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DESIGN OF IOT BASED WEATHER MONITORING SYSTEM

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ABSTRACT

There are several areas where weather monitoring is essential. The weather has a direct impact on several businesses, including agricultural and food manufacture. The atmosphere is the state of the environment, whether it's hot or cold, humid or dry, quiet or noisy, sunny or overcast. The stratosphere is much above the average temperature where most temperature anomalies happen. Atmosphere describes typical weather over longer periods of time, while climate describes more frequent changes in temperature and precipitation. Without a specific meaning, the word "climate" is taken to mean the weather on Earth. Keeping tabs on weather conditions is just not feasible. In order to assess local weather conditions and make data accessible over a network, this study proposes a contemporary technique. At its core, this is based on the cutting-edge and inexpensive Internet of Things (IoT) technology, which allows for the connection of an endless number of physical objects to a network. Items such as electrical devices, sensors, and electronic components for vehicles might be located here. The system collects data from sensors that measure and alter variables including humidity, temperature, barometric pressure, and rainfall levels. This data is then sent to a web page where it may be visualised. Any internet-connected device, including smartphones, laptops, desktops, or tablets, may access the data stored in the deployed system. All things considered, the suggested method has been a success; it is possible to achieve the intended objectives quite precisely while staying true to its design goals of being inexpensive and easy to use.

INTRODUCTION

A weather station is a facility, either on land or sea, with instruments and equipment for measuring atmospheric conditions to provide information for weather forecasts and to study the weather and climate. The measurements taken include temperature, atmospheric pressure, humidity, rain level.

Weather Monitoring Systems are used to keep track of the ever-changing weather conditions. The information obtained by such sensors is used to report weather and maintain track of environmental changes in a given location. Such information is particularly useful in the study of the earth as well as the analysis of changing climatic and environmental conditions in a given location.

Furthermore, the collected data and analytics can be used in a range of applications, including agriculture, geology, mining, and building weather forecasting models. A simple weather monitoring system is built in this project, which can monitor the temperature, humidity, barometric pressure and rain condition of a location.

This project's weather monitoring system is an IoT gadget based on NodeMCU. NodeMCU is an IoT board that works with Arduino. To write the program code for any NodeMCU board, we can use Arduino IDE or we can first create an account on the Arduino Cloud Platform and link his user account to the NodeMCU board.

