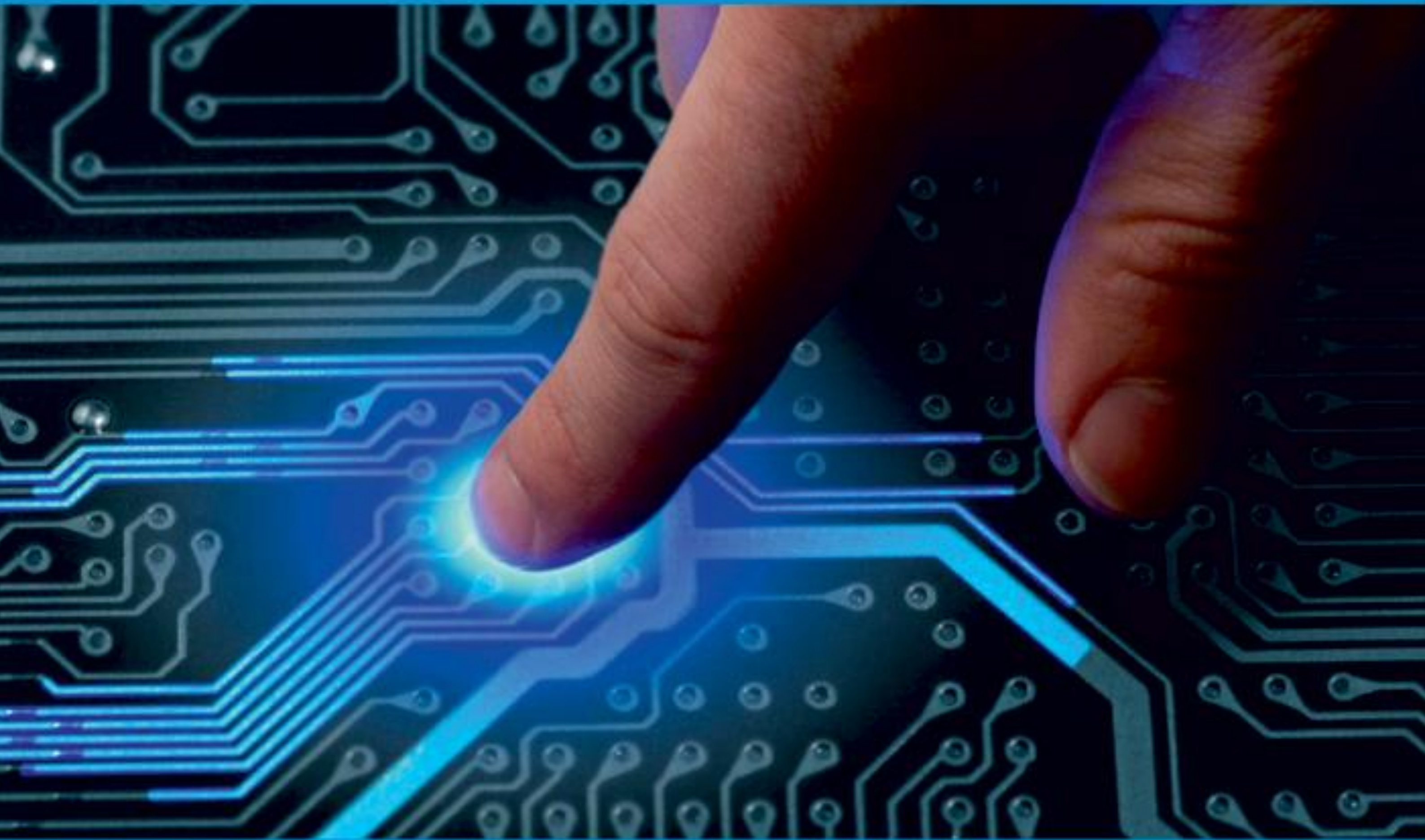
IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 11, Issue 4, April 2023

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.379

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 4, April 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1104113 |

