Employability of the Internet of Things (IOT) in the Enhanced Efficacy of Meteorological Forecast and Smart Monitoring System[1]

Ahmed Abbas Naqvi

New Delhi, India

DOI: 10.37648/ijrst.v10i04.009

Received: 06th September, 2020; Accepted: 24th October, 2020; Published: 17th November, 2020

ABSTRACT

The paper proposes making data from a real-time weather monitoring system accessible worldwide from a specific location. The Internet of Things (IoT) is the technology behind this. This is a sophisticated and effective technique for connecting things within a network to the internet and the entire world. A DHT11 sensor continuously monitors temperature and humidity, a rain sensor measures rainfall intensity, and an LDR sensor measures weather conditions like cloudiness or sunshine. The framework sends this data to the microcontroller regularly, which then forms it and sends it to the internet web server over a Wi-Fi connection. The implemented system's updated data can be accessed online from anywhere worldwide.

INTRODUCTION

Weather monitoring and access to and data collection for research publications require an effective monitoring system. A weather monitoring system based on the Internet of Things (IoT) is presented in this study. A new application that uses multiple sensors to determine weather reports is developed using this approach. This application's built-in sensors can detect cloudy or sunny weather, temperature, humidity, and rainfall. The primary objective of this project is to design and implement a sound monitoring system in which the necessary parameters are monitored remotely via the internet, sensor data is recorded, and the predictable trend or data is displayed in the web browser. The implementation and data visualization of the obtained data is the subject of extensive detail in this article.

COMPONENTS GENERAL

1) ESP8266 Node MCU: A low-cost microcontroller with a Wi-Fi microchip and integrated TCP/IP networking software is the ESP8266 Node MCU. It is a small module that uses Hayes-style instructions to allow microcontrollers to connect to a Wi-Fi network and create straightforward TCP/IP connections. An all-inclusive and self-contained Wi-Fi networking solution can be created using the ESP8266; It can host the application or delegate Wi-Fi networking to a different application processor. The Vin pin provides an input power rating of 5v to 12v. We will be able to use a smartphone app to keep track of the weather parameters with this Wi-Fi module.[9]

2) DHT 11: Here, temperature and humidity sensors are sensed by DHT 11. A low-voltage-level response signal of 80 microseconds is sent out as soon as DHT detects the signal. To get the DHT ready for data

[1] *How to cite the article:* Naqvi A.A., Employability of the Internet of Things (IOT) in the Enhanced Efficacy of Meteorological Forecast and Smart Monitoring System, IJRST, Oct-Dec 2020, Vol 10, Issue 4, 60-64, DOI: http://doi.org/10.37648/ijrst.v10i04.009

(IJRST) 2020, Vol. No. 10, Issue No. IV, Oct-Dec e-ISSN: 2249-0604, p-ISSN: 2454-180X

transmission, the DHT program changes the Data Single-bus voltage level from low to high and keeps it there for 80 microseconds. Vcc, output, and GND are the three pins that make up its array. The sampling period at intervals should be one second at maximum, and the typical operating voltage of the DHT 11 is 5 volts DC. It works with a humidity sensing accuracy of 5% RH and a temperature sensing accuracy of 2°C.[10] The rain sensor in our project is there to figure out how much rain has fallen. This sensor board can be used as a switch to measure the rain's intensity when a raindrop falls through it. A rain board, a separate control board for convenience, a power indicator LED, and a potentiometer for adjusting sensitivity are all included in this module. Rainfall amounts can be detected using the analogue output. When the induction board is connected to a 5V power supply, the LED will turn on when there is no raindrop, and the DO output is high. When the DO output is low and a small amount of water is dropped, The indicator on the switch will come on. 4) LDR Sensor: When the water droplets are removed by brushing, it returns to their original state and produces a high output level[11]. An LDR sensor has been utilized in our project to detect sunlight. The resistance of a light-dependent resistor (LDR) is inversely proportional to the amount of light hitting its sensitive surface. An insulating substrate is covered with an active semiconductor layer in a typical photoresistor configuration. It is usually lightly doped to give the semiconductor the right amount of conductivity. Contacts are then positioned on either side of the exposed area.

