IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

IOT BASED SMART PRECISION AGRICULTURE

[1]Dr. P. K. POONGUZHALI, [2]K. ARULSRI MUTHUKUMARAN, [3]K. GANESAN, [4]M. ABUBACKER SIDIK

[1]Associate Professor, [2, 3, 4] UG Scholar

[1]Department of Electronics and Communication Engineering,

[1]Hindusthan college of Engineering And Technology, Coimbatore, India

Abstract: Automatic detection of plant diseases is essential to detect the symptoms of diseases in the early stages when they appear on the growing leaf and fruit of a plant. This is helpful to a farmer to get a solution to disease and proper plantation. Organic foods are very important for human health. Genetically modified fruits and vegetables will damage human cells and may affect the upcoming generation. To overcome a problem we can go for IOT based monitoring and controlling system. In today's greenhouses, many parameter measurements are required to monitor and control the good quality and productivity of plants. Butto get the desired results that are some very important factors that come into play like Temperature, Light, GAS and moisture that are necessary for better plant growth. This system is a very efficient good quality plant the other important part of this project is that is very useful for people because it controls through mobile using NODE MCU. ESP 32 automatically turns on and turns off the appliances. This paper provides efficient and accurate plant disease detection and classification technique by using MATLAB

Index Terms - Plant diseases Identification using MATLAB, GAS, and Temperature monitoring system.

I. INTRODUCTION

Increase & Affection of plant diseases at different seasons has to be identified & treated in their early stages when they appear on the leaf and fruit of the plants. The greenhouse is a room, or area, usually chiefly of glass, in which the temperature is maintained within the desired range, and is used for growing plants. The plant disease is detected at its early stage by using MATLAB software. After the identification of the disease, it is treated by using fertilizers. ich is overseeing the aspect of a greenhouse, such as a temperature, humidity, gasses, and light intensity to keep the greenhouse in the ideal condition. IoT and Arduino-based Greenhouse Environment Monitoring and controlling projects use a moisture sensor to detect the Soil moisture in the Greenhouse. The greenhouse allows the production of crops, especially fruits and vegetable production that requires cold weather to grow fast in a quality manner, all year round and meet consumer demand for out-of-season fruit and vegetables. The use of light-emitting diode (LED) technology for plant cultivation under controlled environmental conditions can result in significant reductions in energy consumption. However, there is still a lack of detailed information on the lighting conditions required for optimal growth of different plant species and the effects of light intensity and spectral composition on plant metabolism and nutritional quality. In the present study, wheat plants were grown under six regimens designed to compare the effects of LED and conventional fluorescent lights on growth and development, leaf photosynthesis, thiol, and amino acid metabolism as well as grain yield and flour quality of wheat.

2. LITERATURE REVIEW

Akash Chandel1, Sameeksha Singh2, Pankaj Kumar Singh3, Shobit Rana Bhat4, " Precision Techniques and Agriculture 4.0 Technologies to promote Sustainability in the Coffee Sector: State of the Art, Challenges and Future Trends," International Journal of Scientific & Engineering Research, 2020 From the technical point of view, IoT is being a system of interrelated computing devices, sensors, or actuators that provides different services over the internet, some of them are Agriculture. IoT helps in making Monitoring more convenient for people by providing various monitoring techniques.

Anuradha . A, Pandit Avinash V. Mancharkar2, "Smart Agriculture Wireless Sensor Routing Protocol and Node Location Algorithm based on Internet of Things Technology" International Journal of Scientific & Engineering Research, 2018 The system's temperature monitor and control system works according to the temperature value set by the user. First it gets the value from the `user and maintains the temperature on the LED screen for user reference. The temperature of the greenhouse is reduced by the fan that is placed inside the greenhouse.

Dr. Jennifer S. Raj, J. Vijitha Ananthi, "Unmanned Aerial Vehicles in Smart Agriculture: Applications, Requirements and Challenges", Journal of Information Technology and Digital World (2019) The proffered internet of things platform provides an automated form of green- house environment enabling a significant connections among the people it allows a real time information gathering, analysis, processing and meditation employing the social networking that are connected through an application interface that is open source to aid variety of platforms.

