ISSN NO: 9726-001X

Volume 11 Issue 01 2023

JOURNAL OF CURRENT SCIENCE

System Design for Internet of Things-Based Weather Monitoring

Mr. N. Murugan, Dr. L. Vigneash, Dr. D. Satyaraj, Mr. P. A. Prassath

Assistant Professor [1,3,4] Associate Professor [2]

nmurugan@actechnology.in, dr.vigneashl@actechnology.in,

dsatyaraj@actechnology.in, paprassath@actechnology.in

Department of ECE, Arjun College of Technology, Thamaraikulam, Coimbatore-Pollachi Highway, Coimbatore, Tamilnadu-642 120

ABSTRACT

There are several areas where weather monitoring is essential. The weather has a direct impact on several businesses, including agricultural and food manufacture. Whatever the weather is like—hot or cold, humid or dry, quiet or stormy, sunny or cloudy—that's what we call the atmosphere. The stratosphere is much above the average temperature where most temperature anomalies happen. While "atmosphere" describes typical weather over longer periods of time, "climate" describes more frequent shifts in temperature and precipitation. In its capacity-free use, "climate" is meant to refer to the climate on Earth. The tracking of atmospheric conditions is physically impossible. 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. Here you might find things like electrical devices, sensors, and electronic equipment for vehicles. The system's sensors track and modify variables including humidity, temperature, barometric pressure, and precipitation level; the data is then sent to a website for visualisation. You may access the data from the system that was implemented using any internet-connected device, whether it a smartphone, laptop, computer, or tablet. 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

In order to research the weather and climate, meteorologists use data collected from devices installed at weather stations, which may be located on land or in the water. Several parameters are measured, such as temperature, humidity, pressure, and precipitation level. In order to keep

ISSN NO: 9726-001X

Volume 11 Issue 01 2023

JOURNAL OF CURRENT SCIENCE

up with the constantly shifting weather conditions, weather monitoring systems are used. Weather reports and environmental change tracking are both made possible by the data collected by these sensors. Earth science and the study of localised climate and environmental change both benefit greatly from this kind of data.

. 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.

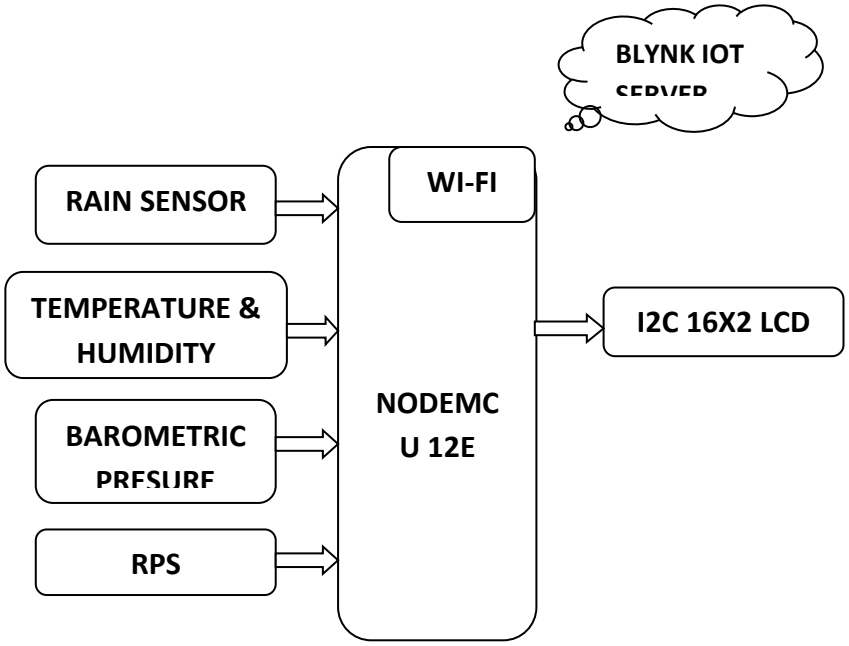


Figure.1 Block Diagram

OBJECTIVE OF THE PROJECT

1. Monitor Weather Conditions: The primary goal is to collect real-time data on various weather parameters such as temperature, humidity, air pressure, 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

Define Keywords and Search Queries:

Start by defining keywords related to your topic, such as "IoT weather monitoring," "Internet of Things in meteorology," "smart weather sensors," etc.