It is suitable for our project due to its quick response, dependable performance, and good spectrum characteristics.

It has a photo resistance of between 2 and 6 kilograms and a darkness resistance of 0.15 mega ohms[12]. CIRCUIT DIAGRAM In this diagram, the anode of the DC battery is connected to the Vin pin of the Node MCU, and the cathode is connected to the GND pin. The sensors' Vcc pins are connected to a 3.3-volt Node MCU pin and the GND and GND pins. D3 and D4 are connected to the digital outputs of the DHT 11 and LDR sensors, while the rainfall sensor's analogue output is connected to the A0 pin of the Node MCU.

MODEL LAYOUT

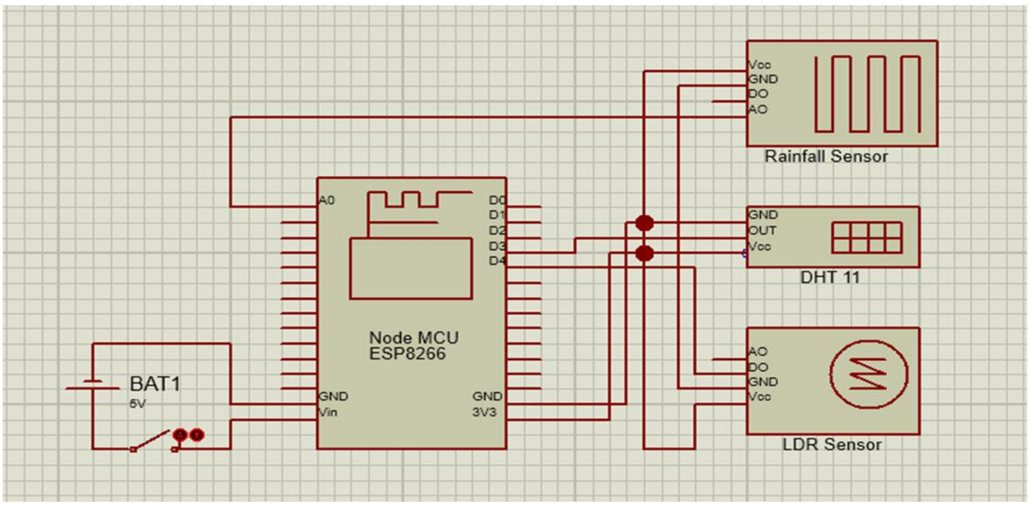

Fig. 1 Main circuit diagram of our system

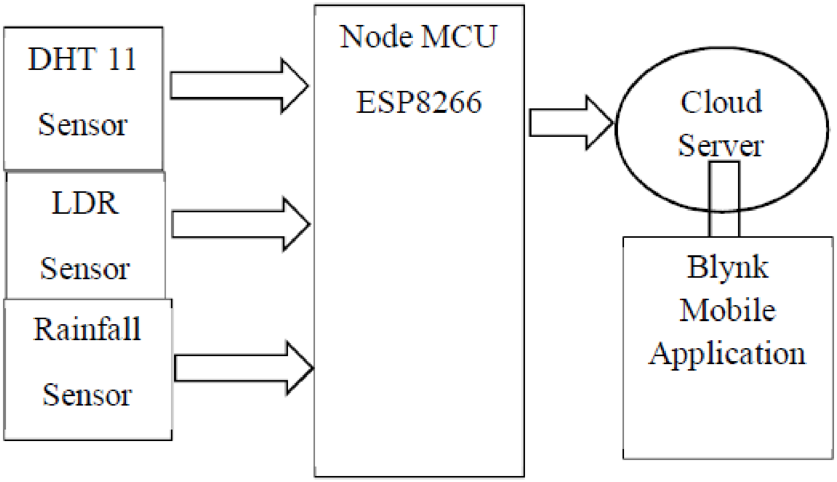

Fig. 3. Block diagram of our system

METHODOLOGY

This study aims to develop a weather monitoring system that includes multiple sensors. The system will continuously monitor live environmental factors, such as the weather, via Wi-Fi. Various factors are measured by the weather monitoring system using a variety of sensors. A microcontroller with a 2.4GHz Wi-Fi connection is the Node MCU ESP8266.

