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Smart Agriculture Using IOT

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Abstract
Greenhouse Environment or Smart agriculture , used to grow plants under controlled climatic conditions for efficient production, forms an important part of the green house and horticulture sector .To create an optimal environment the main parameters such as temperature, humidity, light intensity ,ground water ,etc. needs to be controlled. The main objective of this project work is to design an automated greenhouse which is purely sensor based system .The system inputs from various sensors and displays output .The developed system is simple, cost efficient and easily installable. The results show that the system could be more efficient in man power saving and raising the economic value of products. This asset allows the green houseer to improve the cultivation in a way the plants need. It leads to higher crop yield, prolonged production period, better quality, and less use of protective chemicals. For continuous monitoring and controlling, we are using wireless sensor network. Here the greenhouse parameters are send through the internet to the open source cloud server. The parameters can be controlled by another web-server hosted locally. This project mainly focused on user friendly UI design and automatic system.

Keywords: Greenhouse, Plants, sensor, Humidity, Horticulture, Cultivation, Crops, UI

1. INTRODUCTION

Cash crops allude to the products which return significantly more benefit to the agriculturists than the typical harvests and demands as well. In the meantime, the cultivation of such crops is not usually carried in India out because of the climatic barriers of the country and these crops need intensive care for producing the best yields otherwise can be easily affected by diseases and pests. This issue can be overwhelmed by the utilization of computerized automated greenhouse technology which can be constructed using advanced technologies of the Internet of Things i.e., IoT through various sensors, actuators, microcontrollers, etc . The automated greenhouse technology is one of the best options by which farmers can be benefitted from all over India and in this paper, we have proposed the greenhouse technology having the minimal construction cost so that it can afford by the Indian Farmers and if not then they can apply for loans from the govt available under various schemes for rural and agricultural development.

1.1 SMART AGRICULTURE

The identification of the techniques of smart farming that can give a boost to the deteriorating traditional agricultural sector. Use of smart techniques like Precision farming, efficient water management, Soil

moisture and humidity monitoring are sure-shot methods to increase yield per acre of land. Precision Agriculture avoids the improper and excess application of pesticides and fertilizers and enables the farmer to use land according to its quality and nature. Precision Farming is a potential salvager at a time when the water tables in India are diminishing at a rapid rate due to unprecedented demand by the agricultural and industrial sectors. Farmers still procrastinate or stubborn to traditional practices and delay in implementation may further decent the GDP in India.Recently skill acquired migrants all over the India who had returned to their natives during the Pandemic Covid-19 had chosen farming as their profession and are not interested go back. These migrants can now move closure to smart agriculture systems as it takes lesser time than traditional farmers to convince the adopt for the implementation of Smart agriculture system.

INTERNET OF THINGS

Internet of Things (IoT) is used for communication that may be helpful in future development, in which the objects like micro- controllers, transceivers may be used for future. The IoT aims to making Internet even more immersive and pervasive by enabling very easy access and interaction with a variety of devices like home appliances, cameras, monitoring systems, actuators, displays, vehicles, home automation, smart grids, automotive, traffic management and so on. Mobile communication technologies has beenwell established with "Anytime, Anywhere" access to information and related services. The Internet of Things (IoT) is an environment in which objects, animals, peoples or birds are providedwith unique identifiers and the ability to transfer data over a network. IoT has developed from the convergence of wireless technologies, micro - electromechanical systems (MEMS) and the Internet. This may also be called as Internet of Everything. IoT used in heart monitoring system, a farm with animal biochip transponder, automobile with sensor devices to alert the driver when vehicle tire pressure is low etc. It is also associated with machine-to-machine (M2M) communication.
IoT contains many types of applications such as fitness trackers, health monitoring system, sensor devices in agricultural field etc. Embedded system shares a typical challenges and disadvantages likeultra-low power supply, sensing, actuation, low pressure cycles, lowpower wireless devices[5]. The new technologies in Internet of Things (IoT) are enabling the citizens to participate in sensing, sharing the collection of data, monitoring process that cannot be easily measured by an individual .

2. LITERATURE SURVEY

2.1 The study and application of the IOT technology in Green House

Ji-chun Zhao ; Jun-feng Zhang ; Yu Feng ; Jian-xin Guo
2010 3rd International Conference on Computer Science and Information Technology
Year: 2010 | Volume: 2 | Conference Paper | Publisher: IEEE
In recent years, greenhouse technology in Green House is to automation, information technology direction with the IOT (internet of things) technology rapid development and wide application. In the paper, control networks and information networks integration of IOT technology has been studied based on the actual situation of agricultural production. Remote monitoring system with internet and wireless communications combined is proposed. At the same time, taking into account the system, information management system is designed. The collected data by the system provided for agricultural research

facilities.