Use these keywords to search in academic databases like IEEE Xplore, Google Scholar, ScienceDirect, and meteorological journals.

Review Academic Papers:

Look for academic papers published in journals and conferences related to IoT, meteorology, environmental monitoring, and sensor networks.

Focus on papers that discuss the design, implementation, deployment, and evaluation of IoT-based weather monitoring systems.

Pay attention to research on sensor technologies, data communication protocols, data analysis techniques, and applications in weather forecasting and climate research.

Explore Patents:

Search for patents related to IoT-based weather monitoring systems. Patent databases like Google Patents or the United States Patent and Trademark Office (USPTO) can provide insights into innovative technologies and solutions.

Look for patents related to IoT sensors, data processing algorithms, communication protocols, and integration with weather forecasting systems.

Check Technical Reports and Theses:

Technical reports and theses may contain detailed studies, experiments, and prototypes of IoT-based weather monitoring systems.

Search university repositories and institutional databases for theses and technical reports on IoT applications in meteorology and environmental monitoring.

Look for Review Articles and Book Chapters:

Review articles and book chapters can provide comprehensive summaries of existing research in IoT-based weather monitoring.

Look for literature reviews and survey papers that summarize the state-of-the-art technologies, challenges, and future directions in this field.

Search for Industry Publications and Whitepapers:

Industry publications, weather technology companies' websites, and whitepapers may contain case studies, best practices, and real-world implementations of IoT-based weather monitoring systems.

Look for reports from IoT solution providers, weather technology companies, and research organizations working on environmental monitoring projects.

PROPOSED system

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.

The program code can then be developed on the Arduino website's Web IDE and sent over the internet to a registered IOT board. If the selected board, in this case NodeMCU, is turned on and connected to the Arduino cloud service, the code is burned to the board over the air via an internet connection, and the board begins to operate according to the transferred code.

In our project we have interfaced four sensors for temperature, humidity, barometric pressure, rain and light intensity measurement those are DHT11, BMP180, Rain sensor module respectively.

