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IOT IN SMART IRRIGATION

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Abstract - *In India, agriculture plays an important role in the country development in food production. In our country, 60-70 percent agriculture depends on the monsoons which are not sufficient source of water. One of the basic service to survive on earth is water .Water is main resource for Agriculture. Irrigation is only method to supply water. In some cases there will be lot of water wastage. Internet of Things (IoT) is a milestone in the evolution of technology. IOT plays an important role in many fields, one of that is Agriculture by which it can feed billions of people on Earth in future. Sensors is used to check moisture of soil, temperature, air moisture. Decision is controlled by the user(farmer) by using microcontroller. Data received by sensor are sent to server database using wireless transmission.*

Key Words*: *Sensors, Bluetooth communication, Android.

1. INTRODUCTION

Agriculture plays and important role in GDP of country.60-70 percent of Indian population depend on agriculture for employment. IoT had help farmer to fight the most of problems is agriculture. India is the second largest country in the growth of population so it is necessary to increase the rate of production of agriculture.

Every year irrigation requires more amount of water than the annual rainfall falls which has lead to a critical phase of water resource for future generation. The preservation of water resource for next generation and for proper water usage, it is necessary to adopt some of the strategies because of which minimal water is used as per requirement. Their should be some of the techniques that can be implemented to stop wastage of water.

IoT is the technology that enables us to adopt the strategies to monitor the usage of water via connecting the android application. Soil moisture sensor is placed in the soil with crops because of which we come to know the moisture level of soil.

2. OBJECTIVES OF THE STUDY

H1) The soil moisture sensor will detect the dryness in the soil while testing and get less water in the soil so it will supply water for good growth of crop.

H2) The system is going to check the weather and if the climate get changes it will send message to farmer

3. LITERATURE REVIEW

In study published by B.V, A ln(1) In this paper the author had developed the mobile application for automatic irrigation. Sensor data and threshold value are stored in local memory of the mobile. The farmer can set the system to manual mode and he himself can decide the switching of the motor. Notifications regarding the water level in reservoir so that he can make alternatives when there is scarcity of water in reservoir. In the proposed paper the work is that to make user interface much simpler by just using SMS messages for notifications and to operate the switches.

In study published by Rawal, S. In(2) In this paper, the system was designed to monitor the moisture of soil system can be used to switch on/off the water sprinkler according to soil moisture levels thereby automating the process of irrigation which is one of the most time consuming activities in farming. The paper says that the farmer comes to know about the field when he is at the place. But it should be that if he is not present in farm but can control the water pump for on/off the pump in order to start/stop.

In study published by kumar, A., kumar, A., &sharma, P. In(3) In this paper, the author had made a system that starts and send a command by a user by pressing a click button on web page to start the motor. That will sent a HTTP request, a string to Arduino through serial terminal that will match the string with the saved one in Arduino and if it is correct then it will start the motor. After that the complete task of irrigating the field will be done by the microcontroller itself automatically. This paper represent that it is easy and comfortable for farmers to operate the irrigation at remote location that is from home. It will also control the consumption of water for the irrigation of the field, thus preventing the water wastage and would help in sustain the

productivity, increasing the yield. Further more innovative by adding controlling and monitoring the sprinkles, checking the faults in the irrigation network and correcting them.

In study published by H., R, Y., & Reddy K, V. C. In (4) In research paper, the author proposed that it maintains the desired soil moisture level in the soil and sends the data to Arduino. Which is control unit. Based on the sensed values, water will be supplied to the plant which can help us to avoid over-irrigation and under irrigation. Water sensor is used to sense the amount of water still available in the tank. The two soil moisture sensors give information which will be regularly updated to the web page using WIFI module and message alert will be sent to the user.

In study published by Lahande, P., & Mathpathi, D. In(5) In this research paper, the author has designed an developing motor pump ON/OFF by sensing moisture content of the soil through application of Internet of Things (IOT). In the paper the notification is given to the farmer throught database and other message but that should be in regional language that farmer could understand.

In study published by Naik, P., Kumbi, A., Katti, K., &Telkar, N. In(6) In this research paper, the paper proposed system that are using various sensors like temperature, humidity, soil moisture sensors which senses the various parameters of the soil and based on soil moisture value land gets automatically irrigated by ON/OFF of the motor. These sensed parameters and motor status will be displayed on user android application.

In study published by Gori, A., Singh, M., Thanawala, O., Vishwakarma, A., &Shaikh, P. A.In(7) the paper proposed the system that detect the moisture content of the soil and depending on it sprinkle water .This entire information will be sent to the user's mobile phone. The smart irrigation system is cost effective. Proposed system can be used to switch on/off the water sprinkler depending on the soil moisture levels thereby making the process simpler to use.