Tang, Yuanhe, Jia, Min, Mei, Yifeng, Yu Yang Zhang, "A Systematic Review on Monitoring and Advanced Control Strategies in Smart Agriculture", 2019. The whole system of the hybrid intelligent lighting by the sunlight-LED based on the IOT is shown in figure 1. The system includes three major parts, including sunlight delivering device, LED supplementary part and wireless controller.

3. PROBLEM IDENTIFICATION

When all nodes in the agricultural monitoring system operate in inclement weather, they differ from standard sensor network designs. The sensor network has a high number of nodes due to the bigger monitoring area of agricultural output, ensuring the network's cost. To ensure complete surveillance of other agricultural fields, the nodes will be dispersed throughout diverse locations. Because the sensor node's energy is restricted, node failure is quite likely. The monitoring system must resolve the issue of dependability. WSN's lifespan is determined by sensor node failure. Simply put, the agricultural monitoring system must address the following issue:

3.1 The Large-scale High-density Network Structure

The requirement of monitoring material movement in geographical space is intrinsic motivation of the sensor networks. Compared with the traditional mode base on radar or satellite, WSN has some unique technical advantages on distributed multi-dimensional and multi-angle information processing. It can significantly improve the signal-noise ratio, reduce the possible exploration in the region, and eliminate shadows and blind spots. The network nodes must be a large-scale, high-density deployment method to keep monitoring the area coverage and connectivity. A large number of nodes in the network will inevitably increase the cost which will affect the network in the practical application. The premise of agriculture application is to design an available and economic deployment mechanism for WSN.

3.2 Data Processing and Node Energy

Communication is the maximal energy consumption. Each node has a data-independent processing ability. It reduces network transmission cost by processing and extracting the original data. A well-designed network networking, data transfer, and data integration algorithms are important to the lifetime of the network.

3.3 The Network Redundancy and Tolerance

The validity and accuracy of data in agricultural monitoring systems are very important. The optimization of node distribution is studied to reduce energy consumption and ensure effective information acquisition in a wireless sensor network. Network fault tolerance includes node failure detection and failure recovery. Node failure needs to locate. If each node has portable GPS devices, it will inevitably increase the cost of the entire network. How to balance network configuration and node failure detection is a problem to be solved. Node failure recovery adopts the replacement of the general failure of redundant nodes, but it needs to design the number and the location of redundant nodes.

4. SYSTEM ANALYSIS

To prevent the short circuit and power cut. The main objective of this project is to save plants from several diseases at different climates by using MATLAB. To achieve automatic moisture control and temperature control. To achieve IoT control ON and OFF the motor helps to plant growth.

4.1. EXISTING SYSTEM

The existing system includes sensors that are deployed in the field like temperature sensors and moisture sensors. The existing methodology still uses the manual system in monitoring the temperature and humidity. The data collected from these sensors are connected to the microcontroller through RS232. In manual mode, the user has to switch ON and OFF the microcontroller by pressing the button. The wireless network can be used to gather the data from one point to another more human energy is wasted in this system. This system only maintains plant growth and no more plant disease are not detected.

4.2 PROPOSED SYSTEM

In this system, when soil is dry moisture sensor sends information to the Arduino then the motor pump will pump the water into the soil. in addition we have 2 bulbs lights which will help to different phase of plant growth which controlled by the light sensor automatically. DHT 11 sensor which will monitor humidity and temperature. gas sensor here is to monitor the level of green house gases present on the atmosphere. these are displayed in lcd as well as in mobile. image processing is also implemented with this system for disease detection. when disease detected then that information will be shared to the microcontroller. the microcontroller will process it and will turn on the fertilizer motor connected in the hardware side. all the sensed information of sensor will be share to the concerned person's mobile through IOT.

