IOT BASED AUTOMATION IN AGRICULTURAL FIELD

[1]Yuvraj N. Mali, [2]Sourabh S. Jog, [3]Pratik S. Kumbhar, [4]Prof. Anushka D. Kadage

[1, 2, 3]B. Tech Student, [4]Assistant Professor
[1, 2, 3, 4]Department of Electronics & Telecommunication Engineering,
DKTE Society's Textile and Engineering Institute, Ichalkaranji, Maharashtra, India

Abstract: **The lack of rain water and scarcity of water in reservoirs and poor conservation mechanisms of water affects the production of food products. This motivates us to do an extensive research for conserving water in agriculture. The advancements in wireless sensor network help to sense several factors like soil moisture, temperature and humidity. Thereby deploying sensors in agriculture fields to monitor we can conserve water for irrigation. This paper briefly explains the Automated Irrigation System using Soil Moisture Sensor. This paper is also explains about greenery protection from the birds by using ultrasonic sensor. In the proposed system, the data of the moisture content updated for regulating the water pump. This paper will give a clear knowledge about the suitable method for the better irrigation and granary protection.**

Keywords**: Temperature, Humidity, Granary Protection, Automatic Irrigation, User Friendly Application**

1. INTRODUCTION:

The continuous increasing of food demand requires the improvement in food production technology. The food production requires continues monitoring and protecting of crops for irrigation with the help of humans. This continuous monitoring by humans is not possible for all the time. Hence automatic irrigation and protecting system is a suitable one which helps to irrigate the crops without the help of human intervention. This system will have continuous monitoring that helps better production.

Automatic irrigation system is a new model developed using advancement in communication technology. This system will monitor the soil moisture and environment temperature using wireless sensor networks. The sensed information are send to a centralized computing server for making computation and to report the need of irrigation based on the values received from the sensors. When the soil requires water the microcontroller instruct the motor pumps to supply water in the field. The most commonly used soil moisture tester and temperature sensor dht11 is employed for sensing the data from the field. The most popularly used microcontroller Raspberry pi is used for processing the sensed information and regulating the water pipe. The Raspberry pi is constructed with Wi-Fi and Bluetooth. To have a good system for irrigation; it can be updated with various technologies. In this paper, we have discussed several methods for the maintenance and better irrigation of crops. This paper is organized as follows section 2 gives an overview of Automatic Irrigation System. The greenery protection method is given in section 3. The section 4 gives the proposed method of Automatic Irrigation system finally conclusions and future enhancements are given in section 5.

The main aim of the project is to reduce the wastage of water and protect the crops from the birds. In agricultural field 56%of water is wasted due to improper irrigation systems and improper conservation system.

Fig1.(a)Water wastage in farm

Fig1.(b)Birds eating the granary

Objectives of developed work are,

1. To update farmers with the new technology and to avoid manual labour.
2. To reduce wastage of water and enhance productivity of crops by providing them ideal condition.
3. To meet the difficulties such as severe weather conditions and advancing climate change, and environmental consequences resulting from intensive farming practices.
4. Design a model and connect it to the android app and cloud server.

BLOCK DIAGRAM:

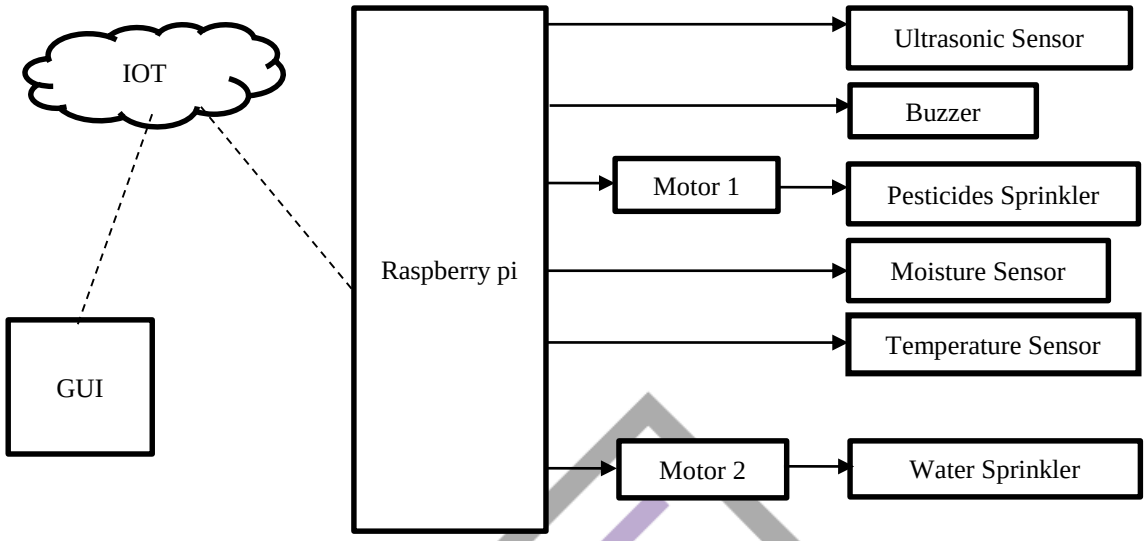

Fig 2.Block Diagram of proposed project

A block diagram reveals in which scenario the automation irrigation system works. The moisture and temperature sensors are employed in the agricultural field for sensing the level of moisture and temperature of the soil. The sensors are integrated with the single chipped microcontroller which is used to calculate and process the data from the sensor. The sensed information is send to the microcontroller in the form of digital signals. The microcontroller processes the digitalized data and takes relevant actions to regulating the water pump. If the processed data of the soil moisture is low, the motor is indicated by the microcontroller to turn on the water pump.

A. Sensor

The sensor is electronic equipment employed to identify and react to the natural phenomena and takes it as their input. The input such as moisture, pressure, temperature, heat and light. The signals are generated as the output of the signal which is in the form of human-readable format to the specified location is transmitted through a network for further analysis or processing. In this paper the two sensors are used majorly for sensing which are listed below.

B. Soil Moisture Sensor

Soil moisture sensor is used for the measuring of the water content in the soil. The traditional quantities description of the soil requires a various methods such removing drying etc., but the soil moisture sensor indirectly measure the water level of the soil by using the another set of property such as electrical resistance, dielectric constant or the synergy of the neutrons. The soil moisture may vary according to the temperature, soil type and the electrical conductivity. The set of moisture sensor will help to find out the potential of the water, hence this type of sensors called soil water potential sensors.

C. Temperature Sensor

Temperature sensor senses the temperature from the various range of physical body. It is one of the main thing had often calculated. The sensing of the temperature using temperature sensor is done by two ways either by direct or indirect method. The direct method is done by made a contact with the source and the indirect method is done without contacting the source body instead of that using radiated energy of the source. In this project, we are using DHT11 which is the temperature sensor. It consists of four pins, the first pins is used for the voltage supply, the second pin is used as the output pin, the third pin is considered as NULL pin and the last pin is used for the ground supply.