ISSN NO: 9726-001X

Volume 11 Issue 01 2023

JOURNAL OF CURRENT SCIENCE

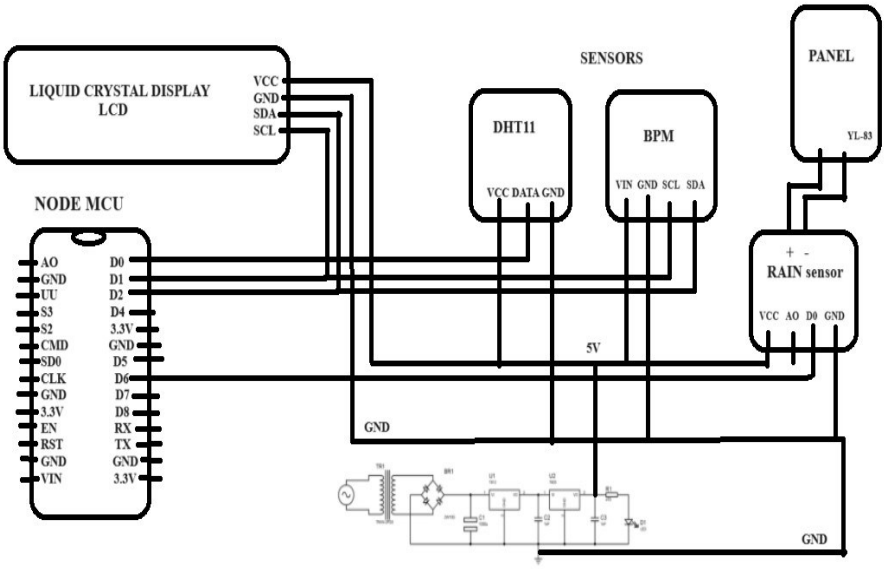
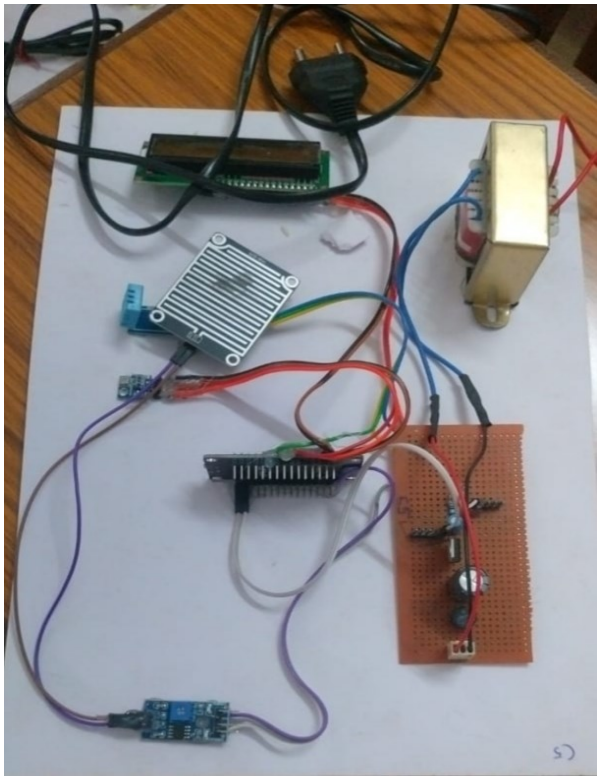
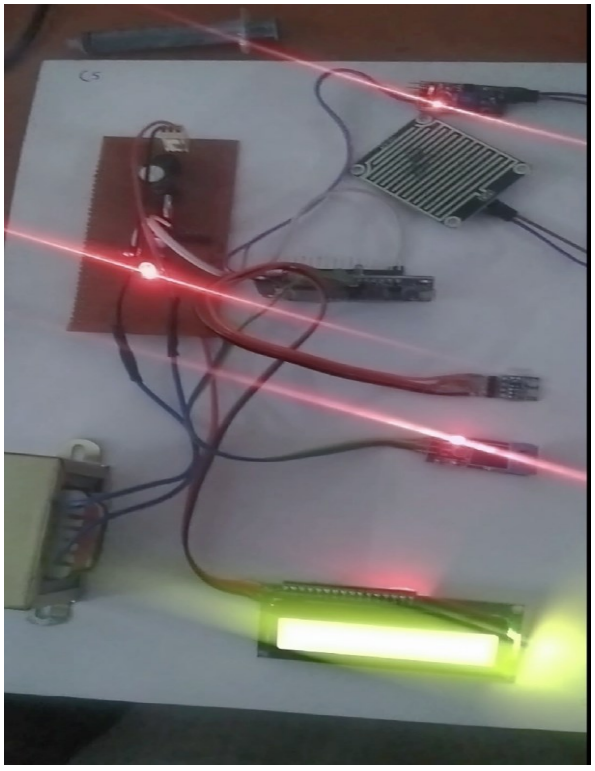