5. SYSTEM ARCHITECTURE

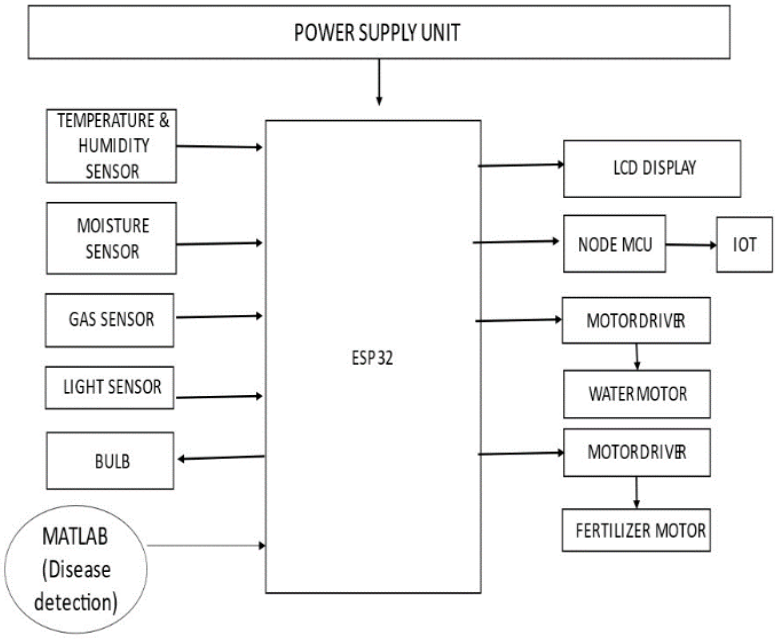

Fig.1: Shows the block diagram of IoT of IoT integrated with Matlab

The Fig.1 shows the .block diagram of IoT integrated with Matlab for detecting plant diseases and applying appropriate fertilizer. Whenever there is a change in plants or diseases affect a plant, MATLAB identifies the Disease by using digital image processing then sprays fertilizers to heal the plants from diseases. LCD display shows that whether the plant has a disease or not as its output. Motors can be automated easily by using controllers and no need of labor to turn on and off by using moisture level sensor. The sensed parameters can be uploaded in the website and it can be seen by using mobile phone. This is implemented in the Domestic house.

