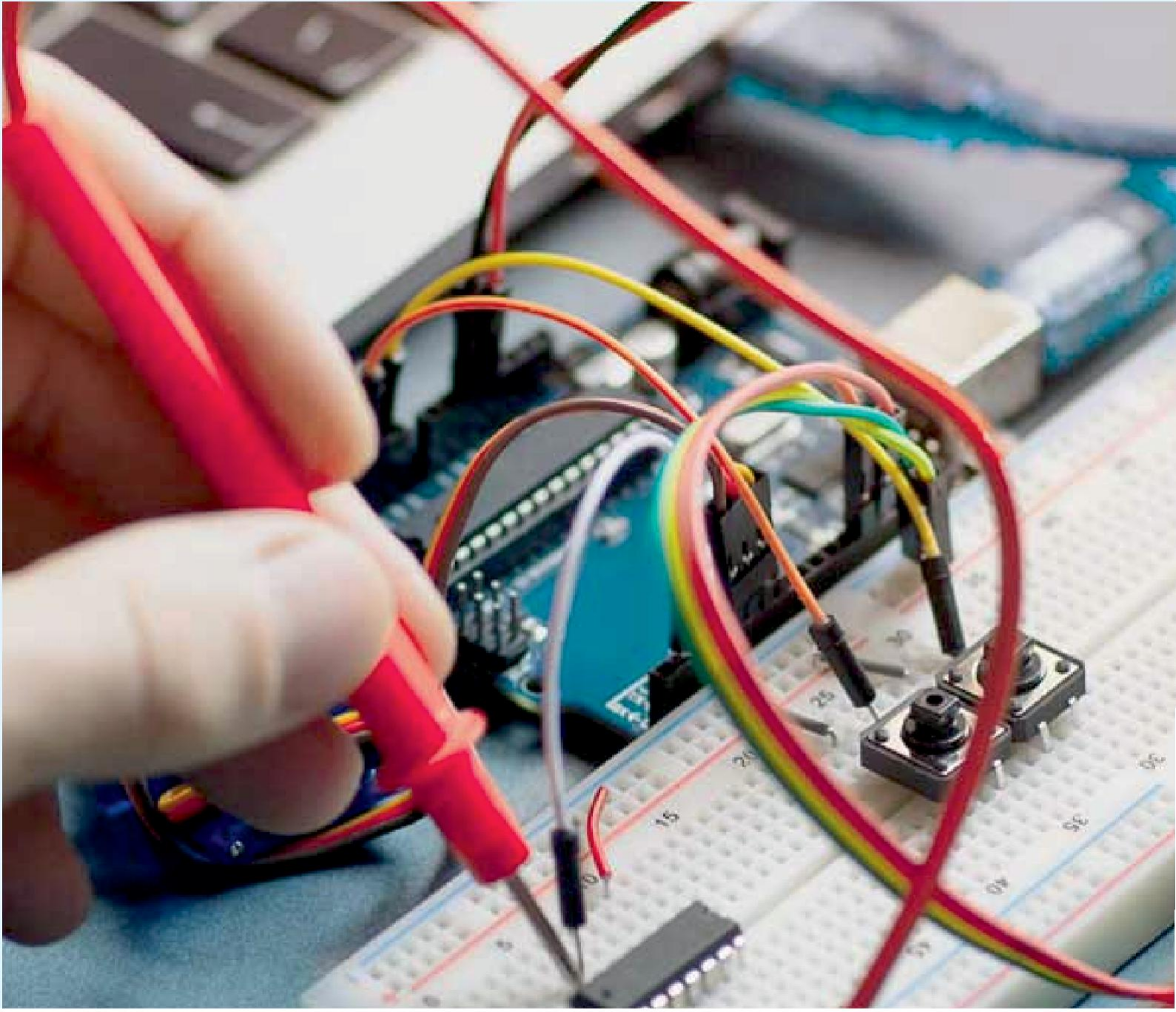
Fig. 10 Testing of LDR

IV. CONCLUSION

The important parameters for weather monitoring is sensed by differed sensors and the results are monitored by two different IoT platforms. The proposed models present a clever technique to monitor the environment and an efficient, low-cost embedded system. The temperature, humidity, light, and rain level values can be monitored using the Internet of Things (IOT) concept, which has been experimentally validated.

REFERENCES

[1] https://srituhobby.com/iot-based-weather-monitoring-system-using-nodemcu-and-blynk.
[2] https://iotdesignpro.com/projects/solar-powered-wi-fi-weather-station-using-nodemcu-and-thingspeak T. Mohana Priya.
[3] https://www.researchgate.net/publication/288873843_Bluetooth_Based_Weather_Station.
[4] https://www.granthaalayahpublication.org/ijetmrojms/index.php/ijetmr/article/view/06_IJETMR15_A04_03/15.
[5] https://www.watelectronics.com/light-dependent-resistor-ldr-with-applications.
[6] https://www.robocraft.ru/files/datasheet/DHT11.pdf.
[7] https://www.circuito.io/blog/nodemcu-esp8266.



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