International Research Journal of Education and Technology
Peer Reviewed Journal
ISSN 2581-7795

SMART HYDROPHONICS SYSTEM WITH REAL-TIME MONITORING AND CONTROL SYSTEM

Dr.R. Rajeswari[1],Devarapalli Vasanthi[2], Gothala Vikash[3],R. Pradeep [4],

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

Department of ECE, PERI Institute of Technology, Chennai, India.

Abstract

This paper proposes a technique of growing plants without soil using minimum usage of water. Sensors are connected to PIC Controller which monitors the supply of nutrients that requires for plant growth. In this project Internet of Things (IOT) is mainly used to regulate temperature, humidity, PH level , flow of water and nutrients. Correct air temperature, relative humidity, nutrient level of the water and correct irrigation of water is critically important in hydroponics. In this hydroponic system the user enables to control certain mechanisms for refilling, sprinkling, draining through web application. They can also monitor the pH level relative humidity and water level etc. which is data collected from the sensors.

I. Introduction

Agriculture is considered as the vital piece of life for the human species as it is the fundamental wellspring of sustenance grains what's more, other crude materials required for person. Tragically, numerous agriculturists still utilize the conventional strategies of cultivating which brings about low yielding of harvests and natural products.

The greater part of the project means the utilization of remote sensor organize which gathers the information from various sorts of sensors and after that send it to principle server utilizing remote convention. The gathered information gives the data about various ecological elements which in swings screens the framework. Observing natural components are insufficient and finishes answer for enhance the yield of the harvests. Require robotization to make strides the yield of the harvests.There are

International Conference on Electrical Electronics & Communication Technology (ICEECT'24) ISBN: 978-93-340-6066-9, PERI INSTITUTE OF TECHNOLOGY, Chennai.

number of different components that influence the efficiency to awesome degree. These components incorporate assault of bugs when product is at the phase of gathering.

Indeed, even after gathering, ranchers likewise confront issues away of collected trim and some more. In this way, so as to give answers for all such issues, it is important to create coordinated framework which will deal with all components influencing the efficiency in each stage. In this particular project automation of hydroponics farming is to be done completely. In which, automatic supply of water, temperature maintenance of pH level and EC (Electrical conductivity) at required level, automation in required sunlight for farm along with that alarms and indicators for unusual conditions for farms. Also related all information is to be displays on display panel and related info will be send to owner of that particular farm.

II. Methodology

Most of these works that were designed to have a generic IoT-based framework for future smart farming applications. However, only few of them were able to implement an actual farm testbed to verify the performance of the proposed frameworks. There are several applications that are used in the field of hydroponics, out of which “Deep-Water Culture” method is most significantly used. The major limitation of this system is that it requires user interventions. Our system fully automates working of the system which will reduce user work.

The Proposed system is a controlled hydroponic system which is fully automatic with water, power controllers, that helps in circulation of water and nutrients, and also maintain the humidity, temperature, EC and pH level using sensors. This method is applied to help conclude that water circulation will be done by turning

on the pump or not circulating water by turning off the pump in hydroponics based on temperature and humidity parameters

III. Literature Survey

Fully Automated Hydroponics System for Smart Farming

This project focuses on developing a Fully Automatic Hydroponics system, monitoring and controlling temperature, humidity, pH, and EC in Hydroponics. It uses a PIC16F877A microcontroller and four pumps to manage water, nutrient, pH solution, and humidity. The system increases fan speed as temperature rises and turns on pumps based on EC and pH values. A passive LCD displays variations in values. The system aims to increase crop yield, conserve water, and simplify farming. Other projects in this field include automated pH controllers, genetic algorithm-based nutrient control systems, and ontology-based control systems. The proposed system reduces manual labor, improves production efficiency, and minimizes water usage compared to traditional farming. Future enhancements could include wireless interfaces, real-time monitoring, and camera integration.

Optimizing Crop Growth in Smart Hydroponic Systems through IoT Integration

Agriculture is a vital global activity, providing food, materials, and employment, shaping economies and civilizations. With growing populations, innovative farming techniques like hydroponics are emerging to efficiently use space and water. Smart farming integrates IoT and data analytics to optimize crop quality and sustainability. A proposed vertical hydroponics system uses sensors and automation to monitor and adjust environmental

