

Smart Agriculture Greenhouse using IoT/MQTT based Gateway

Hiral R. Joshi¹ Kirit Bhalsod²

¹M.Tech Student ²Assistant Professor

^{1,2}Department of Electronics & Communication Engineering

^{1,2}Gujrat Technological University Ahemdabad, Gujarat, India

Abstract— Internet of Things (IoT) is the backbone of the change in the today's growing technological area. Basically, in the real world the things having sensor capability, sufficient power supply and connectivity to internet makes field like IOT possible. For such rapid growing technology, it is the necessity to have very light, inexpensive and minimum bandwidth protocol like Message Queuing Telemetry Transport (MQTT) Protocol. The Wi-Fi enabled ESP8266 & Atmega328 board interfaces with LM35, LDR sensor, DHT11 sensor, Soil moisture sensor and Gas Sensor which monitor the temperature, ambient light inside greenhouse respectively, humidity, and soil moisture. Collected data form sensor is in Analog data format and Atmega328 microcontroller unit will fetch the data and convert it and process it into the digital format. Therefore, collected data form specific node will have sent to IoT server where it can view and analyses by an expert. MQTT server like broker also provides the facility of monitoring through the dashboard. By analyzing the system will get the temperature, humidity and light intensity level with the respective update. According to the light intensity level the brightness of greenhouse & other parameters are controlled By Node. In this system we implement the idea for the smart Greenhouse monitoring system.

Key words: IoT, MQTT Protocol, Wi-Fi Module, Sensors

I. INTRODUCTION

With the rapid growth of the national economy, modern agriculture has been developing rapidly. The research and application of controlled agriculture are being paid more and more attention especially that the greenhouse project has become one of the important parts of the high-efficiency factory-agriculture.

The development of technology, the old farming methods cannot meet the needs of social development. So we have to update and transform the traditional agricultural technical. Greenhouse agriculture has become a major trend in the development of high-tech agriculture. Greenhouse agriculture needs to control the environmental factors to obtain the optimum growth conditions for the crop. Thus it can extend the production season to get the optimum yield. Currently, artificial management is the major way to detect and control the environment factors, wastes lots of manpower and relatively large of monitoring error, affecting the growth of crops. Providing suitable environment for the growth of crops, the system is based on the wireless sensor detection technology and embedded technology to achieve the intelligent control of greenhouse environment.

This project introduces a kind of agriculture greenhouse monitoring system which are based on Wi- Fi and. the main objective of the system is to control the climate condition as per the crop data sheet, the sensor are design for collecting information about the climate of greenhouse like temp, pressure, light, humidity and CO2.whith the help of

system will decide the action the about the control like fan control, curtain control and sprinkler.[3]

II. LITERATURE SURVEY

In this paper introduces a kind of agriculture greenhouse monitoring system which is low cost, low power consumption and constructed based on short distance wireless communication technology Zigbee. The main objective of the system is to control the climatic condition as per the crop data sheet. The sensor are designed for collecting information about the climate of the greenhouse like Temp, pressure, light, humidity and CO2.with help of this system will decide the action about the control like, Fan control, Curtin control(protect the direct sunlight and sun heat) and sprinkler (to maintain the humidity and temp). In this paper, the low cost, low power wireless technology Zigbee applies in greenhouse monitoring system. The system realizes the remote intelligent control the room equipment through internet, it improves the operational efficiency and system application flexibility by using wireless sensor network and same time reduces man power cost. the practical application approve that the gateway run fine in the greenhouse monitoring system, the environment data of greenhouse can transfer reliably, and control instruction sent timely.[4]

III. PROPOSED WORK

Insidious weather of any Green house is maintained by several of parameters like ambient light inside green house, humidity, soil moisture, temperature and CO2. After implementing this system these parameters are measured by different sensors like LDR, DHT11, Soil moisture sensors, LM35 and Gas Sensor. This data will be collected from the sensor in analog data format. So Atmega328 microcontroller unit will fetch this data convert it into digital format and process it. The collected data from that particular node will be sent to IOT server where it can be view and analyze by experts. MQTT server like broker also provides the facility of monitoring through the dashboard. By analyzing the system will get the temperature, humidity and light intensity level with the respective update. According to the light intensity level the brightness of greenhouse & other parameters are controlled By Node. In this system we implement the idea for the smart Greenhouse monitoring system his will help to collect better and exact data from greenhouse and it will also reduce men power as it can be monitored by any remote locations where user have internet connection. To send this data to internet gateway we will use ESP8266 which is operating on IEEE 802.11 (Wi-Fi) Standard. IoT server will be implemented on PHP based framework. We can place this type of more than one node in different part of green house and measure different parameters at different locations for better management of it.[5]

is high or low indicated by the LED. When the home automation, fire alert system purpose.[11]