2.1.1 Advantages

- Instant monitoring of parameters
- Increase in production
- Autonomous

2.1.2 Disadvantages

- A person has to be online to control
- Cannot monitor crop health

2.2 Internet of Things (IoT) for Precision Green House Application

Manishkumar Dholu ; K.A. Ghodinde
2018 2nd International Conference on Trends in Electronics and Informatics (ICOEI)
Year: 2018 | Conference Paper | Publisher: IEEE

Internet is experiencing a very explosive growth nowadays with the amount of the devices connecting to it. Earlier we had only personal computers (pCs) and Mobile handset connected to internet but now with Internet of Things i.e. IoT concept of connecting things with internet, millions of device are connecting with it. This development of IoT leads to the idea of machine 11 to machine communication which means that two machines can communicate to each other and also all the data which was previously with private server can now is available on internet so the user can access it remotely. Application of IoT is feasible in almost all industries particularly where speed of communication is not an issue. This paper proposes the application of cloud based IoT in the Green House domain. Precision Green House is basically a concept which insists to provide right amount of resources at and for exact duration of time. These resources can be any things such as water, light, pesticides etc. To implement precision Green House the benefits of IOT has been utilized in the proposed paper. The fundamental idea is to sense all the required parameter from the Green House field and take required decision to control the actuator. These Green House parameters are Soil Moisture, Temperature & Relative Humidity around plant, Light intensity. Based on the reading sensed by the sensor suitable action is taken i.e. irrigation valve is actuated based on soil moisture readings, valve for fogger (for spraying water droplet) is actuated based on the Relative humidity(RH) readings etc. This paper proposed the development of the sensor node capable of measuring all these parameter and creating the actuation signal for all the actuator. On top of that sensor nodes are also capable of sending this data to cloud. An Android
Application is also developed in order to access all these agricultural parameter.

2.2.1 Advantages

- Decision making can be done remotely
- Reduces human labour • Online monitoring
- No need of testing in labs

2.2.2 Disadvantages

- Constant linking with internet is needed
- Not suitable for all type of minerals

3. EXISTING SYSTEM

3.1.1 Applications of GSM in Green House

The current methods use gsm for precision Green House. The paper discusses possible solution in reduction of transport cost for agricultural products, also predicts the prices of crop based on past information and present market scenario. It also gives a solution of reducing middle mans who normally tends to get more profit share than producers and consumers. This solution helps to bridge a communication gap between farmers and agricultural product buyer. The author explains the need of wireless sensor network in the agricultural field so as to increase the productivity. Author also explains the need of precision Green House in current scenario of Green House particularly in India. This paper shows the architecture for analyzing and monitoring of the environment parameters.

3.1.2 Global System for Mobile Communication

GSM (Global System for Mobile Communications, originally Group Special Mobile) is a standard developed by the European Telecommunications Standards Institute (ETSI) to describe the protocols for second-generation digital cellular networks used by mobile devices such as tablets, first deployed in Finland in December 1991. As of 2014, it has become the global standard for mobile communications – with over 90% market share, operating in over 193 countries and territories One of the key features of GSM is the Subscriber Identity Module, commonly known as a SIM card. The SIM is a detachable smart card containing the user's subscription information and phone book. This allows the user to retain his or her information after switching handsets. Alternatively, the user can also change operators while retaining the handset simply by changing the SIM. Some operators will block this by allowing the phone to use only a single SIM, or only a SIM issued by them; this practice is known as SIM locking. 13 Patents remain a problem for any open-source GSM implementation, because it is not possible for GNU or any other free software distributor to guarantee immunity from all lawsuits by the patent holders against the users. Furthermore, new features are being added to the standard all the time which means they have patent protection for a number of years. The original GSM implementations from 1991 may now be entirely free of patent encumbrances, however patent freedom is not certain due to the United States' "first to invent" system that was in place until 2012. The "first to invent" system, coupled with "patent term adjustment" can extend the life of a U.S. patent far beyond 20 years from its priority date. It is unclear at this time whether Open BTS will be able to implement features of that initial specification without limit. As patents subsequently expire, however, those features can be added into the open-source version. By this everyone can get accessed there is no security. The garbage filling level is only get monitored through the GSM Modem. Sensors are used to identify the garbage level and it does not take any action by itself. The manual operations can get delayed sometimes due to the absence of the monitor. It

creates unhygienic condition for the people and creates bad smell around the surroundings this leads in spreading some deadly diseases & human illness. Due to this environment become unhygienic. Lot of diseases can get spread over the environment because of unhygienic environment.