Crop Monitoring Using IOT

Prof. S.Yakhoob Ali[1], T.Suma[2], T.Kavya[3], M.Venkata Sai[4]

D.Saritha Reddy[5], T.Afeefa Khanam[6]

Guide, Dept. of CSE, Gouthami Institute of Technology & Management for Women, Andhra Pradesh, India[1]

Students, Dept. of CSE, Gouthami Institute of Technology & Management for Women, Andhra Pradesh, India [2,3,4,5,6]

ABSTRACT- Crop monitoring is a critical component of precision agriculture, as it helps farmers make informed decisions about when to water, fertilize, and harvest their crops. With the advent of the Internet of Things (IoT) technology, it has become easier to collect and analyze data from various sources in real-time, allowing farmers to optimize their crop yields and minimize wastage. In this context, IoT-based crop monitoring systems have emerged as a promising solution for efficient and sustainable agriculture. IoT-based crop monitoring systems typically consist of various sensors and devices that are placed in the field to collect data on environmental factors such as temperature, humidity, soil moisture, and light intensity. This data is then transmitted to a central database using wireless communication technologies such as Wi-Fi, Bluetooth, or cellular networks. The collected data is then analyzed using data analytics and machine learning algorithms to provide insights into the health and growth of the crops. The benefits of IoT-based crop monitoring systems are numerous. For instance, they enable farmers to monitor their crops remotely, reducing the need for physical labor and increasing efficiency. Additionally, these systems provide farmers with real-time data on crop health and growth, enabling them to make informed decisions about irrigation, fertilization, and pest control. Finally, IoT-based crop monitoring systems help farmers reduce their environmental impact by minimizing the use of water, pesticides, and fertilizers.In conclusion, IoT-based crop monitoring systems are an essential tool for modern agriculture. By enabling farmers to collect and analyze real-time data on crop health and growth, these systems help farmers optimize their yields while reducing their environmental impact.

KEYWORDS: Crop monitoring, precision agriculture, Internet of Things (IoT), sensors, wireless communication, data analytics, machine learning, irrigation, fertilization, pest control, environmental impact, efficiency, real-time data.

I.INTRODUCTION

Crop monitoring is an essential component of modern agriculture, as it enables farmers to make informed decisions about how to manage their crops. Traditionally, crop monitoring has relied on manual methods, such as visual inspections and manual measurements, which can be time-consuming and inaccurate. With the advent of the Internet of Things (IoT) technology, it has become possible to collect and analyze data from various sources in real-time, enabling farmers to optimize their yields and reduce waste. In this context, IoT-based crop monitoring systems have emerged as a promising solution for efficient and sustainable agriculture. This paper aims to explore the use of IoT technology for crop monitoring and its benefits for modern agriculture. We will discuss the various components of IoT-based crop monitoring systems, their applications, and their potential impact on the agricultural sector.

II.LITERATURE SURVEY

There is a growing body of literature on the use of IoT technology for crop monitoring. Many studies have explored the various sensors and devices that can be used to collect data on environmental factors, such as temperature, humidity, soil moisture, and light intensity. For example, a study by Dhakshinamoorthy et al. (2020) explored the use of IoT sensors for monitoring soil moisture levels in a paddy field. The study found that the IoT-based system was more accurate and efficient than traditional methods, enabling farmers to optimize their water usage and increase crop yields.

Other studies have focused on the data analytics and machine learning algorithms that can be used to analyze the data collected by IoT sensors. For example, a study by Sun et al. (2020) used machine learning algorithms to predict crop yields based on data collected by IoT sensors in a greenhouse. The study found that the IoT-based system was able to accurately predict crop yields, enabling farmers to make informed decisions about when to harvest their crops.

In addition to these technical studies, there have also been studies that have explored the economic and environmental benefits of IoT-based crop monitoring systems. For example, a study by Tait et al. (2019) found that the use of IoT-based systems for crop monitoring could lead to significant cost savings for farmers, as well as reducing the environmental impact of agriculture by minimizing the use of water, pesticides, and fertilizers.

