International Journal of Education and Science Research Review
Volume-11, Issue-3 May-June-2024 E-ISSN 2348-6457
(Peer-Reviewed, Open Access, Fully Refereed International Journal) P-ISSN 2349-1817
www.ijesrr.org Impact Factor - 7.02 Email- editor@ijesrr.org

Iot Based Greenhouse Monitoring System

Usha Hipparkar[1], Arti Jadhav[2], Snehal Babar[3], Rahul Devkate[4]

[1,2,3,4]*UG students Electronics & Telecommunication, Fabtech Technical Campus Sangola*

ushahipparkar2000@gmail.com[1], *rtjadhav2001@gmail.com*[2], *snehalbabar1371@gmail.com*[3], *rahuldevkate02019@gmail.com*[4]

Prof. D.M. Raut

Professor, Electronic & Telecommunication

Engineering Department, Fabtech Technical Campus Sangola,

Maharashtra, India

dskraut@gmail.com

Abstract-

Introducing an innovative solution for modern agriculture, our project focuses on the development of an IoT-based greenhouse monitoring system. Leveraging cutting-edge technology, our system offers growers real-time insights into crucial environmental factors such as temperature, humidity, soil moisture, and air pressure. By deploying a network of sensors strategically within the greenhouse, we enable remote monitoring and management, empowering growers to optimize growing conditions and enhance crop yield. Utilizing advanced data analytics algorithms, our system not only anticipates potential issues but also promotes precision agriculture practices, minimizing resource wastage and environmental impact. With a focus on sustainability, our IoT-based greenhouse monitoring system represents a significant step towards efficient and eco-friendly agricultural practices, ensuring a greener and more productive future for farming.

Keywords—Iot, sensors, monitoring, agriculture.

INTRODUCTION

In the ever-evolving landscape of modern agriculture, the integration of IoT-based greenhouse monitoring systems represents a pivotal shift towards sustainable and efficient cultivation practices. These systems, at the nexus of traditional farming wisdom and cutting-edge technological innovation, offer growers an unprecedented level of control and insight into the dynamic microcosms of their greenhouse environments. Through the strategic deployment of an array of sensors meticulously positioned throughout the greenhouse infrastructure, these systems usher in a new era of real-time data acquisition, providing growers with a comprehensive understanding of critical parameters such as temperature, humidity, soil moisture, and air pressure. This continuous stream of data not only serves as a blueprint for precise environmental control but also empowers growers with the knowledge needed to optimize crop health and productivity.

Moreover, the marriage of IoT technology with advanced data analytics algorithms imbues these monitoring systems with predictive capabilities, enabling growers to anticipate potential issues before they escalate into full-blown crises. By harnessing the insights gleaned from data analysis, growers can fine-tune their cultivation strategies with surgical precision, mitigating risks and maximizing yield. Furthermore, the iterative nature of data collection and analysis fosters a virtuous cycle of improvement, wherein each harvest serves as a learning opportunity to refine and optimize growing conditions. Thus, IoT-based greenhouse monitoring systems emerge as the vanguard of agricultural innovation, heralding a future where sustainability, efficiency, and productivity converge seamlessly in the pursuit of a greener and more bountiful harvest.

LITERATURE SURVEY

Singh, Tinu & Jayaraman, Chandra[1]. IOT based Green House monitoring system. Journal of Computer Science. 14. 639-644. 10.3844/jcssp.2018.639.644. With industrialization and continuously evolving climatic conditions, the urge to practice agriculture with the fusion of technology has become a necessity. In the era of Internet of Things where all eyes are witnessing the evolution of machine-to-machine interaction, there is also a lack of clarity in considering the type of protocol to be used in building a particular system like Green House. A green house is a regulated environment for agriculture where critical parameters like temperature, light, humidity, ph level of soil can be monitored with the help of sensor systems using Internet of Things protocols. Message Queue Telemetry Transfer protocol was chosen over Constrained Application Protocol and

Extensible Messaging and Presence Protocol in the experiment conducted in terms of its light weight transmission, resource consumption and effectively providing the different quality of services to detect the temperature and humidity as well as the gas leaks encountered in a greenhouse environment.