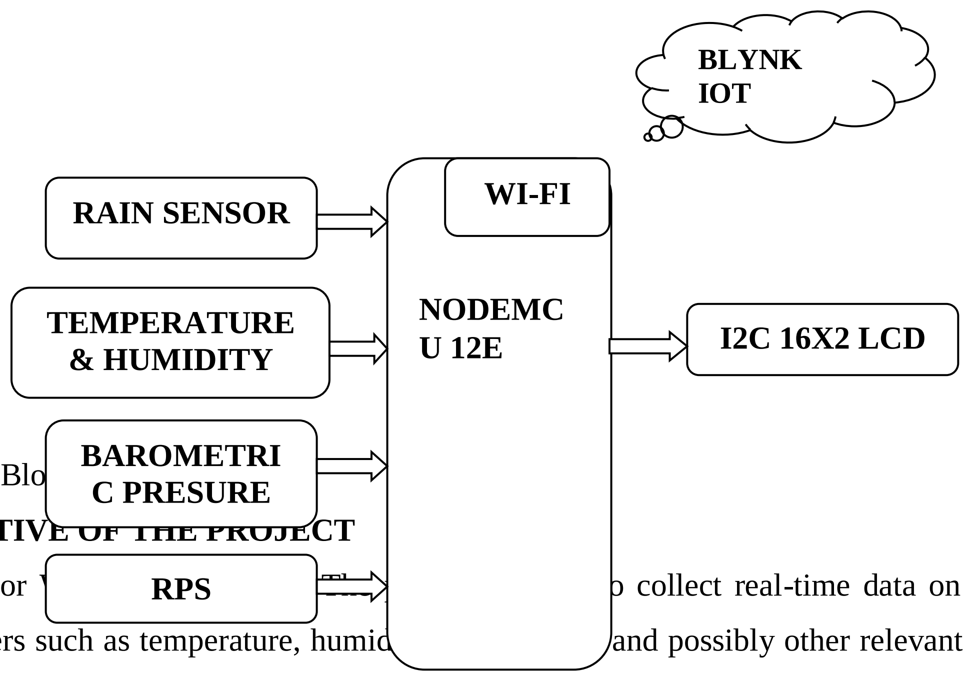

Figure.1 Blo

OBJECTIVE OF THE PROJECT

1. Monitor W ... to collect real-time data on various weather parameters such as temperature, humid ... and possibly other relevant metrics like UV index or precipitation levels.

2. Wireless Connectivity: Utilize NodeMCU 's capabilities to connect to the internet via Wi-Fi, enabling remote access to the collected weather data.

3. Data Logging and Analysis: Store the collected weather data in a database for historical analysis and trend forecasting. This may involve using cloud services or local storage solutions.

4. Remote Access and Control: Enable users to remotely access the weather data from anywhere via a web interface or mobile application. Additionally, users may be able to remotely control certain

aspects of the system, such as adjusting sampling frequency or activating/deactivating sensors.

5. Alerting Mechanisms: Implement alerts or notifications based on predefined thresholds for specific weather conditions. For example, sending alerts for excessively high or low temperatures, humidity levels, or sudden changes in weather patterns.

LITERATURE SURVEY

Sensor Technologies for Weather Monitoring:

Investigate research papers and articles that discuss sensor technologies used in IoT-based weather monitoring systems.

Look for studies that explore the deployment of sensors for measuring parameters such as temperature, humidity, air pressure, wind speed, wind direction, rainfall, solar radiation, and UV index.

Data Transmission and Communication:

Review literature on communication protocols and technologies used to transmit weather data from sensors to a central monitoring system.

Explore studies that discuss the integration of wireless communication technologies such as Wi-Fi, Bluetooth, LoRaWAN, Zigbee, or cellular networks for data transmission over short or long distances.

Data Analytics and Visualization:

Examine research papers and articles that discuss data analytics techniques applied to weather data collected by IoT sensors.

Look for studies that describe how data is processed, analyzed, and visualized to provide insights into weather patterns, trends, and anomalies.

Integration with Weather Forecasting Models:

Investigate literature on how IoT-based weather monitoring systems integrate with weather forecasting models.

Explore studies that discuss the use of machine learning algorithms, statistical models, and numerical weather prediction techniques to improve the accuracy and reliability of weather forecasts based on real-time sensor data.

Weather Monitoring for Specific Applications:

Review research papers and articles that discuss IoT-based weather monitoring systems tailored to specific applications or industries.

Look for studies that focus on applications such as precision agriculture, renewable energy management, urban planning, aviation, maritime navigation, and emergency response.

PROPOSED SYSTEM

From the power supply board, power is transmitted to the NODEMCU board.We see that the power indicators of the supply of NODEMCU is ON, indicating the supply is available.We keep the digital humidity and temperature sensor, barometric pressure sensor, and rain sensor in the atmosphere for checking the weather conditions.The DHT11 sensor detects relative humidity by measuring the electrical resistance between two electrodes. The value will be shown in a LIQUID CRYSTAL DISPLAY.The BPM180 is used to detect the pressure and temperature in the atmosphere. The value will be shown in a LIQUID CRYSTAL DISPLAY.

The Rain sensor used as a switch when raindrop falls through the raining board and also for measuring rainfall intensity. The value will be shown in a LIQUID CRYSTAL DISPLAY.This is actually can operate through remotely also.We written a code for BLYNK server to access remotely.It is useful to know the weather conditions and inform farmers of current weather conditions and potential threads which may affect crops, industry, food manufacturing, and many other industries.The main aim is to CHECK THE WEATHER CONDITIONS remotely.