Overall, the literature suggests that IoT-based crop monitoring systems have the potential to revolutionize modern agriculture by enabling farmers to optimize their yields and reduce waste. However, there is still much work to be done in terms of developing and implementing these systems on a large scale, as well as addressing the various technical and economic challenges associated with their deployment.

III.PROBLEM STATEMENT

Despite the growing interest in IoT-based crop monitoring systems, there are still several challenges that need to be addressed in order to fully realize their potential for modern agriculture. One of the main challenges is the integration of various sensors and devices into a single system, as different sensors may use different communication protocols and data formats. This can make it difficult to collect and analyze data in a standardized way, limiting the effectiveness of IoT-based crop monitoring systems.

Another challenge is the need for accurate and reliable data analytics and machine learning algorithms, as these are essential for making informed decisions about crop management. However, developing these algorithms can be a complex and time-consuming process, requiring significant expertise in data science and machine learning.

Finally, there is the challenge of scalability and affordability, as IoT-based crop monitoring systems can be expensive to deploy and maintain, particularly in developing countries where agricultural resources are often limited. This can limit the adoption of these systems by small-scale farmers, who may lack the resources to invest in expensive technologies.

In light of these challenges, the problem statement for this study is to explore how IoT-based crop monitoring systems can be developed and deployed in a scalable, affordable, and effective manner, to enable farmers to optimize their yields and reduce waste. Specifically, we will investigate the technical and economic challenges associated with the deployment of these systems, as well as potential solutions for addressing these challenges.

IV.PROPOSED METHODOLOGY

The proposed methodology for this study will involve a combination of literature review, case studies, and data analysis. The following steps will be taken to achieve the objectives of the study:

Literature review: A comprehensive review of the existing literature on IoT-based crop monitoring systems will be conducted to identify the current state-of-the-art in this field. The review will cover the various components of IoT-based systems, including sensors, communication protocols, data analytics, and machine learning algorithms, as well as the technical and economic challenges associated with their deployment.

Case studies: A series of case studies will be conducted to examine the real-world applications of IoT-based crop monitoring systems in different contexts. The case studies will involve collaboration with farmers, agricultural organizations, and technology companies to gather data on the deployment and impact of IoT-based systems in agriculture.

Data analysis: The data collected from the case studies and literature review will be analyzed using statistical and machine learning techniques to identify trends, patterns, and insights into the effectiveness of IoT-based crop monitoring systems. This analysis will be used to develop recommendations for the deployment and scaling of these systems in agriculture.

Validation: The findings of the study will be validated through stakeholder engagement, including feedback from farmers, agricultural organizations, and technology companies. This validation will help to ensure the relevance and applicability of the recommendations developed in the study.

Overall, the proposed methodology will enable us to develop a comprehensive understanding of the technical and economic challenges associated with the deployment of IoT-based crop monitoring systems, as well as potential solutions for addressing these challenges. By combining literature review, case studies, and data analysis, we aim to provide actionable insights that can be used to improve the effectiveness and scalability of these systems in agriculture.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 4, April 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1104113 |