In study published by Durga, S. N., & Ramakrishna2, M.In(8) In this research paper the author has used moisture sensors that measure the moisture level of the different plants. If the moisture level goes below the desired and limited level, the moisture sensor sends the signal to the Arduino board which triggers the Water Pump to turn ON and supply the water to respective plant. When the desired moisture level is reached, the system halts on its own and the water Pump is turned OFF. The proposed paper focuses primarily on reducing the wastage of water and minimizing the manual labor on field for irrigation so that you can saving time, cash and power of the farmer.

In study published by kumar, A., kumar, A., &sharma, P. In(9) proposed paper author has used ATMEGA 328 microcontroller to control the entire system. Temperature sensor and humidity sensor are connected to internal ports of microcontroller via comparator, whenever there is a fluctuation in temperature and humidity of the environment these sensors senses the change in temperature and humidity and gives an interrupt signal to the micro-controller and thus the motor is activated, along with this buzzer is used to indicate that pump is on. Hardware and software used perform their function properly to produce desired result which is the required for the farmers in the irrigation field. Runtime switches with microcontroller makes it flexible in respect of time settings for running a water pipe line. This system will help farmer to do irrigation at night also. Farmers will get the protection while doing the irrigation work in extremely odd weather conditions.

B.Pawar, M. S., Rajput, P. P., &Shaikh, P. A. In(10) the proposed paper author had used the system that control the water motor automatically and can observe the growth of plant with the help of webcam. Live streaming through mobile phones using suitable application using Wi-Fi. Raspberry pi is important in the system. System had provided the feedback of control system that has been monitored and controlled the activities of plant growth and irrigation system easily. In this we can also add some water quality sensor.

4. COMPONENTS

Arduino Microcontroller: Arduino is an open-source gadgets platform. It depends on easy touse hardware and software. Arduino sheets can peruse inputs light on a sensor, a finger on a button and turn it into an output activating a motor, turning on a LED. A microcontroller is a little PC on a single integrated circuit. In modern terminology, it is a framework on a chip. It contains one or more computer chips alongside memory and programmable input/output peripherals. Microcontrollers are intended for installed application. There are utilized in automatically controlled product and devices, for example, automobile engine control systems, implantable medical devices, remote controls, office machines and other embedded systems.

Sensors: In this system 2 sensors are utilized to get the information about the environmental condition and soil. Which is soil moisture sensor and temperature and humidity sensor.

Temperature and Humidity Sensor: The DHT11 is a fundamental, ultra ease computerized temperature and humidity sensor. It utilizes a capacitive humidity sensor and an thermostatto measure the surrounding air, and lets out an advanced sign on the

information pin. It estimates relative humidity. Relative humidity is the measure of water vapour in air versus the immersion purpose of water fume in air. At the saturation point, water vapour begins to condensed and accumulate on surfaces shaping dew. It identifies water vapour by measuring the electrical obstruction between two electrodes.

Soil Moisture Sensor: Soil moisture sensors quantifies the volume of water content in soil. Since the estimation of free soil moisture requires eliminating, drying and weighing of a sample, soil moisture sensors measure the volumetric water content by implication by utilizing some other property of the soil, for example, electrical resistance, dielectric constant, orinter action with neutrons, asaproxy for the moisture content. This sensor has two tests through which current passes in soil, at that point read the resistance of soil by reading Moisture level. We realized that water make the soil more inclined to electric conductivity coming about less obstruction in soil where on other hand dry soil has poor electrical conductivity thus more resistance in soil.

Bluetooth Wireless Technology: Bluetooth is a fast, low-power microwave wireless connection innovation, intended to interface telephones, PCs and other compact gear along with almost no work by the utilization. Dissimilar to infra-red, Bluetooth doesn't need view situating of associated units. The innovation utilizes adjustments of existing remote LAN strategies yet is generally striking for its little size and ease. The current model circuits are contained on a circuit board 0.9cm square, with a lot more modest single chip adaptation being developed. The essential strength of Bluetooth remote innovation is the capacity to all the while handle information and voice transmissions, which gives clients an assortment of imaginative solutions. This innovation accomplishes its objective by installing little, reasonable, short-range handsets into the electronic gadgets that are accessible today. The radio works on the all around the world accessible unlicensed radio band, 2.45 GHz, and supports information paces of up to 721 Kbps, just as three voice channels. Every gadget has a one of a kind 48-piece address from the IEEE 802 norm. Associations can be point-to-point or multipoint. The most extreme reach is 10 meters however can be stretched out to 100 meters by expanding the force. Bluetooth devices are shielded from radio interference by changing their frequencies discretionarily upto a limit of 1600 times each second, a method known as frequency hopping.

