Field Monitoring and Irrigation Automation using Robot based On IOT

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Abstract : - **Internet of thing is the newest technology which is used for different human needs. IOT is basically where the number of things is communicating with each other through the internet. Up till now, many efforts took on developing cost-effective and proper irrigation technique. For assistant of farmer different field monitoring methods developed so far. Irrigation automation is the main aim of many efforts. Different sensor based technique used and different controllers are used. This paper focuses on two concepts field monitoring and irrigation automation. Temperature, humidity, and light intensity this parameter is observed using temperature, humidity sensor, and light sensor respectively. Data is checked, stored and transmitted to the cloud using a raspberry pi. For irrigation, the robot is used which consistently measure soil moisture with irrigation automation.**

Keywords: irrigation, raspberry pi, agrirobot, IOT, field monitoring

I. INTRODUCTION

Agriculture is the primary source of income of the most of the people in India. This sector has the huge contribution to an economy. Precision agriculture is the concept arisen which is the use of new technology of electronics for agricultural development. Production improved by this techniques. WSN also one of the technologies used in agriculture. Crop field monitoring in past depends on the manual system. An Observation was the main source of this monitoring. The Manual system is incorrect.

Farming based on the rain is the direct water feeding of water from rainfall. Rainfall in India is uncertain. There are lots of problems when rainfall is reduced. On another side, water supplied in an artificial way increase the risk of contamination of food products. Irrigation is the water supplied in an artificial way to the soil by various means ie .pumps, tubes, water pumps.

Irrigation water has available in different forms like groundwater, wells, surface water, through rivers, lakes, or reservoirs, or even other sources, such as treated wastewater. So now there is increasing demand for storing water.

A. Importance of irrigation:

1. Irrigation provides moisture that is necessary for plant growth
2. Proper irrigation increases crop yield.

B. Irrigation methods

There are different techniques available for irrigation. These methods are different from each other. These methods based on how the water distributed in the field. Irrigation is the process of providing water to plant. It must be according to need. Amount of water have must not be less or more. Water for irrigation available in the form of many natural resources

Surface Irrigation:

This is the one of the traditional method used for irrigation. Water is supplied from one end of land and water flows according to gravity.

Flow irrigation:

I n this method, water is stored on heights. When there is need of water for irrigation water starts flowing automatically in down word direction.

Sprinkler irrigation:

In this method, The pipe is supplied amount of water. A Sprayer is used for spraying this water to the crop. The Sprinkler sprays this water directly onto the crop with high pressure. This reduces the wastage of water.

Drip irrigating:

This is the most is low water usage method of irrigation. The water is supplied through pipes to the near of root zone drop by drop

Flow irrigation:

In this method, water is stored on heights. when there is need of water for irrigation water starts flowing automatically in down word direction.

Literature Survey

We will focus the different efforts crop field monitoring and irrigation mechanism

The motto of proposed system by Rajalakshmi et.al.[1], is to build crop field monitoring and irrigation automation using IOT technology. Use of IOT technology is used for data storage is the advantages of this system. Two part of this system of data acquisition and wireless data transmission. For data sensing purpose different sensors are used. All the sensors are low-cost sensors. Arduino microcontroller is used for data processing. the wireless transmission was used for sending this data on a server. A separate module is used for this transmission.nRF2401L is the module used for the wireless transmission.

In paper [2]Automated irrigation system is developed to reduce water usage. In this system moisture sensor and temperature sensor are used. These two networks are available in the form of the distributed wireless sensor network. This network is placed in the root zone of plants. Information sensed by the sensor is given to gateway unit. These units handle and process the information. After that actuator activated and this data sent to the web application. This works on solar power

The system proposed by, et al. [3], in which water quantity measurement is an important factor. In this system water quantity needed for irrigation is measured. Water management in cultivated field done by this system. The historical data and climatic value change considered. Also, one method is used for managing energy of sensors. This model uses threshold for data collected to minimize sensors energy.