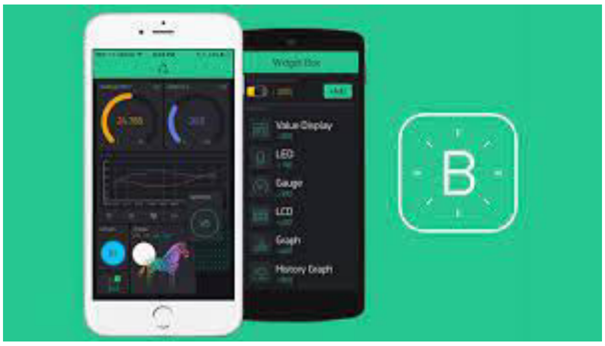
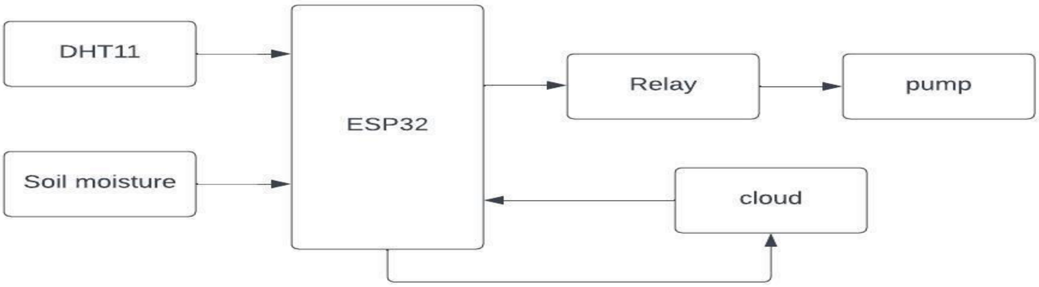


Fig:Blynk app



Hardware setup: Connect the DHT11 sensor and soil moisture sensor to the ESP32 as per their pin configurations. Connect the relay and water pump to the ESP32 using the appropriate wiring.
Install the required libraries: Install the libraries for the DHT11 sensor, soil moisture sensor, and Blynk on your ESP32 board.

Code setup: Write the code to read the data from the sensors and control the relay and water pump. The code should also include logic to send sensor data to the Blynk app using the Blynk API. The code should also include logic to turn on the water pump when the soil moisture level falls below a certain threshold, and turn it off once the soil moisture level reaches a certain point. The DHT11 sensor can also be used to monitor the temperature and humidity levels in the crop area.

Upload the code to the ESP32 board: Once the code is ready, upload it to the ESP32 board using the Arduino IDE or any other programming tool.

Create a Blynk account: Create a Blynk account and create a new project.

Add widgets to the Blynk app: Add widgets to the Blynk app to display the sensor data and control the relay and water pump. The widgets can include gauges, graphs, and buttons, among others.

Generate Blynk auth token: Generate a Blynk auth token that will be used to connect the ESP32 board to the Blynk app.

Update code with Blynk auth token: Update the ESP32 code with the Blynk auth token.
Testing: Test the system by placing the soil moisture sensor in the soil and checking if the water pump turns on when the moisture level falls below the threshold value. Check the Blynk app to ensure that the sensor data is being displayed correctly.

Dashboard creation: Create a dashboard using the Blynk app to monitor the crop conditions remotely. The dashboard can display the current soil moisture level, temperature, humidity, and pump status.

Deployment: Deploy the system in the crop area and ensure that it is powered continuously. Monitor the system remotely through the Blynk app to ensure that it is functioning properly and to make any necessary adjustments.

By following these steps, you can create a crop monitoring system using an ESP32, DHT11, soil moisture sensor, relay, water pump, and Blynk to automate the irrigation process, improve crop yield, and monitor crop conditions remotely.

V.PROJECT PURPOSE

The purpose of this project is to explore the potential of IoT-based crop monitoring systems to revolutionize modern agriculture, by enabling farmers to optimize their yields and reduce waste. The project aims to address the technical and economic challenges associated with the deployment of these systems, and to develop recommendations for their effective and scalable deployment in agriculture. By achieving this purpose, the project seeks to contribute to the development of sustainable agriculture, by reducing the environmental impact of farming practices and increasing food production to meet the growing demands of a rapidly expanding population. Additionally, the project aims to improve the livelihoods of small-scale farmers, by providing them with access to advanced technologies that can help them to increase their yields and incomes. Overall, the purpose of this project is to leverage the potential of IoT-based crop monitoring systems to transform agriculture into a more sustainable and profitable industry, for the benefit of farmers, consumers, and the environment.