3.1.3 Advantages

- Getting an sms alert about the mineral level
- Switching the motors through mobile
- Remote monitoring

3.1.4 Disadvantages

- Online monitoring of corresponding parameter is notavailable
- Minimal user interface
- Instant measuring cannot be done.

3.2PROPOSED METHOD

3.2.1 Automatic Soil Parameter Monitoring And Analysis Of Irrigation System In Green House Using Iot

In this work low cost soil moisture sensors and mineral sensors are used. They continuously monitor the field and send it to the web server using ESP8266 transmitter and receiver and Ethernet connection at receiver ends. The sensor data are stored in database. The web application is designed in such a way to analyze the data received and to check with the threshold values of moisture and magensium. The decision making is done at server to automate irrigation. If soil moisture is less than the threshold value the motor is switched ON and if the soil moisture exceeds the threshold value the motor is switched Off. This method can also be used in green houses where in addition light intensity control can also be controlled and automated. The system design is represented in Fig. 3.1

BLOCK DIAGRAM

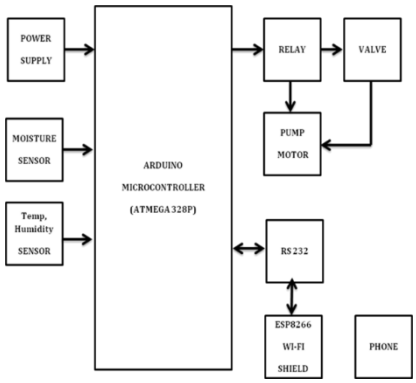


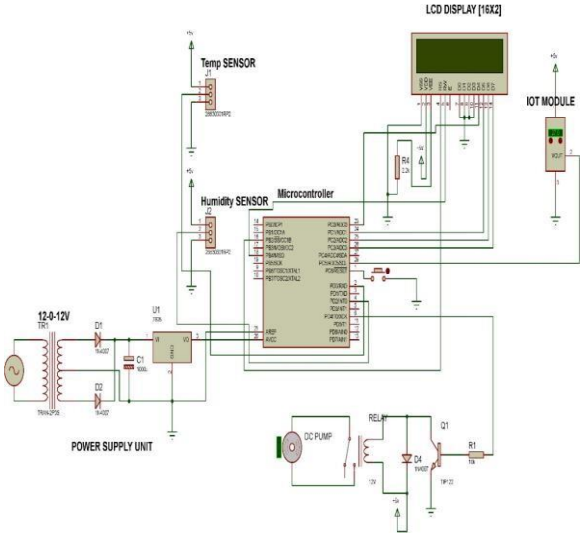
Fig 3.1

3.2.2 THEORY OF OPERATION

The sensors monitor the level of moisture and temperature. The microcontroller processesthe data from the sensor and itsends information to the authorized person via IoT .In this system, automatically opens

and closes the motors containing the water and mineral. The LCD displays the parameters such as the moisture level and mineral level. The power supply block gives a regulated dc supply to the sensors and the microcontroller. Here we have used the atmel microcontroller Atmega8. The lcd s data pins and the control are connected to the microcontroller.The relays are used to switch on / off the motors. The switching of the relays is done with the help of the transistors.

3.2.3 CIRCUIT DIAGRAM



4. FUTURE ENHANCEMENT

In future, this idea can be implemented with more sensors and applications like seed sowing and weed removing. Green House can be automated in all aspects. A web server is also been set up through which the other farmers also get information about the crops in their area. This project came in comfortable which a worthy elucidation for maintaining farming environment. This model is providing lot of opportunity in improvement and future development. All the components and controlling units can be precised.

5. CONCLUSION

Precision Green House can be made more accurate and efficient with IOT enabled technologies. IOT can be applied in different domains of Green House. With the help of IOT, use of effective energy for pumps, boosters, lighting and other purposes also done the second one is the crop monitoring. By deploying sensors in the crop field which is connected to the internet for an appropriate decision can be taken with IOT. Efficient use of fertilizers can be made with IOT. Finally conclude that need to develop on optimal Agri- IoT architecture which is enclosed with low cost, low power consumption of devices, better decision making process, QoS service, optimal performance and it is easy to understand the farmer without knowledge.

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