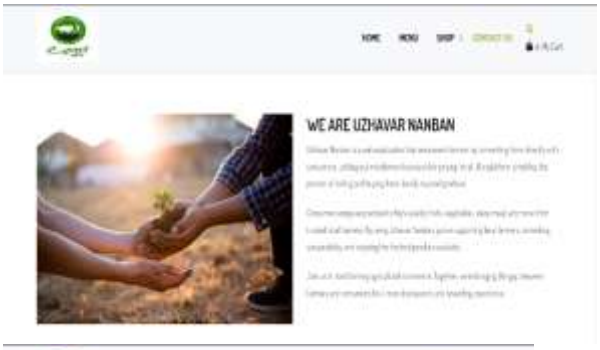
conditions, reducing water usage and chemical inputs. Components include a Raspberry Pi, sensors for pH, temperature, humidity, light, and nutrient levels, as well as mechanisms for water pumping and rotation to ensure proper sunlight exposure. Additionally, sensors trigger alerts or actions, such as activating a buzzer when water levels are low or adjusting pH levels with dispensers. Ultimately, this system aims to revolutionize farming by minimizing human intervention, environmental impact, and resource consumption while maximizing crop yield and quality.

A Smart Hydroponics Farming System Using Exact Inference in Bayesian Network

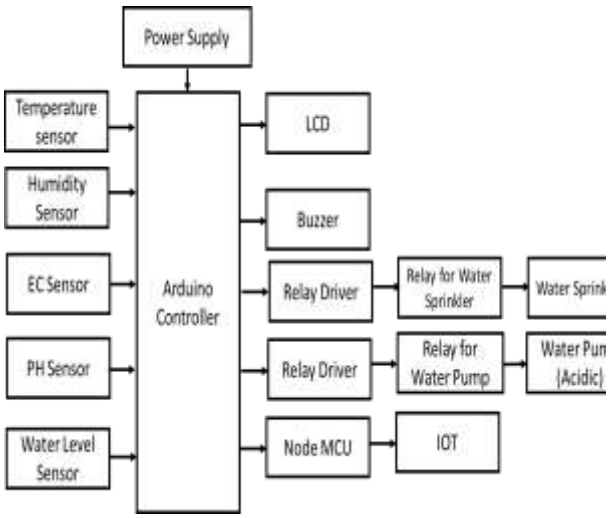
Smart farming, utilizing IoT, enhances crop quality by intelligently sensing and controlling farm parameters. A smart hydroponics system, employing Bayesian Network inference, automates crop growth by monitoring and adjusting light intensity, pH, electrical conductivity, water temperature, and relative humidity. A web interface enables remote monitoring and control. Automatic control using BN minimizes sensor value fluctuations, resulting in a 66.67% higher crop yield compared to manual control. Other relevant works propose decision support models, semantic frameworks, farm management systems, and autonomous gardening robots leveraging IoT for improved farming practices. The smart hydroponics system comprises sensors, data analytics, and a web interface. Hardware includes a sensor network monitoring pH, EC, RH, LI, and WT. Software involves

International Research Journal of Education and Technology
Peer Reviewed Journal
ISSN 2581-7795

data analytics and a cloud server for storage and predictive analysis. Leafy plants like iceberg lettuce are suitable for hydroponics farming due to their lightweight roots. Maintained light intensity and optimal pH, EC, and temperature levels are crucial for success. Data is processed through the cloud server, generating time series charts for monitoring system performance.



