PROJECT REPORT

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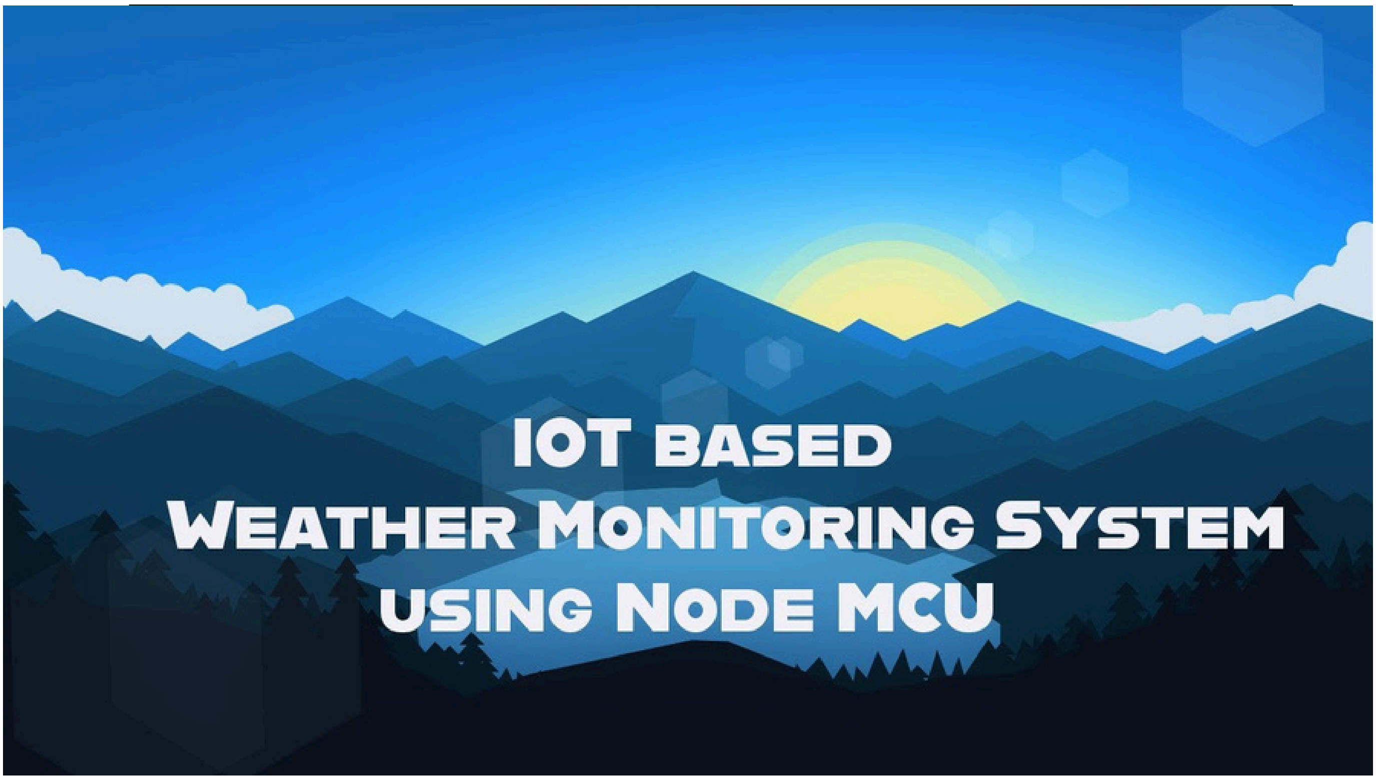

ABSTRACT

This project presents an IoT-based weather monitoring system that measures tem- perature, humidity, rain detection, and ambient light intensity in real time. Using
sensors such as DHT11, rain sensor, and LDR, the system collects environmental data and transmits it via Wi-Fi using the ESP8266 NodeMCU. The data is logged to an IoT platform for remote monitoring through a smartphone or web dashboard. This so- lution is cost-effective, scalable, and useful for applications like smart agriculture and environmental monitoring.

1 INTRODUCTION

Weather monitoring plays a vital role in agriculture, disaster management, and daily activities. Traditional manual observations are often time-consuming and inaccurate. The advent of IoT technology enables automatic measurement, recording, and transmission of weather parameters. This project designs and implements an IoT-enabled weather monitoring system to measure temperature, humidity, rain, and light intensity in real time.

2 OBJECTIVESOFTHEPROJECT

1. To design a real-time IoT-enabled weather monitoring system. 2. To measure temperature and humidity using the DHT11 sensor. 3. To detect rain presence using a rain sensor. 4. To measure light intensity using an LDR sensor.

5. To transmit collected data to an IoT cloud platform. 6. To provide remote access to weather data via a mobile/PC dashboard. 7. To provide a scalable and cost-effective monitoring solution for agriculture and smart environments.

3 BLOCK DIAGRAM OF THE SYSTEM

A logical block diagram illustrating the system architecture is shown in Figure 1.