The system proposed by et al. [4], Microcontroller based plant irrigation system developed. In this system, soil moisture sensor was used. This sensor senses the moisture level of the soil. For controlling purpose Arduino board used in system This board is programmed by Arduino software along with this temperature sensor also used for temperature measurement. This two sensor placed at the root of the plant. Sensors information is given to microcontroller. The value of moisture sensor decides the on-off of the pump. GSM send the
information user

This system was designed for making measurement and recording air and soil temp status in cropped fields automatic. This microcontroller is an important part of this system. Clock sensor power and the digital temperature is handled by the microcontroller.[5]

In this paper et.al.[6]of a system for irrigation automation is developed. The microcontroller used in this system. Solar power was used in this system. Sensors sense moisture level continuously. After that, this information was given to farmer through SMS. This allows the farmer to control motor through a cellular phone. If the moisture level falls to turn off without confirmation of farmer[6]

This System uses ARM controller and GSM module. This is real-time irrigation system. For sensing moisture level sensor placed at the root of the plant. GSM does the important function of communicates. In real time this system detects variation in climate condition. Set of Attention command used for sending this information to the user in the form of SMS and GSM modem is. Most of the functions of GSM model is controlled by this commands. [7]

In the paper, wireless sensor network and internet are used for automatic irrigation. The main aim of this system is to reduce cost and water usage. The data is obtained through the sensor placed in the farm. This information stored at center monitor and also passes to data collection interface and then transmits to the wireless sensor node. Using internet and information we can control the system. [8]

In this paper, improvement in remote sensor systems was utilized as a part of observing different parameters in agribusiness. In this unique situation, because of the headways in little scale sensor gadgets with remote advances, one can remotely screen stickiness, temperature and dampness. In this paper it was proposed to actualize a remote sensor organize associated with unified essential hub utilizing ZigBee, which was Central Monitoring Station (CMS) through Global System for Mobile (GSM) technologies or General Packet Radio Service (GPRS). The system acquires Global Positioning System (GPS) parameters identified with the field at that point exchanges them to a focal observing station. This framework was dared to assess soil conditions and act as needs be keeping in mind the end goal to help agriculturists. This framework infers checking different factors, for example, moistness, soil dampness and give remote observing utilizing ZigBee which sends information remotely to a local server which gathers information store it and enables it to be shown as required and furthermore be sent to the customer versatile.[9]

Different sensors are used in this system. Soil moisture sensor, temperature, humidity sensor and water level sensor used for monitoring. ARM controller is used for controlling purpose. If moisture level falls automatically supply water to plant. Relay and motor is used for this purpose. Other sensor are mounted at the deft of field near root zone of plant. Moisture sensor provide range of 3.3 to 5 volts.GSM is used for sending SMS to user.[10]

In this paper field monitoring done with the field server sensor. The field server is an internet-based observation robot It is placed in the field. This is one of the methods of monitoring environmental parameter in real time. The data can be collected from sensors. After that, it is published on the internet. Web server and A to D converter are used. The camera also used at fixed center.[11]

This paper introduces new concept aggriboat is introduced. A robot is used in agriculture for doing different processes. The main of this paper to reduce manpower, to increase the speed of work. This robot performs the different operation like plowing the seeds, sowing seeds, and sowing seeds.[12]

PROPOSED SYSTEM

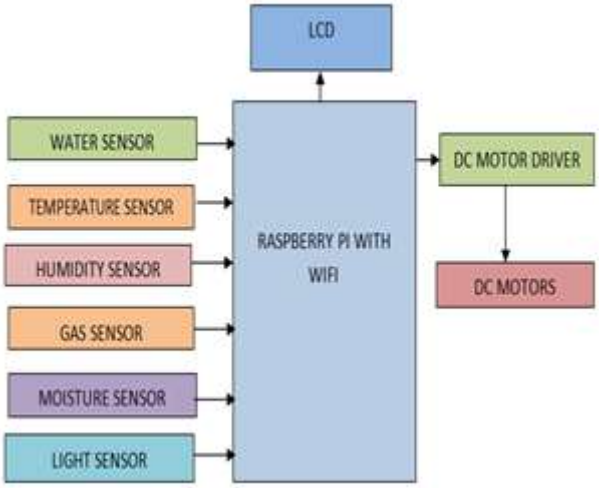


Fig. Block diagram of the system

Our system has three important parts

1..Field monitoring using sensors
2.Irrigation using agrirobot
3.Wireless data transmission

1.Field monitoring using sensors

a. Temperature and humidity sensor-

DHT11 is the common sensor used for monitoring. both parameters temperature and. Humidity .measurement of this parameter is important for plant growth. As we know temperature plays important role in plant growth. Change in temperature in a large manner may affect plant growth. Every plant has its ideal temperature range.