8. SYSTEM IMPLEMNETATION

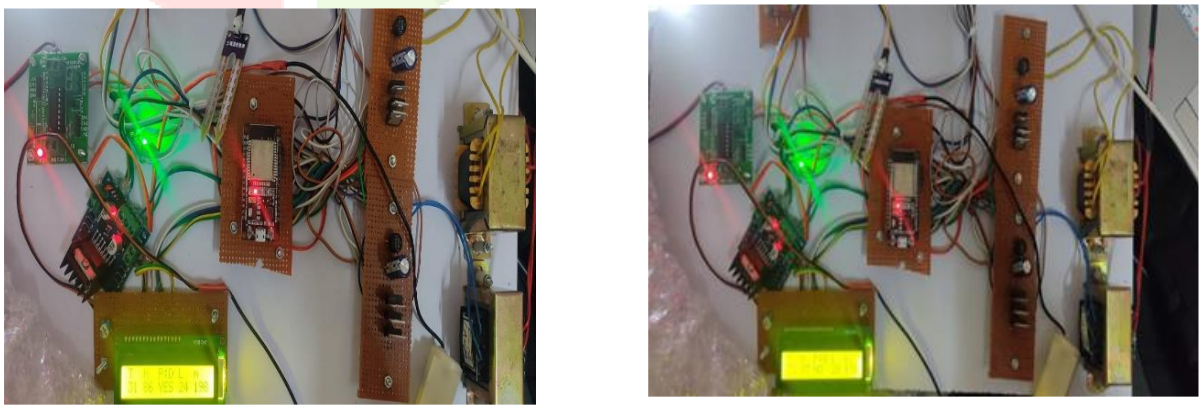

Fig.-2: Detection of Plant diseases through Smart Precision Agriculture

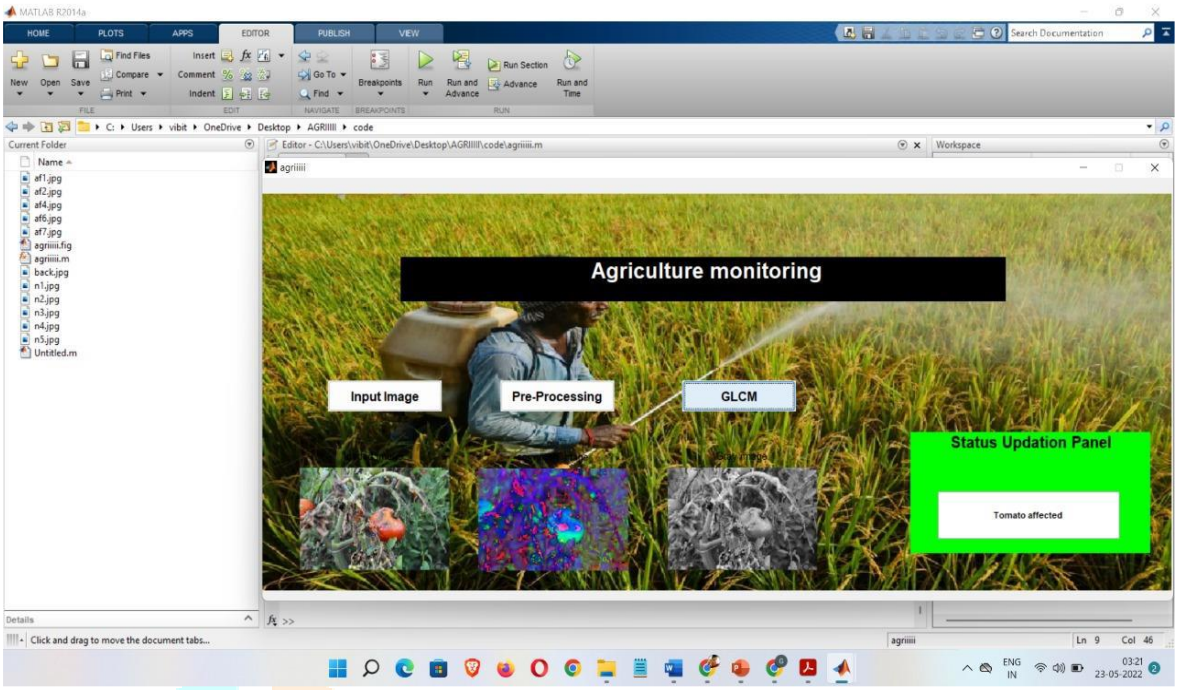

Fig.3-Identifying plant diseases using MATLAB

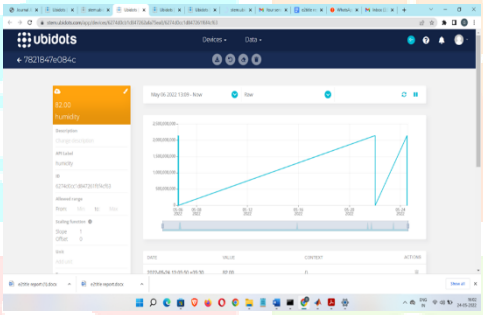

Fig.4- Humidity

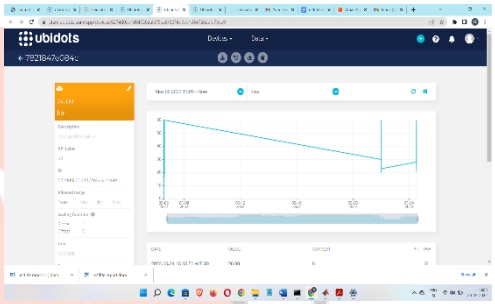

Fig.5-LDR

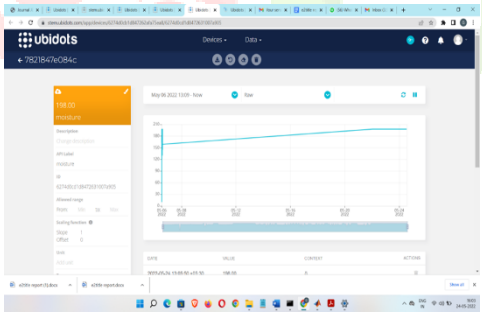

Fig.6-Moisture

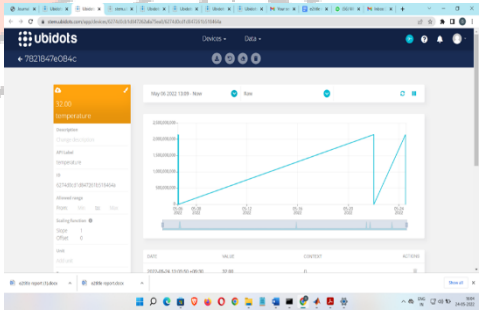

Fig.7-Temperature

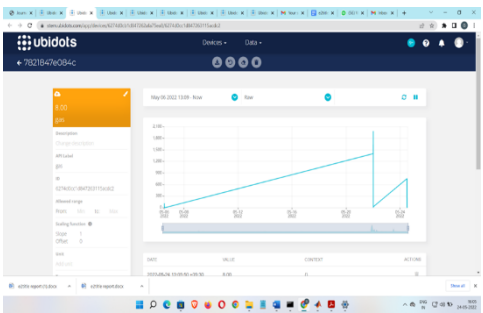

Fig.8-GAS

After the implementation of all the steps, MATLAB identifies the Disease by using digital image processing then sprays fertilizers to heal the plants from diseases. LCD display shows that whether the plant has a disease or not as its output. Fig.4 shows the presence of water in the atmosphere. Fig.5 shows the detection or presence of light. Fig.6 shows the presence of water or moisture in the ground. Fig.7 shows the level of the temperature, whether it is high or low. Fig.8 shows the presence of gases in the atmosphere. The output is sent to a third party website(www.ubidots.com) by IoT through Wi-Fi module.

9. PERFORMANCE ANALYZIS

An IOT-based system can provide data from linked devices to non-experts. We may easily collect real time information from any location using the cloud and wi-fi module.IOT makes automation easier .it's an excellent time saving device. It simplifies data retrieval.

10. CONCLUSION AND FUTURE ENHANCEMENT

This helps to optimize the water usage in the field and provides a remote controlling and monitoring for the irrigation system. Using Internet of Things concepts, the system communicates and processes data from sensors and using android application. As user interface, notification about humidity and moisture level is given to the farmer so as to control the water supplied to the farm. Digital capturing of visually observed symptoms on the stem and leaf of the plant and images processing on it is used for detecting the plant disease at