Figure.2 Schematic diagram

RESULTS





ISSN NO: 9726-001X

Volume 11 Issue 01 2023

JOURNAL OF CURRENT SCIENCE

Figure.3 Project Setup

Figure.4 Displaying values on LCD

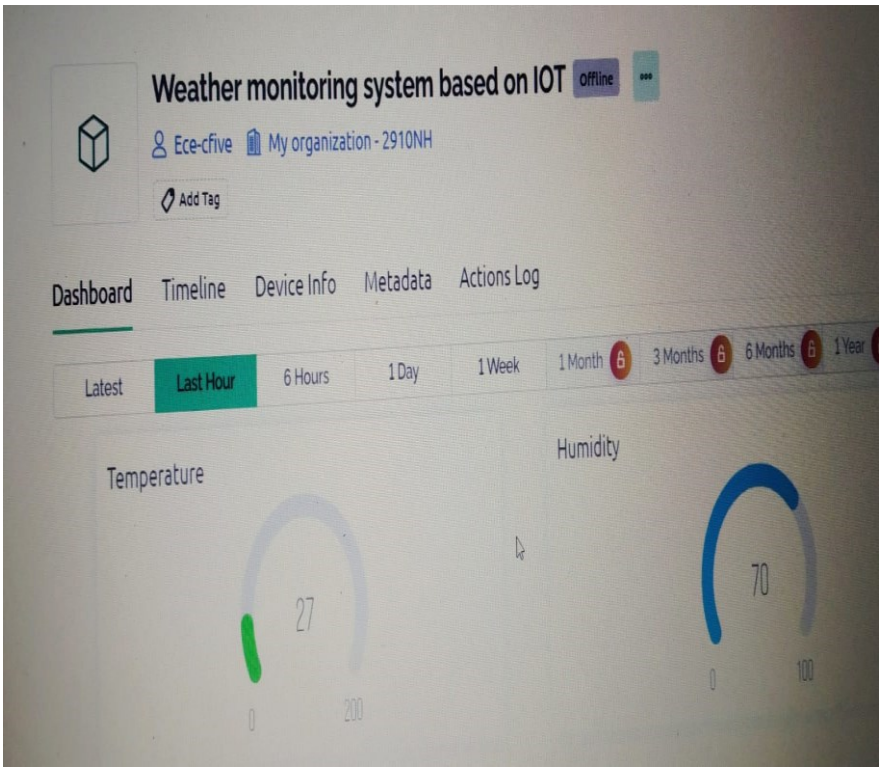


Figure.5 Temperature & Humidity values on Blynk

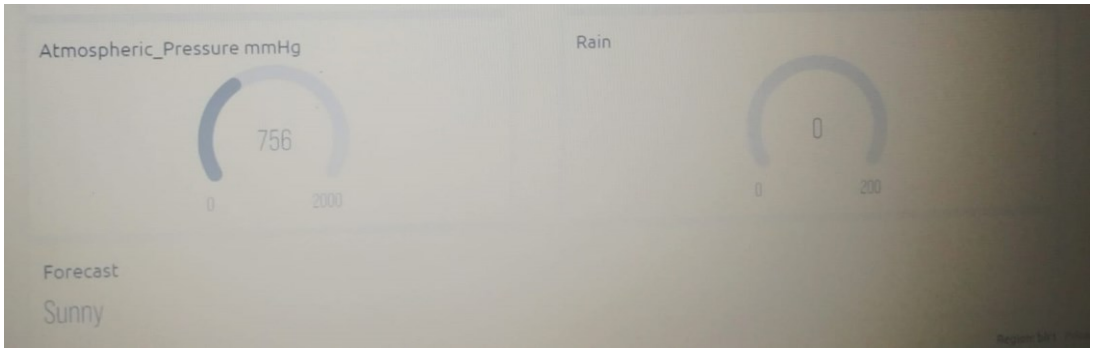


Figure.6 Pressure & Rain values on Blynk

ADVANTAGES

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

- Smart Agriculture and Industry

APPLICATION

- Agriculture
- Transportation and Logistics
- Energy Management
- Construction and Infrastructure
- Retail and Tourism
- Healthcare

CONCLUSION

In conclusion, IoT-based weather monitoring systems represent a transformative technology with widespread applications across various sectors and industries. By leveraging sensors, connectivity, and data analytics, these systems provide real-time insights into weather conditions, enabling organizations to make informed decisions, optimize operations, and enhance safety and resilience.

From agriculture and transportation to smart cities and emergency management, IoT weather monitoring systems offer a multitude of benefits, including improved resource management, enhanced risk mitigation, and increased efficiency. By integrating weather data into decision-making processes, organizations can better anticipate and respond to weather-related challenges, such as extreme temperatures, storms, and natural disasters.

Despite their numerous advantages, IoT-based weather monitoring systems also present challenges, including reliability issues, security concerns, and technical complexity. Addressing these challenges requires careful planning, investment in infrastructure and resources, and ongoing monitoring and maintenance.

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 analyse 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 behaviour, and mitigate risks related to weather-related disruptions and disasters.

Addressing privacy and security concerns will remain a priority for future IoT-based weather monitoring systems, with a focus on implementing robust data protection measures, ensuring user consent and transparency, and safeguarding sensitive weather data from unauthorized access and misuse.

REFERENCE

[1]. Anita M. Bhagat1, Ashwini G. Thakare, Kajal A. Molke1, Neha S. Muneshwari, Prof. V. Chowdhary “IoT Based Weather Monitoring and Reporting System Project”, International Journal Of Trending Scientific Reasearch And Development.

[2]. Abhay Sharma Under the supervision of Dr. ShailendraShukla, ”Development of IoT Based Weather Reporting System”, Material Science And Engineering.

[3]. Prof. S.B. Kamble1 , P.Ramana P. Rao , Anurag S. Pingalkar , Ganesh S. Chayal,“IOT Based Weather Monitoring System”.

[4]. A F Pauzi1 and M Z Hassan, “Development of IOT Based Weather Reporting System”, Material Science And Engineering. [5]. Suryakant Acharkar, Prashant Dawnade, Binay Kumar Dubay, Prof. PrabhakarMhadse, “IOT Based Weather Monitoring System”