Humidity is the measure of moisture in the air. Humidity is important in maintaining moisture and temperature. we can maintain this humidity with the help of artifice techniques. the Humidifier is the example of this. Another method is grouping plant together. DHT11 temperature and humidity sensor are shown in Fig.

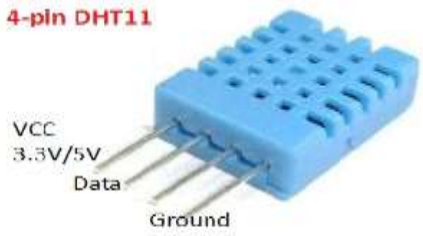


Fig.DHT11 sensor

b. Light sensor

Light is the second important part related to plant growth. The light sensor is used for sensing light intensity. The most important metabolic process is photosynthesis. Light energy is the important source of this process. Plant food, leaf color, and flowering these factors are dependent on light Intensity. Plant grow better in bright light as compared to low light. The need for light intensity is differing from plant to plant. The plants are classified as low high and medium level on the basis of need of light intensity. Methods of light intensity increment manually incandescent or fluorescent lights.

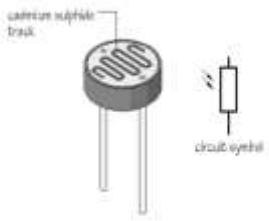


Fig. 4. Light Dependent Resistor

c. Gas sensor

The gas sensor used for monitoring element needed for plant growth.

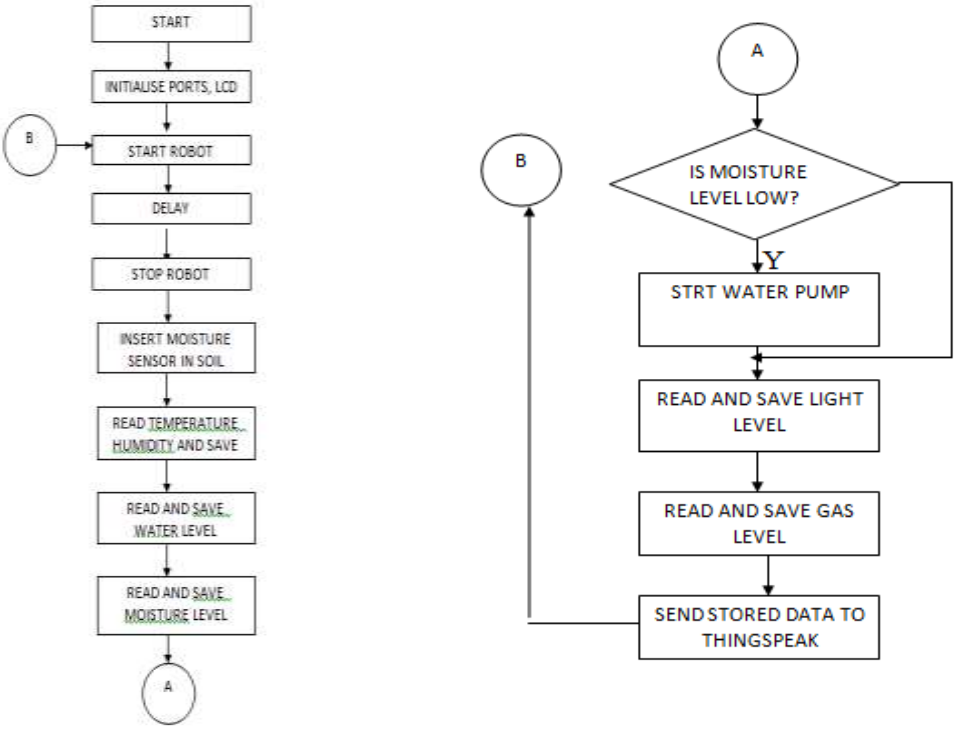
2. Irrigation using the robot.