G. GAS Sensor [12]



Fig. 6: GAS Sensor

Here we are using MQ-5 gas sensor. The gas sensor will detect the toxic gases if it is present. High sensitivity to LPG, natural gas, town gas and small sensitivity to alcohol, smoke. It is having fast response. And has a long life.[12]

V. SOFTWARE USED PROTEUS8 SIMULATOR

Proteus 8 is one of the best simulation for various circuit designs of microcontroller. It has almost all microcontrollers and electronic components rapidly available hence it is widely used simulator. The simulation of programming of microcontroller can also be done in proteus. Simulation avoids the risk of damaging hardware due to wrong design.

VI. EXPERIMENTATION & RESULTS



Fig. 7:

For future developments it can be enhanced by developing this system for large acres of land. Also the system can be integrated to check the quality of the soil and the growth of crop in each soil. The sensors and microcontroller are successfully interfaced and wireless communication is achieved between various nodes. All observations and experimental tests prove that this project is a complete solution to field activities an irrigation problem. Implementation of such a system in the field and definitely help to. [13] Improve the yield of the crops and overall production. [13]

VII. FUTURE WORK & CONCLUSION

For future developments it can be enhanced by developing this system for large acres of land .Also the

system can be integrated to check the quality of the soil and the growth of crop in each soil. The sensors and microcontroller are successfully interfaced and wireless communication is achieved between various nodes. All observations and experimental tests prove that this project is complete solution to field activities an irrigation problem. Implementation of such a system in the field and definitely help to improve the yield of the crops and overall production.

ACKNOWLEDGEMENT



Fig. 8:

It is an incident of great euphoria in submitting this dissertation phase –I report on “Smart agriculture greenhouse using IoT/MQTT based gateway”. I am very much fortunate to get opportunity to work on the dissertation as a part of our research on” Smart agriculture greenhouse using IoT/MQTT based gateway”. Man’s quest for knowledge never ends. Theory and practice are essential and complementary to each other. I am thankful for the assistance received from various individuals in making this dissertation report successfully. I find no words to express our gratitude in towards those to a consistently involved with me through on my dissertation report.

I would like to express my profound sense of gratitude to Prof. kirit bhalsod my faculty guide, who has always give me motivational boost to go and perform. I would further like to thank his for persistence to listen my problem and give appropriate solution.[14]

REFERENCES

- [1] [1] KLakshmisudha, Swathi Hegde, Neha Kale, ShrutiIyer, “Smart Precision Based Agriculture Using Sensors”, International Journal of Computer Applications (0975-8887), Volume146-No.11, July2011
- [2] Nimesh Gondchawar, Dr. R.S. Kawaka, “IoT Based Smart Agriculture”, International Journal of Advanced Research in Computer and Communication Engineering (IJARCCE), Vol.5, Issue6, June2016.
- [3] M.K. Gayatri, J.Jayasakthi, Dr.G.S.Anandhamala, “Providing Smart Agriculture Solutions to Farmers for Better Yielding Using IoT”, IEEE International Conference on Technological Innovations in ICT for Agriculture and Rural Development (TIAR 2015).
- [4] Chetan Dwarkani M,Ganesh RamR,JagannathanS,R. Priyatharshini, “Smart Farming System Using Sensors for Agricultural Task Automation”, IEEE International

Conference on Technological Innovations in ICT for Agriculture and Rural Development (TIAR 2015).

- [5] S.R.Nandurkar, V.R.Thool, R.C.Thool, "Design and Development of Precision Agriculture System Using Wireless Sensor Network", IEEE International Conference on Automation, Control, Energy and Systems (ACES), 2014