4 EXPLANATION

- DHT11 Sensor: Measures temperature and humidity and provides a digital output to the microcontroller.
- Rain Sensor: Detects presence or absence of rain by sensing water droplets on its sensing pad, outputting an analog or digital signal.

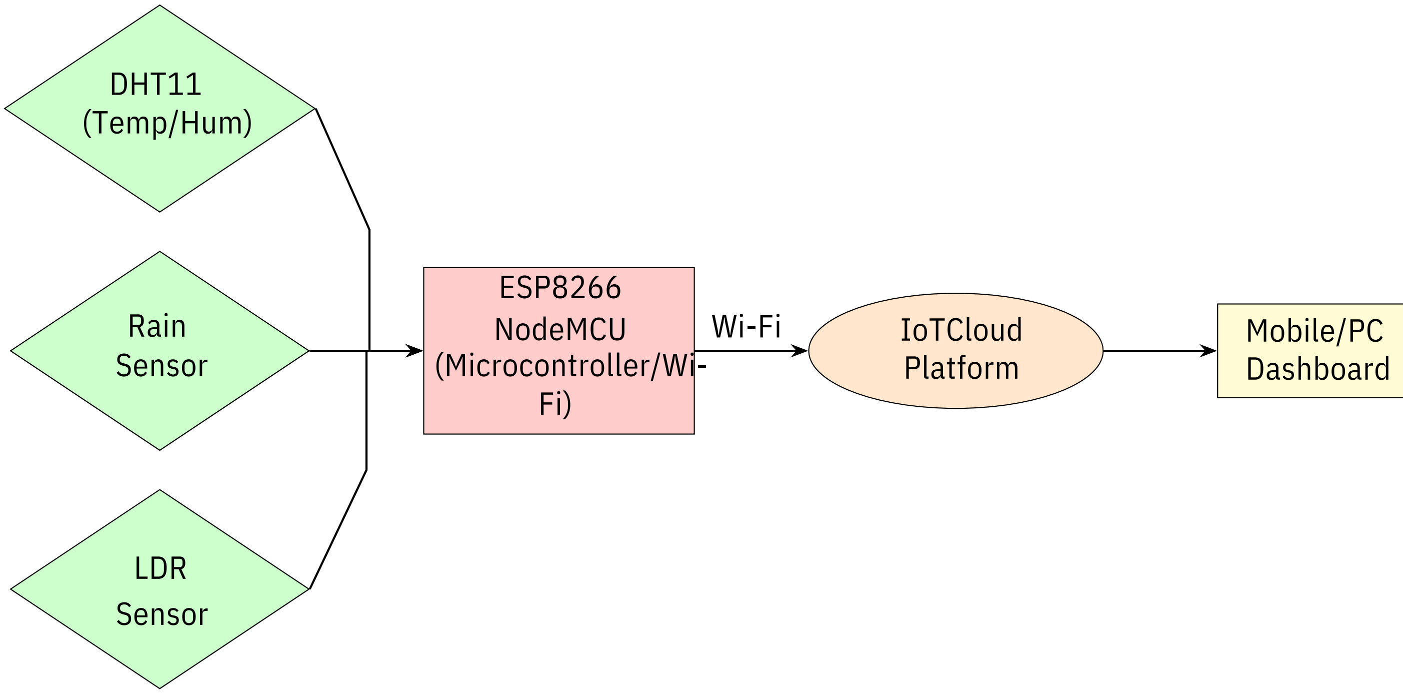

Figure 1: Block Diagram of the IoT Weather Monitoring System

- LDR (Light Dependent Resistor): Measures ambient light intensity (luminosity) by changing its resistance based on the light level.
- ESP8266 NodeMCU: A Wi-Fi-enabled microcontroller that processes the sensor data, connects to the Wi-Fi network, and transmits the compiled data to the cloud.
- IoT Cloud Platform: A service (e.g., ThingSpeak or Blynk) that securely stores the real-time weather data and makes it accessible for remote viewing.
- Mobile/PC Dashboard: The user interface that allows the user to monitor the weather parameters remotely and visualize trends.

5 CIRCUITDIAGRAMWITHDETAILEDCOMPONENTS

5.1 Components Required

- ESP8266 NodeMCU – Wi-Fi-enabled microcontroller
- DHT11 Sensor – Temperature and humidity measurement
- Rain Sensor Module – Rain detection
- LDR Sensor – Ambient light measurement
- Breadboard, jumper wires, resistors (e.g., 10kΩ for LDR pull-down)
- Power supply (5V)