When the remotely managed NET PI network system is implemented, the suggested device uses an ESP8266 node MCU microcontroller to maintain and monitor the location's state. A Wi-Fi (router) station connects the ESP8266 to the network as an AP access point. A sensor that measures temperature and humidity is the DHT 11. Before sending a digital signal to the data pin, it detects the air around it with a thermistor and a capacitive humidity sensor. Despite its ease of use, data collection necessitates precise scheduling. An LDR is a light-controlled variable resistor. The LDR's resistance decreases as the light becomes more intense. It has an analogue output that connects to the Node MCU's A0 pin. The LDR sensor detects sunlight's presence rather than its intensity.

The proposed model accurately measures the environment. The connection between the sensor and the microcontroller node MCU is shown in the model. In the design, the node mcu8266 houses the sensors. Data from sensors are immediately downloaded, uploaded, and displayed on web servers when the system connects to the internet. The Blynk app's gauges 1 and 2 display temperature and humidity, respectively; the LED indicator's gauges 3 and 4 depict a complete building. Verify the system's usability and dependability.

RESULT

The outcome is that our Blynk mobile app displays three gauges and an LED indicator. The LED indicator indicates whether the day is sunny or cloudy, while the first three gauges display rainfall's temperature, humidity, and intensity.

CONCLUSION

Our model includes DHT 11, a rain sensor, and an LDR sensor. With the help of the blink app, an open-source Internet of Things (IOT) application and API for storing and retrieving data from things via the HTTP protocol over the Internet or a Local Area Network, our model collects data from environments using these sensors. This data is processed by a microcontroller (ESP8266).

REFERENCES

[1] Girija C, Harshalatha H, Andreanna Grace Shires, Pushpalatha H P (2018), Internet of Things (IOT) based Weather Monitoring System, *International Journal of Engineering Research & Technology*, Vol 6, issue 13.

[2] Iswanto, Helman Muhammad, (2012), Weather Monitoring Station with Remote Radio Frequency Wireless Communications, *International Journal of Embedded Systems and Applications (IJESA)* Vol.2, No.3 pg: 99-106; DOI: 10.5121/ijesa.2012.2311

[3] Ragini D. Khadse, G. Borkhade, (2015), Implementation of Wireless Sensor Network for Real Time Monitoring of Agricultural Parameter, *International Journal of Science and Research*, Volume 4 Issue 4, pg 1644-1646

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

[5] E. Cruz, Juan G. Ruiz (2015), Portable Weather System for Measure and Monitoring Temperature, Relative Humidity, and Pressure, Based on Bluetooth Communication, *American Journal of Networks and Communications*, Volume 4, Issue 3, June 2015, Pages: 49-53

[6] Lay Nandar Soe, K. Lwin, H. Tun, (2014), Implementation of Microcontroller Based Sensing Unit in Transmitter for Wireless Weather Station.

[7] M. Prasanna, M. Iyapparaja, M. Vinothkumar, B Ramamurthy, S.S. Manivannan, (2019), An Intelligent Weather Monitoring System using Internet of Things, *International Journal of Recent Technology and Engineering (IJRTE)* ISSN: 2277-3878, Volume-8 Issue - 4, November.

[8] Node MCU ESP8266 – datasheet

[9] DHT 11 sensor datasheet

[10] Rainfall sensor datasheet

[11] Photoresistor sensor data sensor datasheet