



Smart Irrigation System Based on Internet of Things Using Design Thinking Approach

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Abstract: India is mainly an agricultural country. Agriculture is the most important Occupation for the most of the Indian families. It plays vital role in the Development of agricultural country. In India, agriculture contributes about 16% of total GDP and 10% of total exports. Water is main resource for Agriculture. Irrigation is one method to supply water but, in some cases, there Will be lot of water wastage. So, in this regard to save water and time we have Proposed project titled automatic irrigation system using IoT. In this proposed System we 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 a gets automatically irrigated by ON/OFF of the motor. These sensed parameters and motors status will be displayed on user channel.

Keywords: GDB – Gross Domestic Product, Internet of Things

I. INTRODUCTION

Agriculture is the major source of income for the largest population in India and is Major contributor to Indian economy. However, technological involvement and its Usability have to be grown still and cultivated for agro sector in India. Although few Initiatives have also been taken by the Indian Government for providing online and Mobile messaging services to farmers related to agricultural queries and a grovendor's Information to farmers. Based on the survey it is observed that agriculture contributes 27% to GDP, and Provides employment to 70% of Indian population. IoT is changing the agriculture domain and empowering farmers to fight with the huge difficulties they face. However, agriculture requires irrigation and with every year we have more water consumption than rainfall, it becomes critical for growers to find ways to conserve water while still achieving the highest yield. But in the present era, the farmers have been using irrigation technique through the manual control in which they irrigate the land at the regular interval. According to statistics, agriculture uses 85% of available freshwater resources worldwide, and this percentage will continue to be dominant in water consumption because of population growth and increased food demand.

There is an urgent need to create strategies based on science and technology for sustainable use of water, including technical, agronomic, managerial and institutional improvements. Agricultural irrigation based on Internet technology is based on crop water requirement rules. By using Internet technology and sensor network technology we can control water wastage and to maximize the scientific technologies in irrigation methods. Hence it can greatly improve utilization of water and can increase water productivity. The Internet of Things (IoT) is a technology where in a mobile device can be used to monitor the function of a device. It can also be used to modify the status of the device. The central processing unit will also include communication device to receive data from the sensors and to be relayed to the user's device. This will be done using a higher communication device such as a Relay module. The data processed by the central module is converted to meaningful data and relayed to the user. The user can view the data with the help of a hand-held device such as a mobile phone or a tablet. Now a days water scarcity is a big concern for farming. This project helps the farmers to irrigate the farmland in an efficient manner with automated irrigation system based on soil moisture.

The proposed system has been designed to overcome the unnecessary water flow into the agricultural lands. moisture and humidity readings are continuously monitored by using temperature, moisture and humidity sensor and send these values to the assigned IP address. Android application continuously collects the data from that assigned IP address. Once the soil moisture values are exceeded the particular limit then there lay, which is connected to the Arduino micro-controller controls the motor. The android application is a simple menu driven application, with 4 options. This includes motor status, moisture, temperature and humidity values. The motor Status indicates the current status of the pump.



I. System overview

The smart irrigation system uses temperature, soil moisture and humidity Sensor to measure the relative parameter in order to give the water to crops. Since it's area I time system thus microcontroller sends the measured values of different parameter and according that water is given to the crops.

II. PROBLEMSTATEMENT

In India, agriculture is the need of most of the Indians Livelihood and it is one of the main sources of livelihood. Agriculture also has a major impact on economy of the Country. The consumption of water increases day by day that May leads to the problem of water scarcity. Now adays not Only for crops outdoor plants in home becoming quite difficult for them.The main objective of this project is to provide an automatic irrigation system thereby Saving time, money & power of the farmer. The traditional farm-landirrigationTechniquesrequiremanualintervention.Withtheautomated technology of irrigation the human intervention can be minimized.

III. LITERATURESURVEY

Primary investigation is carried out under the following stages, such as Understanding The existing approaches, Understanding the requirements, developing an abstract for The system. In this paper, soil moisture sensor, temperature and humidity sensors placed In rootzone of plant and transmit data to android application. Threshold value of soil Moisture sensor that was programmed into a microcontroller to control water quantity. Temperature, humidity and soil moisture values are displayed on the thing speak.The paper on "Automatic Irrigation System on Sensing Soil Moisture Content" is intended to create an automated irrigation mechanism which turns the Pumping motor ON and OFF on detecting the dampness content of the earth. In this Paper only soil moisture value is considered but proposed project provided extension To this existed project by adding temperature and humidity values. Remote Monitoring in Agricultural Greenhouse Using Wireless Sensor and Short Message Service (SMS). In this paper they are sending data via sms but proposed Systems ends the values to thing speak channel.

The proposed paper is Arduino based remote irrigation system developed for the Agricultural plantation, which is placed at the remote location and required water Provides for plantation when the humidity of the soil goes below the set-point value. But in this we did not aware about the soil moisture level so to overcome this Drawback proposed system included with extra feature soil moisture value and Temperature value which displayed on the farmer thing speak channel.

"Irrigation Control System Using Android and GSM for Efficient Use of Water and Power" this system made use of GSM to control the system which may cost more. So, to overcome that proposed system used arduino uno board which already consist of In build relay module.