an early stage. Treatment is suggested corresponding to the recognized ailment which will help farmers with low experience to prevent the vegetation.For future work, we will investigate the performance of the proposed model with long-term irrigation tests with more plants. Our initial tests were conducted in an indoor environment where temperature change. Additionally, we will extend our test bed to outdoor environments to observe the behavior of the model in different environmental conditions

REFERENCE

[1] Juan Felipe Corso Arias., Yeison Julian Camargo Barajas., Juan Leonardo Ramirez Lopez., ''Wireless Sensor System According to the Concept of Internet of Things'', International Journal of Advanced Computer Science and Information Technology Volume 3, Issue 3, ISSN: 2296-1739. 2018

[2] Montesano, Francesco Fabiano, Serio, Francesco, Signore, Angelo, Santamaria, Pietro, "Supplementary Far-Red Light Did Not Affect Tomato Plant Growth or Yield under Mediterranean Greenhouse Conditions," Agronomy, July 2020
.

[3] Pradeep Tomar, Gurjit kaur, "Aritificial intelligence and IOT-based Technologies for Sustainable Farming and Smart Agriculture" Gautham Buddha University, March 2021.

[4]. Tang, Yuanhe, Jia, Min, Mei, Yifeng, Yu Yang Zhang, "A Systematic Review on Monitoring and Advanced Control Strategies in Smart Agriculture", 2019.

[5]. F. Viani, M. Bertolli, and A. Polo, "Low-cost wireless system for agrochemical dosage reduction in precision farming," IEEE Sensors J.,vol. 17, no. 1, pp. 5–6, Jan. 2017.

[6].Zhang Xin, Huang Ronghui, Huang Weizhao, Yao Shenjing, Hou Dan &ZhengMin,"Real-time Temperature Monitoring System Using FBG SensorsimmersedPowerTransformer",DOI:10.13336/j.10036520.hve.2014.S2.04o0 Supplement2: 253-259v, Augusr31,2016.

[8]. Zhonghua Bian ,N. Jiang, Steven Grundy, Chungui Lu, "Uncovering LED light effects on plant growth LED light for improving plant growth, nutrition and energy-use efficiency," Acta Horticulturae 1227(1227):491-498, November 2018.