IV. Block Diagram

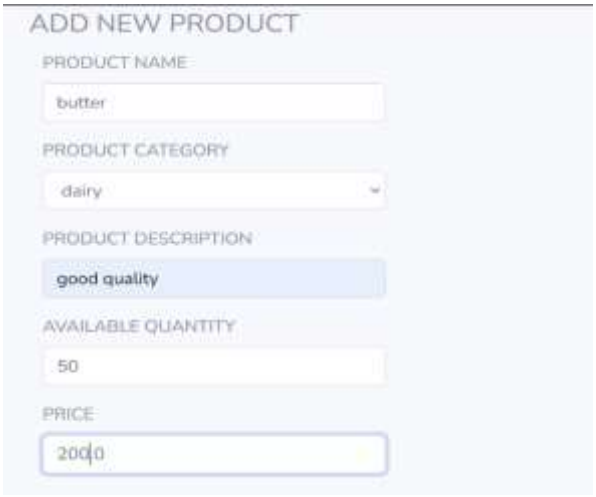


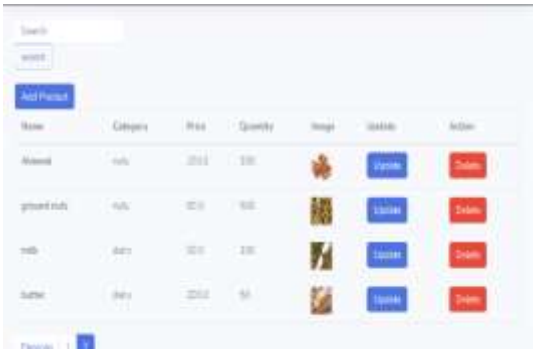
V. Resultsanddiscussion

International Research Journal of Education and Technology

Peer Reviewed Journal

ISSN 2581-7795





VI. Conclusion

In conclusion, the development and implementation of uzhavar nanban represent a significant step towards revolutionizing agricultural commerce by facilitating direct transactions between farmers and consumers. Through the creation of an intuitive web application platform, uzhavar nanban addresses the challenges faced by farmers in accessing markets and enables consumers to connect with local producers for fresh, high-quality products. By promoting transparency, fairness, and sustainability in the agricultural supply chain, uzhavar nanban not only empowers farmers to gain better market access and improve their livelihoods but also provides consumers with access to nutritious, locally sourced food options.

As we move forward, it is essential to continue refining and expanding the uzhavar nanban platform, incorporating user feedback, and adapting to the evolving needs of farmers and consumers. By fostering collaboration between stakeholders in the agricultural ecosystem and leveraging the power of technology, uzhavar nanban has the potential to create lasting positive impacts on the lives of farmers, the resilience of local food systems, and the well-being of communities. Together, let us continue to support and champion initiatives like uzhavar nanban that promote sustainability,

equity, and prosperity in agriculture.

Feel free to adjust the conclusion to better fit the specific achievements and goals of your project. Let me know if you need any further modifications.

References

1. Gomathy C.K, Jaswanth Reddy Vulchi, VenkateshPathipati, Multi-Vendor E-commerce Website for Farmers, May 2021, DOI: 10.21203/rs.3.rs-498792/v1

2. S. Thejaswini and K. R. Ranjitha, "Blockchain in Agriculture by using Decentralized Peer to Peer Networks," 2020 Fourth International Conference on Inventive Systems and Control (ICISC), Coimbatore, India, 2020, pp. 600-606, doi: 10.1109/ICISC47916.2020.9171083.

3. Lakshmi P, Divya K et al.,"Farm Direct Marketing," 2020 International Research Journal of Engineering and Technology (IRJET).

4. J. Li and L. Zhou, "Research on Recommendation System of Agricultural Products E-Commerce Platform Based on Hadoop," 2018 IEEE 9th International Conference on Software Engineering and Service Science (ICSESS), Beijing, China, 2018, pp. 1070-1073, doi: 10.1109/ICSESS.2018.8663921

5. Y. Wang, "Construction of E-commerce Platform System for Targeted Poverty Alleviation," 2020 International Conference on Computer Engineering and Application (ICCEA), Guangzhou, China, 2020, pp. 100-103, doi: 10.1109/ICCEA50009.2020.00028

6. Pinhanez, C. “A Services Theory Approach to Online Service Applications.” IEEE International Conference on Services Computing, 2018.

7. Gabir, H. H., & Karrar, A. Z. “The Effect of Website’s Design Factors on Conversion Rate in E-commerce.” International Conference on Computer, Control, Electrical, and Electronics Engineering, 2018.

8. Zhao, B., & Cheng, Y. “Research on B2C e-commerce website service quality evaluation based on the analytic hierarchy process.” IEEE International

9. Conference on Information Science and Technology, 2014.

10. “Understanding E-Commerce: A study with reference to competitive economy” by Neha Wadhawan and RK Arya in Journal of Critical Reviews on 25 June 2020

11. Muruga Prasaad MD, Manju Prasath D. “e-commerce portal for farmers using Java”. International Conference on Information Technology.APRIL – 2022

12. Peter Namisko and Moses Aballo “Current status of agriculture and Global Trends” in International Journal of Science and Research Volume 2 Issue 7,2013.

13. “E-Commerce in agri-food sector: a systematic literature review” by Yiwu Zeng, Fu Jia, Lia Wan andHongdongGuo in the International Food and Agriculture Management Review on 26 February 2017

14. “The Need of Agribusiness E-commerce to Support Staple Food SelfSufficiency” by UjangMamanandYuniSugiarati in the International Journal of Applied Agricultural Research in 2016.

15. Pinhanez, C. “A Services Theory Approach to Online Service Applications.” IEEE International Conference on Services Computing, 2018.

16. Kumar, G. S., & Jose, J. T. “Developing an electronic commerce platform.” IEEE International Conference on Power, Control, Signals, and Instrumentation Engineering (ICPCSI), 2017.

17. Wangmo, J., Tenzin, S., Lhamo, T., & Dorji, T. “Report on the Feasibility Study of E-Commerce Website Development for the Cooperative Store at College of Science and Technology.” International Conference on Current Trends Towards Converging Technologies, 2018.