Three components of this system Soil moisture sensor, water level sensor, and motor.

A robot is used to take the automation system ahead. This robot has soil moisture sensor connected to it. On this robot water tank placed. Water level sensor is inserted into the tank to continuously check the water level in the tank. A motor is attached to the tank. This robot goes near to each plant and moisture sensor automatically moves in the downward direction.

Soil moisture sensor is a typical sensor which has two probes .information of soil moisture sensor is given to the raspberry Pi sensor in this system raspberry, pi 0 model is used
Raspberry Pi 0.
The Raspberry Pi Zero is the smallest, thinnest, most-affordable Pi ever.
This raspberry pi has wifi inbuilt The Information was given to raspberry pi sent to a server using this wifi. when moisture level goes low then motor automatically turn on.

FLOW CHART



Conclusion

This approach for measuring the soil parameters is used for the efficient plant growth. Measurement is more reliable. The important parameters of the soil such as moisture, humidity, and other value are checked by the respective sensors. The measured parameters are transmitted to the cloud through the raspberry pi Wi-Fi. And the output is displayed on the web server using the web browser.

References

[1]. Rajlakshmi, Mrs. S Devimahalaksmi, "IOT based crop field monitoring and irrigation automation,"

[2]. Joaquin Gutirrez, Juan Francisco Villa-Medina, Alejandra Nieto-Garibay, and Miguelngel Porta- Gandara Automated Irrigation System Using a Wireless Sensor Network and GPRS Module IEEE 2013 K.

[3]. Stefanos A. Nikolidakis, Dionisis Kandris, Dimitrios D. Vergadoschristos Douligeris A"Energy Efficient Automated Control Of Irrigation In Agriculture By Using Wireless Sensor Networks, Computers, And Electronics In Agriculture "0168- 1699/ 2015

[4]. Venkata Naga Rohit Gunturi, "Micro Controller Based Automatic Plant Irrigation System" International Journal of Advancements in Research & Technology, Volume 2, Issue4, April-2013

[5]. D. K. Fisher and H. A. Kebede, "A low-cost microcontroller-based system to monitor crop temperature and water status," Comput. Electron. Agricult., vol. 74, no. 1, pp.168–173, Oct. 2010.

[6]. Jia Uddin, S.M. Taslim Reza, Qader Newaz, Jamal Uddin, Touhidul Islam, and Jong-Myon Kim,"Automated Irrigation System Using Solar Power" ©2012 IEEE

[7]. Ms. Sweta S. Patil, Prof. Mrs. A.V. Malvijay, "Review for ARM-based agriculture field monitoring system", International Journal of Scientific and Research Publications, Volume 4, February 2014.

[8]. Zhang Feng Yulin University Yulin University tfnew21sina. " Research on a water-saving irrigation automatic control system based on Internet of things Institute of Information Technology", 2011 IEEE

[9]. Implementation of Wireless Sensor Network for Real-Time Monitoring of Agriculture. International research journal of engineering and technology (IRJET). Volume: 03 issue: 05 | May-2016

[10]. Ashwini Raut, Mrunal Panse, Darshana Chaware, Aniruddha Koparkar" Sensor Based Automated Irrigation System", International Journal of Engineering Research & Technology, ISSN: 2278-0181, Vol. 4 Issue 05, May-2015

[11]. K. Honda, A. Shrestha, A. Witayangkurn, et. al., "Fieldservers and Sensor Service Grid as Real-time Monitoring Infrastructure for Ubiquitous Sensor Networks", Sensors, vol. 9, pp. 2363-2370, 2009.

[12]. K Durga Sowjanya, R Sindhu, M Parijatham, K Srikanth, P Bhargava, "Multipurpose Autonomous Agricultural Robot," International Conference on Electronics, Communication and Aerospace Technology

[13]. Chung L. Chang "Zigbee-assisted Mobile Robot Gardener", Senior Member, IEEE, and Jia H. Jhu IEEE - 2013.

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