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REAL TIME ENVIRONMENTAL PARAMETER MONITORING SYSTEM USING NODEMCU & RASPBERRY PI

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Abstract - The Real Time Environmental Parameter Monitoring System using NodeMCU and Raspberry Pi is a cutting-edge project designed to provide a comprehensive solution for monitoring various environmental parameters in real-time. With the increasing concerns about climate change and environmental degradation, there is a growing need for efficient systems that can continuously monitor key environmental indicators to ensure the well-being of our planet and its inhabitants.

1. INTRODUCTION

The goal of this project is to run our Raspberry Pi a LAMP server that allows us to store sensor readings from the ESP8266. We can visualize the readings from any browser in your local network.

By using this system, we can access environmental condition very accurately. We display these readings on website with live server for that we will use raspberry pi. One deafferenting factor of this project from other whether prediction app is it will more accurate than any whether because we will use nodemcu to access real time data and our hardware part will be present at that position for maintaining real time data. This project leverages the power of NodeMCU, an open-source IoT platform based on the ESP8266 WiFi module, and Raspberry Pi, a versatile single-board computer known for its reliability and flexibility

2.LITERATURE REVIEW

[1] Anggit Damaz Istoka (2018)– Web-based machine development using raspberry pi & nodemcu (IJID vol.7)2018.

We took information about raspberry pi from this paper and we can able to differentiate between ardiuno and raspberry pi . We took information about Raspbian pi operating system.

We can able to understand about raspberry pi hardware board means all connection of raspberry pi board.

[2] Prashik Naik, Ujjwal Harode (2016)- Raspberry Pi & Iot based Automation (IJIE Vol.4)oct 2026.

We took information about nodemcu and raspberry pi connection how to connect raspberry pi with node mcu .We also took information about transmission protocol from this research paper.

[3] Cheah Wai Zhao – Exploring Iot application using Raspberry Pi (IJCNA Vol.2 Issue 1)Feb 2015.

3.PROPOSED METHODOLOGY

System Components

ESP32/ESP8266 microcontroller: Explain its functionalities (sensor interfacing, Wi-Fi connectivity, etc.).Raspberry Pi: Discuss its role as the server platform (running Linux, Apache, MySQL, PHP).LAMP Stack: Briefly explain the purpose of each component (Linux OS, Apache web server, MySQL database, PHP scripting language).

Data Flow

- Sensor data acquisition by the ESP board.
- Data packaging (e.g., JSON format) for efficient transmission.
- Connection establishment with the Raspberry Pi using a communication protocol (HTTP/MQTT).
- Data transmission from the ESP to the server.
- Data processing and storage in the MySQL database on the Raspberry Pi.
- (Optional) Data visualization on web pages using PHP.

Communication Protocols HTTP (Hypertext Transfer Protocol): Widely used for web communication, offering simplicity.

Data Integrity Error handling techniques in the ESP code and PHP script. Data validation to prevent invalid inputs

3.1 BLOCK DIAGRAM

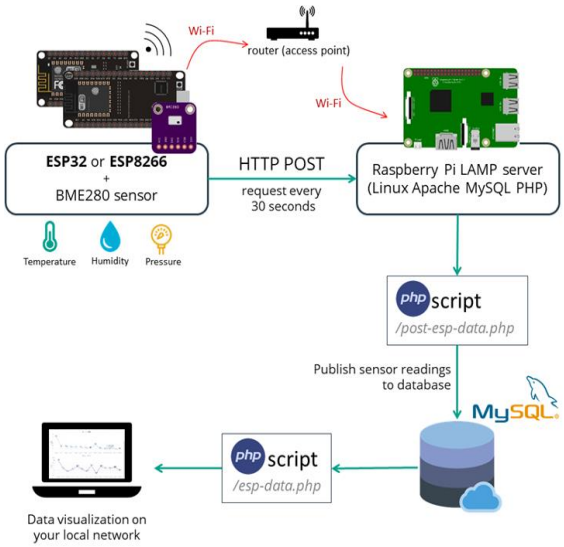

Figure 1: Block diagram

1. Sensor on the ESP reads data (e.g., temperature, humidity).
2. ESP formats the data and connects to WiFi.
3. ESP sends an HTTP POST request with the data to the Raspberry Pi's PHP script URL.
4. PHP script receives the request, parses the data, and connects to the MySQL database.
5. Sensor data is inserted into the database table.

3.2 FLOW CHART

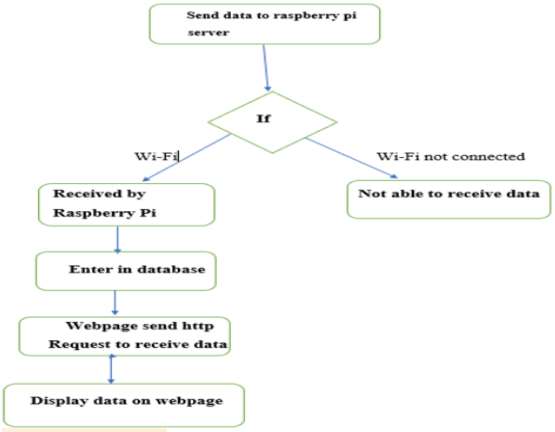

Figure 2. Flow Chart

4.SIGNIFICANCE AND SCOPE

We can take environmental condition readings but these are not those much accurate for that particular place. If we want environmental condition of any particular pin code on google that time it will give you some reading but that is predicted one or it may be taken at district level and according predicted. In our system we can access accurate reading of environmental condition of any specific location by applying actual hardware means NodeMCU there.

By using this system, we can monitor green house, poultry farms, auditoriums. This is only technique that monitors room temperature live with your one click we just need internet connection and that set.

5.RESULT

Sensor readings (temperature, humidity, pressure, etc.) are collected by the ESP8266 board. This data is transmitted wirelessly to the Raspberry Pi server. The PHP script on the Raspberry Pi parses the received data. The data is stored in a structured format (tables) within the MySQL database on the Raspberry Pi. The PHP script can be used to generate dynamic web pages that display the sensor data in real-time or provide historical trends

6.CONCLUSION

In conclusion, the project of publishing data from an ESP32/ESP8266 board to a Raspberry Pi LAMP server offers a robust and adaptable foundation for building real-world Internet of Things (IoT) applications. Enables remote data collection from various sensors and stores it securely in a structured database on the Raspberry Pi. Facilitates real-time monitoring of sensor data with web dashboards and triggers automated actions based on predefined condition. Allows remote control of devices connected to the ESP boards and provides a central point of management for multiple devices.

REFERENCES

[1] Anggit Damaz Istoka (2018)– Web-based machine development using raspberry pi & nodemcu (IJID vol.7)2018.

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[3] Cheah Wai Zhao – Exploring Iot application using Raspberry Pi (IJCNA Vol.2 Issue 1)Feb 2015.