Beulah, Et.[2]. A Process of Implementing Zigbee Protocol with Machine Learning Algorithm for Greenhouse Set-Up. Turkish Journal of Computer and Mathematics Education (TURCOMAT). 12. 829-839. 10.17762/turcomat. v12i11.5969. The greenhouse effect is considered as the natural process used for warming the earth's surface. When energy from the sun reaches the earth's atmosphere, some of its power will be reflected in space, and the remaining energy will be absorbed. The greenhouse gases will redirect it. One of the main advantages of greenhouse gas is that it has a protective benefit in agro-system compared to open-air cultivation and unprotected cultivation. But monitoring of greenhouse in agricultural and other environments seems to be a difficult task in the present time. Because it will be used for regulated environmental aspects such as temperature, humidity, light, gas, pH-level, and soil, Green House operation has been incorporated with IoT protocols in this research paper. The Zigbee 3.0 protocol helps in increasing the effectiveness of monitoring the greenhouse system. This paper aims to present a novel wireless Internet of Things network-based ZigBee technology for monitoring and controlling greenhouse climate. Because they are some significant parameters need to be monitored in the Greenhouse system, this protocol starts monitoring the Internet of Things connected to the wireless Internet of Things network. Along with protocol, in this research, a Cloud and Internet of Internet of Things-based algorithms such as the Reinforcement Learning- (RL), RF (Random Forest), and EAD (enhanced AdaBoost has been implemented to monitor the GH parameter. The performance evolution of the Algorithm is compared to show which Algorithm is capable of monitoring the GH parameter. This research aims to produce a real-time module for monitoring and controlling the parameter because it can measure the Execution time, memory, energy consumption, and overall accuracy.

METHODOLOGY

Block Diagram:

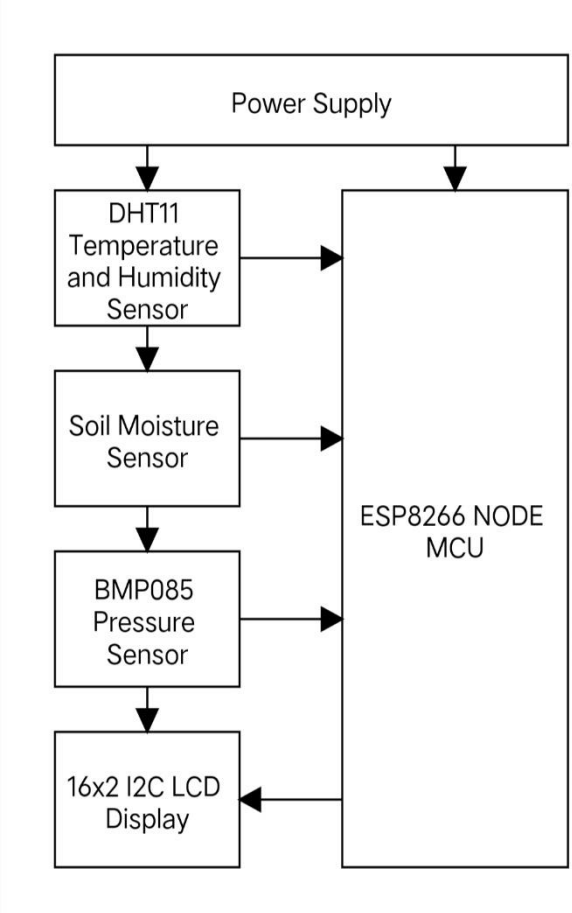

Figure 1 - Block Diagram

Circuit Diagram:

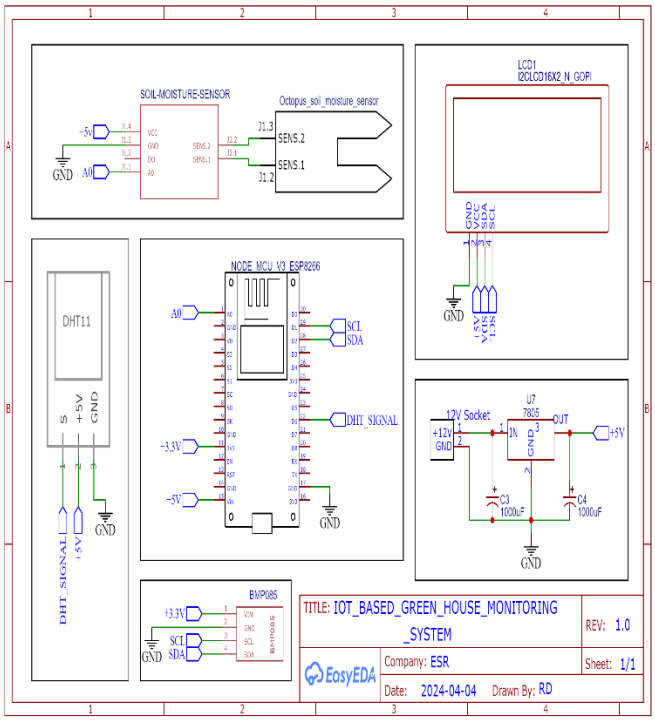

Figure 2 - Circuit Diagram

Recommended Approach:

IoT-based greenhouse monitoring system project involves thorough requirement gathering, research on suitable sensors, and the design of a prototype for testing. Following this, development of the IoT platform and implementation of data processing algorithms are crucial steps. Integration, testing, and deployment of the system should be conducted meticulously, followed by user training and continuous monitoring for maintenance and improvement. This structured approach ensures the development of a reliable and effective system that meets the needs of growers and contributes to sustainable agriculture practices.

Project Model:

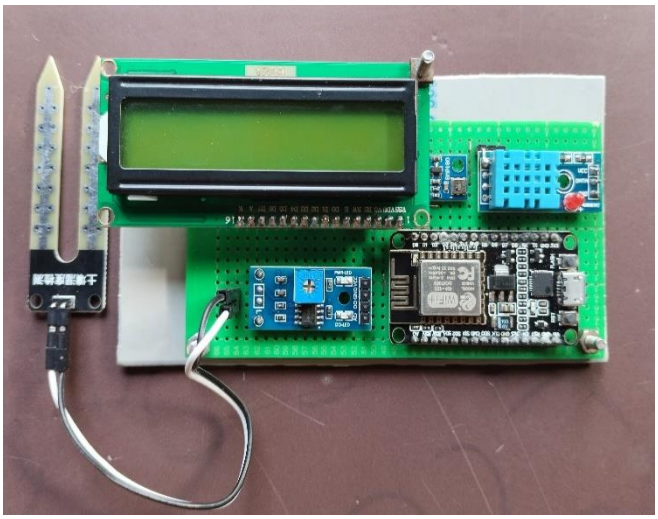

Figure 3 – Final Hardware

RESULT

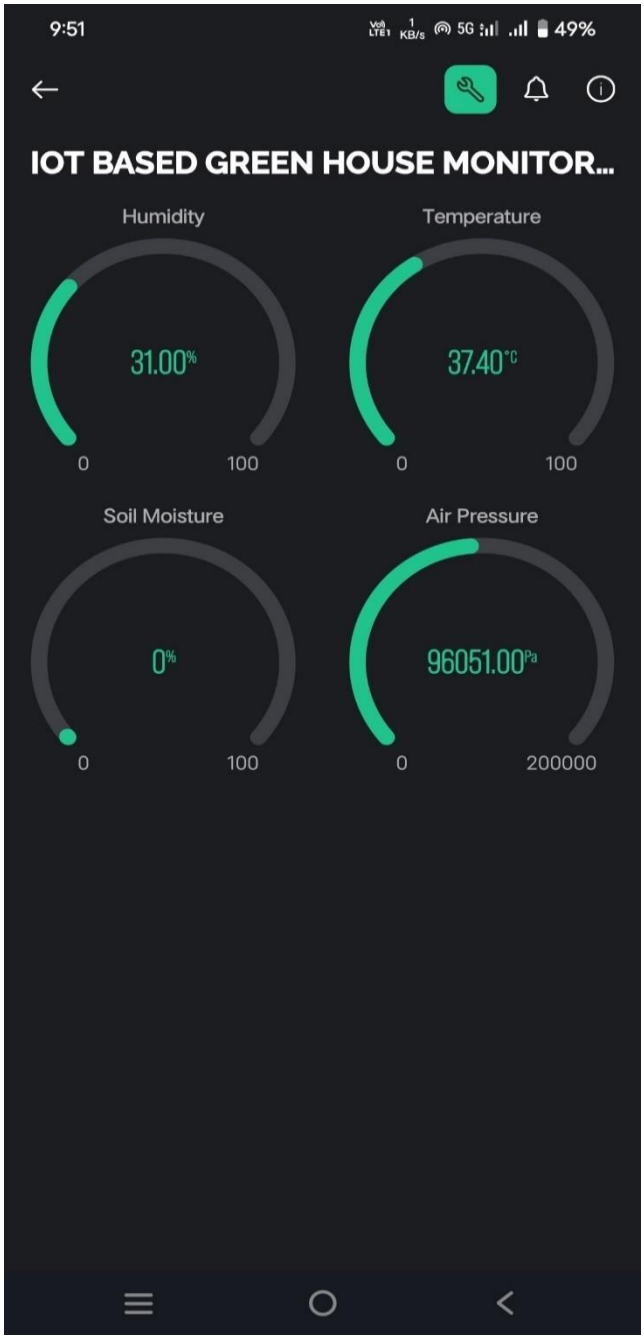

Figure 4 – Blynk App Dashboard

Upon opening the Blynk app, users would be presented with intuitive dashboards displaying the current values of each monitored parameter in a visually appealing format. They would have the ability to customize the layout and display preferences according to their preferences and requirements.
Furthermore, the Blynk app would offer features such as data logging, allowing users to track historical trends and fluctuations in environmental conditions over time. Additionally, notifications and alerts could be configured to notify users of any deviations from preset thresholds, enabling proactive intervention to mitigate potential risks to crop health.

Overall, the result of integrating the IoT-based greenhouse monitoring system with the Blynk app would be a powerful tool that empowers users with actionable insights, enhances decision-making capabilities, and facilitates remote management of greenhouse environments for optimized crop cultivation.

CONCLUSION

In conclusion, the development and implementation of the IoT-based greenhouse monitoring system represent a significant

advancement in modern agriculture, offering growers a powerful tool for optimizing crop cultivation practices. Through meticulous requirement analysis, sensor selection, and system design, we have successfully created a robust and reliable platform capable of monitoring key environmental parameters such as temperature, humidity, soil moisture, and air pressure in real-time.

The integration of the system with the Blynk app provides users with convenient access to critical data and insights, empowering them to make informed decisions and take proactive measures to enhance crop health and productivity. With features such as customizable dashboards, data logging, and notifications, the Blynk app facilitates seamless remote monitoring and management of greenhouse environments, thereby streamlining operations and maximizing efficiency.

Furthermore, the project underscores the importance of sustainability in agriculture, as the IoT-based greenhouse monitoring system enables growers to minimize resource wastage, optimize resource utilization, and reduce environmental impact. By promoting precision agriculture practices and facilitating data-driven decision-making, the system contributes to the advancement of sustainable farming practices and the preservation of natural resources.