FLOW CHART

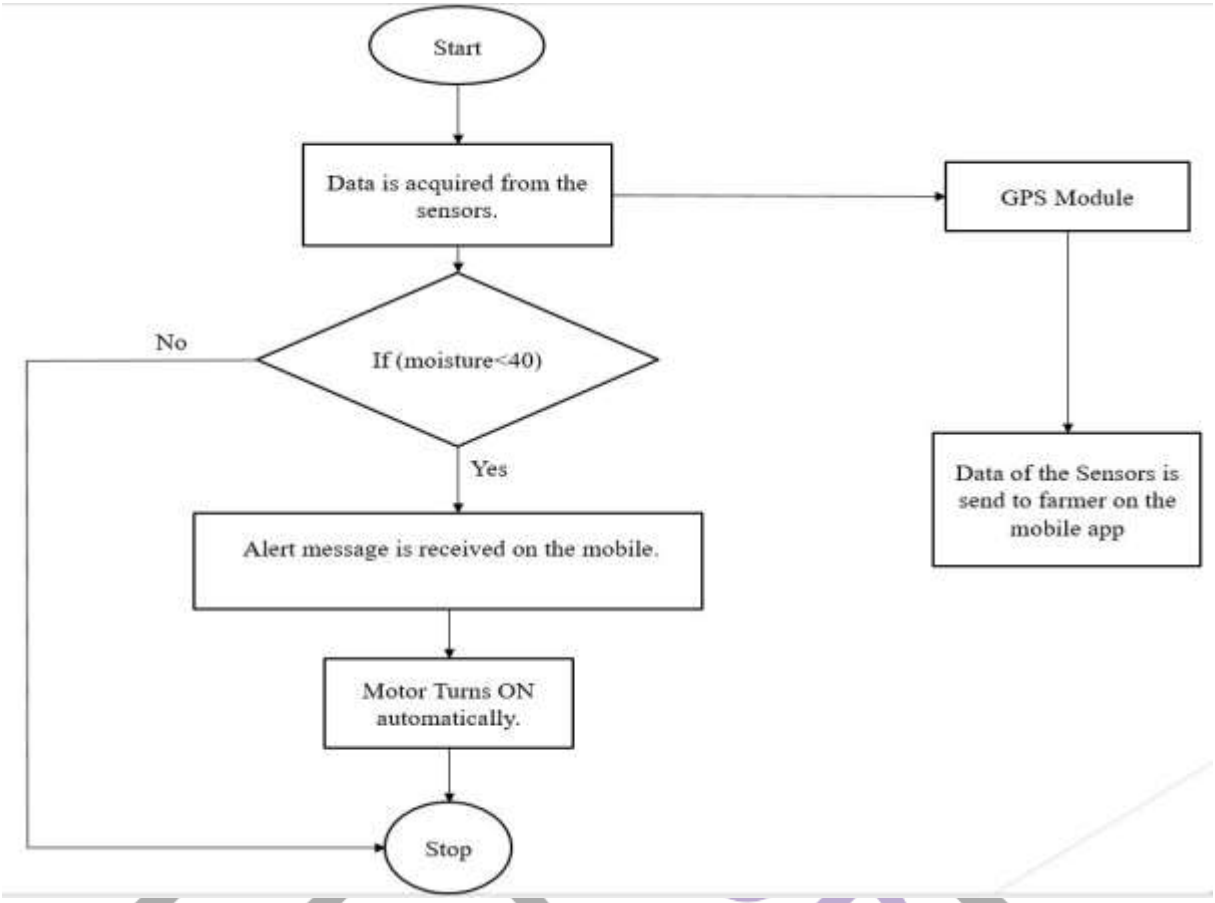

Fig 4.Flow chart of proposed project

3. GREENERY PROTECTION

In agriculture only food production is not important; food protection is also important. In this our project there is a new method invented using ultrasonic sensor. We have placed ultrasonic sensor in different section of farm in different angles by which it can cover whole farm. There is buzzer connected in the assembly for making frightening sound. When the farmer not present in farm and birds or any object detected by the ultrasonic sensor then it will send signal to microcontroller and microcontroller send signal to buzzer. Due to buzzer sound birds will flew away and granary protected.

Fig 5. Birds are detected by ultrasonic sensor

4. METHODOLOGY

Automatic Irrigation System is used to irrigate the land without the help of manpower. It works by using soil moisture and temperature sensor (dht11). The Wireless Sensor Network is employed in the field for sensing the moisture and temperature of the soil. The Raspberry pi used for processing the sensed data from the sensor. The data manipulation is done by the centralized Server. In the Automatic Irrigation System, The soil moisture tester and the temperature sensor are connected by connecting wires. The connection between the microcontroller and the sensor is done by connecting the ground of the microcontroller and the sensor, the