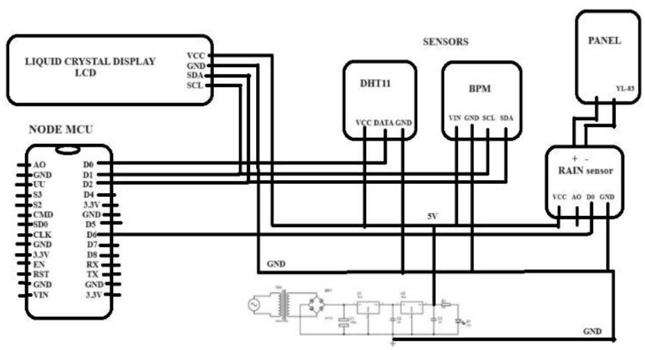

Figure.2 Schematic Diagram

RESULTS

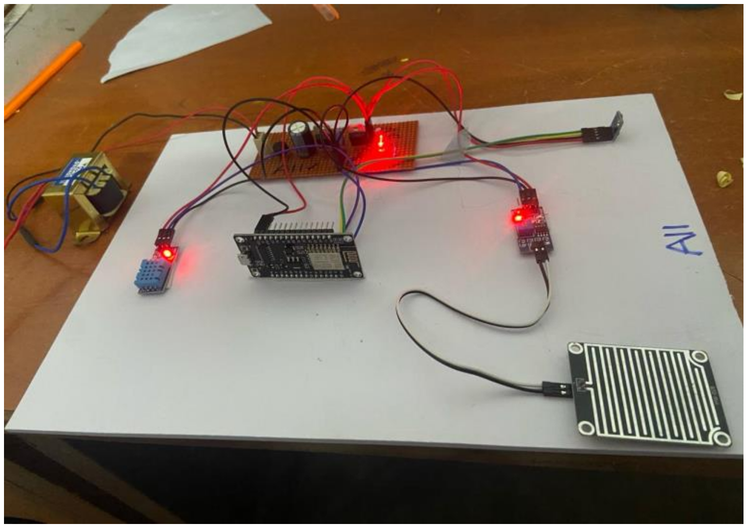

Figure.3 working kit

Figure.4 Blynk Output

ADVANTAGES

- Real-time Monitoring
- Remote Accessibility
- Data Accuracy
- Cost Efficiency
- Integration Capabilities

APPLICATION

- Agriculture
- Transportation and Logistics
- Energy Management

Construction and Infrastructure

CONCLUSION

To sum up, weather monitoring systems built on the Internet of Things are a game-changing innovation with broad potential uses in many fields. These systems enable organisations to make educated choices, optimise operations, and increase safety and resilience by combining sensors, connectivity, and data analytics to deliver real-time insights on weather conditions. Improving resource management, enhancing risk mitigation, and increasing efficiency are just a few of the many advantages that IoT weather monitoring systems provide to a wide range of industries, from smart cities and transportation to agricultural and transportation. Disasters, severe weather, and other weather-related issues may be better anticipated and handled when organisations incorporate meteorological data into their decision-making processes.

FUTURE SCOPE

Future advancements in sensor technology, data analytics, and machine learning algorithms will enable IoT weather monitoring systems to provide even more precise and accurate weather forecasts, with higher spatial and temporal resolutions.

It will increasingly integrate with smart infrastructure, such as smart buildings, smart grids, and intelligent transportation systems, to optimize resource management, improve energy efficiency, and enhance urban resilience.

The adoption of edge computing and artificial intelligence (AI) techniques will enable IoT weather monitoring systems to process and analyze data closer to the source, reducing latency, conserving bandwidth, and enabling real-time decision-making in resource-constrained environments.

It will continue to evolve into predictive analytics platforms, capable of forecasting extreme weather events, natural disasters, and climate-related risks with greater accuracy and lead time, enabling proactive mitigation measures and early warning systems.

It will find applications beyond traditional sectors, such as healthcare, retail, and insurance, where weather data can inform decision-making, influence consumer behavior, and mitigate risks related to weather-related disruptions and disasters.

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