5.2 Circuit Diagram

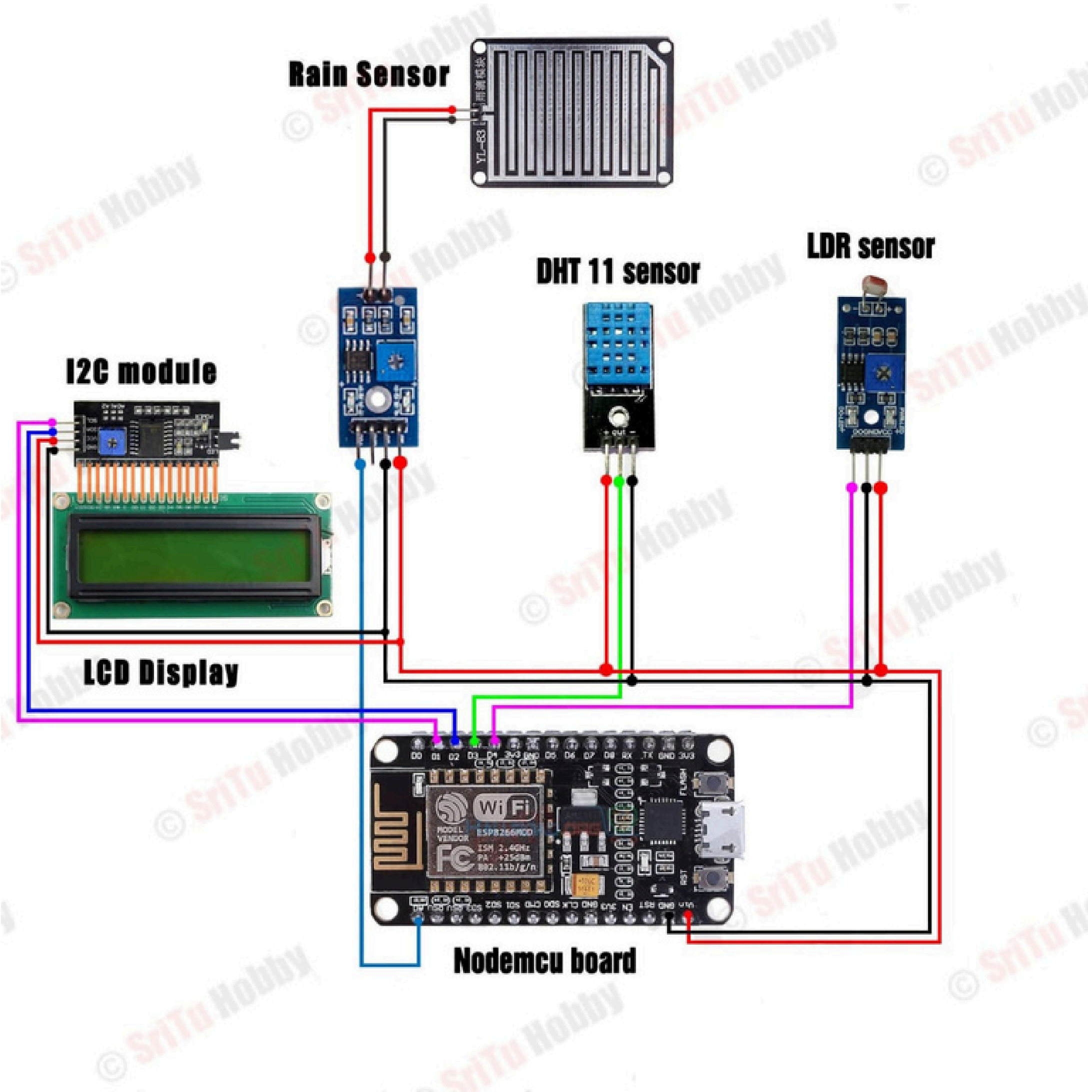

Figure 2: Circuit Diagram of Weather Monitoring System

6 WORKINGPRINCIPLE

The system operates by continuously polling data from the sensors. The DHT11 sensor measures temperature and humidity, the rain sensor detects rain presence, and the LDR monitors ambient light levels. The ESP8266 microcontrollers processes this sensor data, connects to the local Wi-Fi network using programmed credentials, and then sends the aggregated data packet to a predetermined IoT cloud platform (e.g., ThingSpeak or Blynk) using HTTP or MQTT protocols. Users can access and monitor the weather data remotely through a smartphone application or web dashboard, enabling real-time weather tracking and facilitating automated notifications or alerts based on predefined thresholds.

7 EXPECTED OUTPUTS/OUTCOMES

The successful implementation of this project is expected to deliver the following outcomes:

1. Real-time measurement of temperature (◦ C), humidity (%RH), rain detection (Present/Absent), and light intensity (Analog/Lux value).
2. Remote monitoring through an IoT dashboard on a mobile device or PC.
3. Automated alerts for rain detection or significant environmental changes (e.g., high temp erature).
4. Data logging for long-term weather analysis and trend identification.
5. A scalable and cost-effective solution suitable for applications like smart agriculture and general environmental monitoring.

8 CONCLUSION

The proposed IoT-based weather monitoring system using ESP8266, DHT11, rain sensor, and LDR is demonstrated to be a low-cost, reliable, and scalable solution. It achieves its objectives by enabling real-time weather data collection and transmission to cloud platforms, significantly enhancing data accessibility for practical applications such as agriculture and environmental awareness.