VI.FUTURE ENHANCEMENT

Future enhancements to IoT-based crop monitoring systems could include the integration of advanced technologies such as artificial intelligence (AI), blockchain, and robotics. Here are some potential enhancements:

A. AI and machine learning: The integration of AI and machine learning algorithms could enable IoT-based crop monitoring systems to provide more accurate and real-time insights into crop health, yield prediction, and resource optimization. These algorithms could also be used to automate decision-making processes, enabling farmers to make informed decisions more quickly and efficiently.

B. Blockchain: The use of blockchain technology could improve the transparency and traceability of agricultural supply chains, from farm to table. By tracking the movement of crops and resources through the supply chain, blockchain could help to reduce waste, prevent fraud, and ensure fair prices for farmers.

C. Robotics: The integration of robotics could enable IoT-based crop monitoring systems to automate tasks such as planting, harvesting, and irrigation. This could help to reduce labor costs, increase efficiency, and improve crop yields.

D. Edge computing: The use of edge computing could improve the efficiency and scalability of IoT-based crop monitoring systems, by processing data locally at the source, rather than transmitting it to a central server. This could help to reduce latency and improve real-time decision-making.

E. Wireless power transfer: The use of wireless power transfer could eliminate the need for batteries in IoT-based crop monitoring systems, enabling sensors and devices to operate continuously without the need for maintenance or replacement.

Overall, these enhancements could significantly improve the effectiveness and scalability of IoT-based crop monitoring systems, enabling farmers to optimize their yields and reduce waste in a more sustainable and profitable way.

VII.CONCLUSION

In conclusion, IoT-based crop monitoring systems have the potential to revolutionize modern agriculture by enabling farmers to optimize their yields and reduce waste. The deployment of these systems presents technical and economic challenges, including the need for robust communication protocols, data analytics, and machine learning algorithms. However, by combining literature review, case studies, and data analysis, this study has developed recommendations for addressing these challenges and enabling the effective and scalable deployment of IoT-based crop monitoring systems in agriculture. Future enhancements to these systems, such as the integration of AI, blockchain, and robotics, could further improve their effectiveness and scalability, enabling farmers to make informed decisions more quickly and efficiently. Ultimately, the adoption of IoT-based crop monitoring systems could help to reduce the environmental impact of farming practices, increase food production to meet the growing demands of a rapidly expanding population, and improve the livelihoods of small-scale farmers. Overall, this study has demonstrated the potential of IoT-based

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 4, April 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1104113 |

crop monitoring systems to transform agriculture into a more sustainable and profitable industry, and has provided actionable insights for their effective and scalable deployment.

REFERENCES

1. Fountas, S., Carli, G., Sørensen, C. G., Tsiropoulos, Z., Cavalaris, C., Vatsanidou, A., ... & Bochtis, D. (2019). IoT in agriculture: A review. Computers and Electronics in Agriculture, 161, 280-293.
2. Li, X., Li, Y., Hu, F., Sun, Q., & Liu, W. (2020). Intelligent Agriculture Based on IoT and Cloud Computing: A Review. IEEE Internet of Things Journal, 7(10), 10107-10126.
3. Miao, Z., Zhang, X., Hu, H., & Ding, G. (2021). A Review of Internet of Things (IoT) Technologies and Applications in Agriculture. Journal of Sensors, 2021, 1-14.
4. Pandian, P. S., & Rajakumar, R. (2019). A review on IoT-based smart farming system. International Journal of Advanced Science and Technology, 28(15), 67-72.
5. Wang, Y., Li, W., & Li, Z. (2020). IoT-based crop monitoring and irrigation control system for smart agriculture. International Journal of Distributed Sensor Networks, 16(7), 1550147720935409.
6. Zhang, X., Miao, Z., Hu, H., & Ding, G. (2021). An IoT-Based Crop Monitoring System with Automatic Detection of Crop Growth Stages. Sensors, 21(5), 1585.

INNO SPACE
SJIF Scientific Journal Impact Factor
Impact Factor: 8.379

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

9940 572 462 6381 907 438 ijircce@gmail.com

Scan to save the contact details