power supply will be given to the Vcc pin of the Raspberry pi and the A0 pin of the microcontroller and the sensor are connected. When the moisture of the soil is below the threshold value, the sensor intimates the microcontroller to switch ON the valve. After reaching the threshold value, the sensor intimates the controller to switch OFF the pump. The routine activity of the irrigation is send to the user. The Wireless Sensor Module consists of Soil Moisture Tester and Temperature Sensor. The soil moisture and temperature sensor are used for sense the moisture and temperature of the soil. These two sensors are dipped in the crop field for continuous monitoring of soil moisture and temperature of the soil. This sensed data will be send to the microcontroller for further processing of the sensed data from the sensor.

The second motor is connected to the pesticide sprinkler. We can spread pesticides as per our requirement. We are used below pesticides for different crops. We meet some farmers in our area and get the information about different crops. In our project we take only one crop and as per crop requirement we set the pesticide parameters. Sometimes after heavy rain we need to spray pesticide immediately on some crops. This requirement is also fulfilled by this our project. In our application there is a button provided for user to turn on and off the pesticide motor.

CROP	PESTICIDE
Wheat	Organophospate
Carrot	Boscalid
Grapes	Dicloran
Beans	Pyraclostrobin
Rice	Malathion

Table 1.crop and pesticides

A.CONTROLLING UNIT: The control unit consists of microcontroller which controls the execution of operation and the sensing unit consists of different sensors such as DHT11 sensor and soil moisture sensor. The microcontroller used in this project was the Raspberry pi .The DHT11 sensor and soil moisture sensors are interfaced with the Raspberry pi which is developed with inbuilt Wi-Fi. The readings from the temperature sensor are in analogue form. These can be converted into digital form by using ADC converter which is internally present in the microcontroller. The Wireless Sensor Unit operates as a closed loop operation to the system. The microcontroller interfaced with the relay for controlling the switching ON/OFF the motor. The microcontroller gets the sensed value from the Wireless Sensor Network and compares the sensed data with the pre-defined threshold value. If sensed data exceeds the threshold value, the microcontroller controls the motor to Switch OFF. If sensed data is below the threshold value, the microcontroller controls the motor to Switch ON.

B. SENDING MESSAGE USING GSM: The GSM module is interfaced with the output of the microcontroller. The microcontroller sends message to the user. The microcontroller sends an alert SMS about the value of the temperature or soil moisture from the sensor unit to the end user. The irrigation actions done by the microcontroller and also sending to the end user. Message is sending on the Blynk Android application.

Benefits of IoT in Agriculture

1. IoT empowers simple gathering and the executives of huge amounts of information which is gathered from sensors used and with the help of joiningof distributed evaluating administrations such as cloud storage, farming field maps and more information can be retrieved from any place and everywhere which enables live monitoring and connectivity which is end to end.
2. IoT is viewed as an important segment for smart farming because with precise use of sensors and also the smart gadgets, farmers could expand the output by 72% up to year 2050 as delineated by specialists.
3. By the use of IoT creations expenses could be diminished to an astounding dimension that would thus expand productivity and survivability.

SIMULATION RESULTS:

Fig 6. (a) Virtual pin assigned in blynk app

Fig 6. (b) Barcode for clone user

Fig 6.(c) User Interface

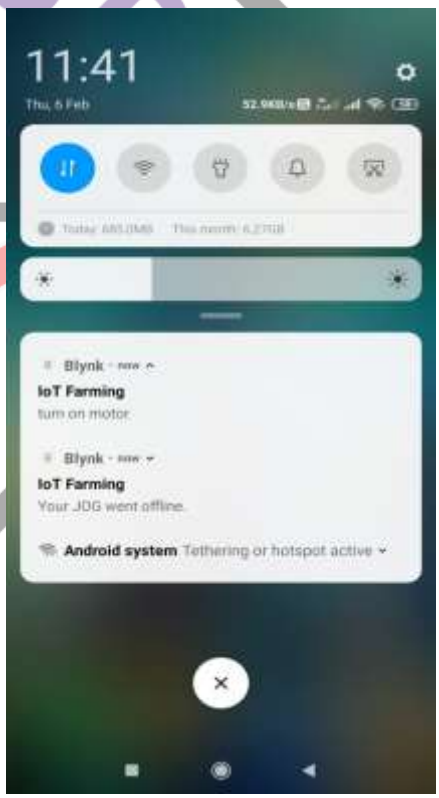

Fig 6.(d) Alert message on app

5. CONCLUSION

The Internet of Things is one of important emerging technology in all the field in our life.The agriculture is emerging as the backbone of the country. From our ancient days, irrigation is carried out by traditional methods. Now, the irrigation is carried out by the automation systems. The proposed Automated Irrigation System is designed for the welfare of the farmer. This system is said to be a real time feedback control system which helps to irrigate the land in an efficient manner. This system is Very reliable and user- friendly. This System can be used at anytime from anywhere. The moisture and temperature sensor will be monitored in the base station. The employing of wireless network and mobile communication reduces the regular monitoring of the field. The employing of Bluetooth helps in eliminating the SMS charge within short range of area. The proposed system is scalable that can deduct other such parameters such as nitrogen content and CO2 level to the multiple users by updating the wireless sensor networks. Also the greenery protection method is new invention. By using this method we can protect the crops.

ACKNOWLEDGEMENT:

We would like to express our heartfelt gratitude to our project coordinator **PROF.A.D.KADAGE** for her guidance, invaluable support and encouragement throughout the project. We would also like to thank our Head of the Department for providing us this opportunity to work on a project .This project would have been impossible without our project guide and we want to extend sincere thanks to her for her guidance and constant supervision as well as for providing necessary information regarding the project. We would also like to express our gratitude towards our parents and our college for their kind co-operation and encouragement which helped us in completion of this project. Our thanks and appreciations also go to our colleague in developing the project and people who have willingly helped us out with their abilities.

REFERENCES:

[1] R.Suresh, S.Gopinath, K.Govindaraju, T.Devika, N.SuthanthiraVanitha, “GSM based Automated Irrigation Controlusing Raingun Irrigation System”, International Journal of AdvancedResearch in Computer and Communication Engineering Vol. 3, Issue 2, February 2014.

[2] Pavithra D.S, M. S .Srinath, “GSM based Automatic Irrigation Control System for Efficient Use of Resources and Crop Planning by Using an Android Mobile”, IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE) Vol 11, Issue I, Jul-Aug 2014, pp 49-55

[3] S.P.Maniraj, Tanya Chaudhary, Akanksha Agarwal, Nandini Kishore, Vaibhavi Verma “Irrigation Management System Using Soil Moisture Sensor and Arduino” Journal of Network Communications and Emerging Technologies (JNCET) Volume 8, Issue 4, April (2018)

[4] Joaquín Gutiérrez, Juan Francisco Villa-Medina, Alejandra Nieto-Garibay, and Miguel Ángel Porta-Gándara “Automated Irrigation System Using a Wireless Sensor Network and GPRS Module ” ieee transactions on instrumentation and measurement, vol. 63, no. 1, January 2014

[5] N.V.Gowtham Deekshithulu, G. Ravi Babu,R. Ganesh Babu and M. Siva Ramakrishna “Development of Software for the Microcontroller Based Automated Drip Irrigation System Using Soil Moisture Sensor” International Journal of Current Microbiology and Applied Sciences ISSN: 2319-7706 Volume 7 Number 01 (2018)

[6] Gautam, I., and Reddy, S. R. N., “Innovative GSM-Bluetooth based remote controlled embedded system for irrigation”, International Journal of Computer Applications, Vol. 47, No. 8, 2012, pp. 1.

[7] Purnima, S.R.N. Reddy “Design of Remote Monitoring and Control System with Automatic Irrigation System using GSM-Bluetooth” ,International journal of computer Applications Volume 47– No.12, June 2012