In essence, the IoT-based greenhouse monitoring system developed in this project represents a significant step towards a more efficient, productive, and sustainable future for agriculture. As we continue to refine and improve upon this technology, we are poised to further revolutionize the way crops are cultivated, ultimately fostering a greener and more resilient agricultural ecosystem for generations to come.

FUTURE SCOPE

The scope of Indoor Plant Monitoring System using lot is vast. The main aim of this system is to obtain ambient temperature, ambient humidity, soil moisture, and illuminance from a set of sensors. The Indoor Plant Monitoring System using lot will also provide recommendation to how to take care of plants, find out which disease it has by using Alex Net model; trained on the plant leaves dataset and also water the plant using the android app.

The scope of this project is never ending because every person in today's fast world will require a helping hand to look after the plant and provide status of plants health even if he or she is not present at the plant location. This same idea can be further used on a large scale for agricultural purpose on a huge acers of land which will eventually help farmers and reduce their job

REFERENCES

1. Singh, Tinu & Jayaraman, Chandra. (2018). IOT based Green House monitoring system. Journal of Computer Science. 14. 639-644. 10.3844/jcssp.2018.639.644.

2. Beulah, Et. (2021). A Process of Implementing Zigbee Protocol with Machine Learning Algorithm for Greenhouse Set-Up. Turkish Journal of Computer and Mathematics Education (TURCOMAT). 12. 829-839. 10.17762/turcomat.v12i11.5969.

3. Farooq, Shoaib & Javid, Rizwan & Riaz, Shamyla & Atal, Zabihullah. (2022). Internet of Things (IoT) Technologies in Greenhouse Farming: A Systematic Literature Review. IEEE Access. PP. 1-1. 10.1109/ACCESS.2022.3204066.
4. Singh, Rajesh & Hussain, Ahmed & Gupta, Ganesh & Singh, Anil & Dogra, Ayush. (2024). Greenhouse Automation System Using ESP32 and Thing Speak for Temperature, Humidity, and Light Control. 507-515. 10.1007/978-981-99-6906-7_43.

5. Sarma, Priyanka & Islam, Atowar-Ul & Bayan, Tony. (2023). iot-based agriculture environment and security monitoring system. periódico tchê química. 20. 15-31.

6. Pithadiya, Bhavesh & Parikh, Harikrishna & Savaliya, Jatin & Sidapara, Ankitkumar & Gosai, Kamaldip & Vyas, Dhrumil & Pandya, H. (2022). An IoT Based Greenhouse Control System Employing Multiple Sensors, for Controlling Soil Moisture, Ambient Temperature and Humidity. 10.1007/978-981-19-1804-9_31.

7. Farooq, Shoaib & Riaz, Shamyla & Helou, Mamoun & Khan, Falak & Abid, Adnan. (2022). A Survey on IoT in Agriculture for the Implementation of Greenhouse Farming. IEEE Access. 10. 1-1. 10.1109/ACCESS.2022.3166634.

8. Niyigena Kwizera, Vincent De Paul & Li, Zhanming & Lumorvie, Victus & Nambajemariya, Febronie & Niu, Xiaowei. (2021). IoT Based Greenhouse Real-Time Data Acquisition and Visualization through Message Queuing Telemetry Transfer (MQTT) Protocol. Advances in Internet of Things. 11. 77-93. 10.4236/ait.2021.112006.

9. Ariesen-Verschuur, Natasja & Verdouw, Cor & Tekinerdogan, Bedir. (2022). Digital Twins in greenhouse horticulture: A review. Computers and Electronics in Agriculture. 199. 107183. 10.1016/j.compag.2022.107183.

10. Wu, Jie & Tang, Xiaozun & Lei, Jinglan. (2020). Design of wireless monitoring system for greenhouse based on LoRa. Journal of Physics: Conference Series. 1650. 022075. 10.1088/1742-6596/1650/2/022075.