In addition to, Bluetooth gadgets won't deplete valuable battery life. The Bluetooth detail targets power utilization of the gadget from a hold mode consuming 30 micro amps to the active transmitting range of 8-30 milliamps Bluetooth devices utilizes radio waves rather than wires or links to connect with a telephone or PC. A Bluetooth item, similar to a headset o watch, contains a small central processor with a Bluetooth radio and programming that makes it simple to interface. At the point when two Bluetooth gadgets need to converse with one another, they have to match. Correspondence between Bluetooth device occurs over short-range, specially appointed organizations known as piconets. A piconet is an network of devices connected utilizing Bluetooth innovation. At the point when an organization is set up, one gadget plays the function of the expert while the wide range of various gadgets go about as slaves. Piconets are set up dynamically and automatically as Bluetooth gadgets enter and leave radio closeness. The sensors are associated with the Arduino board. These hardware impart through Bluetooth.

5. PURPOSE SYSTEM

Irrigation system can be robotized by utilizing Sensors, Micro controller, Bluetooth, Android application. Irrigation can be automatic done by using Sensors, Bluetooth, Microcontroller and Android application. The low cost soil moisture sensor and temperature and humidity sensor are used. They continuously monitor the field. Sensor are connected to Arduino board. The sensor data which are obtained are transmitted through wireless transmission are reached to the user so that he can control irrigation. The mobile application can be designed in such a way to analyze the data received and to check with the threshold values of humidity and temperature, moisture. The decision can be made either by the application automatically without user interruption. Or manually through application with user interruption. 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. The sensors are connected to the Arduino board. These hardware communicate through wireless Bluetooth transmission. So that user can access the data through his mobile that has an android application which can get the sensor data from the arduino via Bluetooth. As far as cost of device is considered. Bluetooth technology is used which can be replaced by wi-fi. Motor is switched OFF.

6. METHODOLOGY

An online survey was taken using the google forms .Link of the form was circulated on social media platforms. The questionnaire was designed inform to test the above proposed hypothesis which verify the certain parameters.

Participants:-To test this hypothesis, this study uses two conditions i.e., first one is helpful and second one not helpful. Total 57 participants data were collected from different states farmers.

Measures:-

Gender	Yes	No	Total
Female	23	3	26
Male	27	4	31
Total	50	7	57

Table1: Collected data by online survey

Here is the formula for calculating the expected value.

Formula:-**Expected Value = (row total)*(column total)/(grand total)**

$\mathbf{E_{11}}$= (26*50)/57=**22.807**

$\mathbf{E_{12}}$= (26*7)/57=**3.193**

$\mathbf{E_{21}}$= (31*50)/57=**27.193**

$\mathbf{E_{22}}$= (31*7)/57=**3.807**

We have obtained these expected values, now we need to compare this value with what has been observed. To do this, we need to calculate the X^2 statistic, which is shown below.

X^2=∑ (Observed value–Expected value)

Expected value

In this formula we have to subtract the expected value from the corresponding observed value. After subtraction has been completed, we have to square the m and after squaring result we have divide it by expected value. We have to perform this step for every value and at the end we have to add this answer together.

Calculation table for above example is given below.

Obs	**Exp**	**Obs-Exp**	**(Obs–Exp)²**	**(Obs–Exp)²/Exp**
23	22.807	0.193	0.037249	0.00163
3	3.193	-0.193	0.037249	0.01166
27	27.193	-0.193	0.03724	0.00136
4	3.807	0.193	0.037249	0.00978
Total				0.02443

Table2: Calculation table

Therefore, value of X^2 is 0.02443

Degree of Freedom= (no.ofrows-1)*(no.ofcolumns-1)

Degree of Freedom= (2-1)*(2-1)=1

7. EXPERIMENT

Test value of independent sample where calculated at the significant level 90% using chi-square test. By using this test, we calculated X^2 value. With the help of the survey, we able to test the multiple parameters in test. The calculated chi value is 0.02443 and tabulated chi value at 90% significant level is 2.71 with degree of freedom 1.

8. RESULT

The test scores of the survey which was analyzed and experimented on random farmers on the basis of the specific parameters resulted that the population is likely to trust the sensor, the acceptance for such a technology would be majorly supported which is a big step towards providing H1.

9. CONCLUSION & FRAMEWORK

The mechanized water irrigation system framework executed was discovered to be possible and savvy for improving water assets for agriculture creation. The water irrigation system framework permits development in spots with water shortage along these lines improving supportability. The water irrigation system framework helps the rancher by making his work more brilliant. As the interest for water increment alongside the need to secure oceanic natural surroundings, water protection rehearses for irrigation system should be powerful and moderate. As various sensors are utilized water can be given distinctly to the necessary region of land.

This system reduces the water utilization to greater content. It needs negligible upkeep. The force utilization has been decreased definitely. The yield profitability increments and the wastage of crops are decreased.

The expansion work is to make user interface a lot easier by utilizing SMS messages for notices and to work the switches.

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