[9]. Xiao-hui Cheng and Yang Wang, "The remote monitoring system of transformer fault based on the internet of things", International Conference on Computer Science and Network Technology, 2016

[10]. E. Chisi, and D.F. Ferreira," Potential for potable water saving by using rainwater and greywater in a multi-storey residential building in southern Brazil" Building and Environment ,42:2512-22, 2013

[11].K.S. Narendra and K. Parthasarathy, Parthasarathy, "Identification and control of dynamical systems using neural networks," IEEE. Transactions on Neural Networks, vol. 1, DOI 10.1109/72.80202, no. 1, pp. 4–27, Mar. 1990. Parthasarathy, "Identification and control of dynamical systems using neural networks," IEEE Transactions on Neural Networks, vol. 1, DOI 10.1109/72.80202, no. 1, pp. 4–27, Mar. 1990.

[12]. Annamaria Castrignano, Gabriele Buttafuoco, Raj Khosla, Dimitrios Moshou, Abdul Mouazen, Olivier Naud, "Agricultural Internet of Things and Decision Support for Smart Farming" Elsevier Science & Technology, Pages 470 / 463, Jan 2020.

[13]. Juan Felipe Corso Arias., Yeison Julian Camargo Barajas., Juan Leonardo Ramirez Lopez., ''Wireless Sensor System According to the Concept of Internet of Things'', International Journal of Advanced Computer Science and Information Technology Volume 3, Issue 3, 2018,ISSN: 2296-1739.

[14]. X. Wang, T. Zhang, X. Xu, L. Chen, X. Xing, and C. L. P. Chen,"Eeg emotion recognition using dynamical graph convolutional neural networks and broad learning system," in 2018 IEEE International Conference on Bioinformatics and Biomedicine (BIBM), DOI 10.1109/BIB-M.2018.8621147, pp. 1240–1244, Dec. 2018.

[15]. M. Han, S. Feng, C. L. P. Chen, M. Xu, and T. Qiu, "Structured manifold broad learning system: A manifold perspective for large-scale chaotic time series analysis and prediction," IEEE Transactions on Knowledge and Data Engineering, DOI 10.1109/TKDE.2018.2866149, pp. 1–1,2018.

[16]. N. W. W. L. Nguyen HL., Woon YK., Heterogeneous Ensemble for Feature Drifts in Data Streams. Springer,Berlin, Heidelberg, 2012.

[17]. C. Mofizur Rahman, L. Afroze, N. S. Refath, and N. Shawon, "Iterative feature selection using information gain naA ̄ve for document ̃classification," in 2018 21st International Conference of Computer and Information Technology (ICCIT), pp. 1–6, 2018.

[18]. X. Peng and Y. Zhu, "A novel strategy to adjust feature weights for data classification," in 2019 12th International Congress on Image and Signal Processing, Bio Medical Engineering and Informatics (CISP-BMEI), pp.1–5, 2019.
[19]. S. G. C. of China, Q/GDW 169-2008,Guide for condition Evaluation of oil immersed power transformers (reactors). Beijing:China Electric Power Press, 2008.

[20]. L. Chun-yan, S. Yuan-zhang, C. Xiang-yi, and D. Gui-ping, "Preliminary analysis of large scale blackout in western europe power grid onnovember 4 and measures to prevent large scale blackout in china," Power System Technology, vol. 30, no. 24, pp. 16–21, 2006.

[21]. Conger, Lucy. "Delivering Water to Mexico City" Urban Age Magazine, Winter. New York ,The World Bank; 2016.
[22]. Monica, M.; Yeshika, B.; Abhishek, G. S.; Sanjay, H.A. and Dasiga, S. (2017) 'IoT based control and automation of smart irrigation system: An automated irrigation system using sensors, GSM, Bluetooth and cloud technology'.

[23]. Sukhadeve, V.; Roy, S. (2016) Advance agro farm design with smart farming, irrigation and rain water harvesting using internet of things. Int. J. Adv. Eng. Manag.

[24].Jain, S. and Vani, K.S. (2018) A survey of the automated irrigation systems and the proposal to make the irrigation system intelligent. Int. J. Comput. Sci. Eng. 6, 357–360.

[25]. Saraf, S.B. and Gawali, D. H. (2017) 'IoT based smart irrigation monitoring and controlling system'