"Microcontroller based Controlled Irrigation System for Plantation" In this paper Old generation with lesser memory microcontroller is used to control the system but Proposed system made use of arduino uno board which is user friendly and it helps to Dump the programs easily.

"A wireless application of drip irrigation automation supported by soil moisture Sensors" in this paper irrigation is carried out using soil moisture values but extend to This proposed system displays temperature and humidity values.

By referring all above papers, it is found that no such systems are existed with all Integrated features but proposedsystemincludestheseallfeaturessuchasdisplayingTemperature, humidity and soil moisture values and also automatic switching on and Off of motor by considering soil moisture values.

IV. PROPOSEDSYSTEM

The proposed system works through different stages:

- If the moister sensor is dry in the line(its locations), the system will check by the rain Sensor if there is rain the system will not work because no need to irrigate at the same time of Rain, otherwise the system will check the temperature, if the Temperature is high and the percentage of light Is high as well then the system will not work Because itis not the right time for irrigation process because the water will easily evaporate. If the temperature is low and there is no rain but the moisture sensor is Dry then it send signal to controller to open the valve and pump. If the level of water in the tank is low then the system will shut down automatically, by using water level sensor.

The below Figure 2.5.1 is a overall block diagram of arduino based automatic irrigation system which consist of three sensors which are connected to controller and sensed Values from these sensors a resend to the user channel

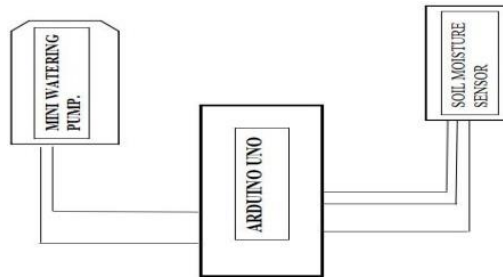


Fig.1 block diagram of smart irrigation

The above figure shows the block diagram of smart irrigation system with IoT. Farmers start To utilize various monitoring and controlled system in order to increase the yield with Help of automation of an agricultural parameters like temperature, humidity and soil Moisture are monitored and control the system which can help the farmers to improve The yield.

This proposed work includes an embedded system for automatic control of Irrigation. This project has wireless sensor network for real-time sensing of an Irrigation system. This system provides uniform and required level of water for the Agricultural farm and it avoids water wastage. When the moisture level in the soil Reaches below threshold value then system automatically switch ON the motor. When The water level reaches normal level the motor automatically switch OFF. This below Figure shows the procedure of displaying soil moisture value.

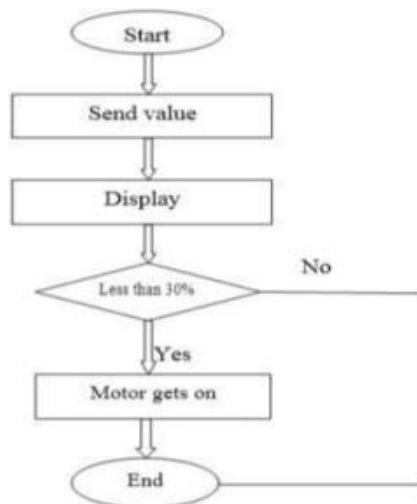
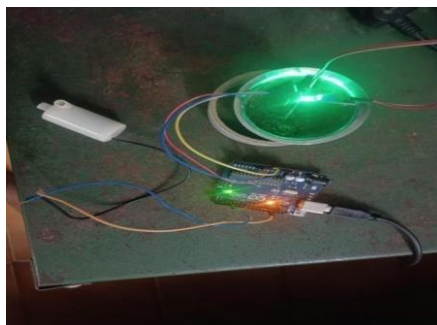


Fig. 2 Flowchart

Soil moisture sensors measure the water content in soil. Moisture in the soil is an Important component in the atmospheric water cycle. Sensor module outputs a high Level of resistance when the soil moisture is low. It has both digit a land analog Outputs. Digital output is simple to use, but it is not as accurate as analog output based. On moisture level motor gets turn on/off automatically.

A. Prototype





B. Pin diagram

Do the following connection which is shown in the image and also we had provided a chart for a better understanding.

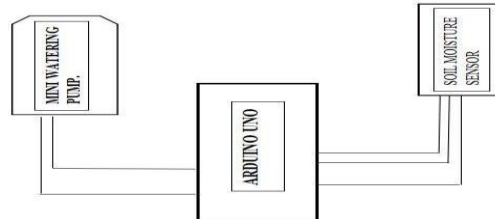


Fig. 4 PIN of smart Irrigation System

The microcontroller arduino is connected to soil moisture sensor and motor. These sensors sense the various parameter of the soil, motor is used to provide water to the land.

V. IMPLEMENTATION

The proposed agricultural system is designed to solve to find an optimal solution to The water crisis. The design implements IoT technology using an android device, a Main controlling unit (MCU), sensors to measure various parameters and a water Pump, which will be used to supply water to the farm.

A. PROGRAMMINGTECHNIQUES

In this project we are handling Water pump through Soil Moisture Sensor. When Soil is wet pump is OFF and when Soil becomes dry then your water pump is ON and your field is now wet. This could be your very first step to start with Smart Irrigation System project understanding and more. It is assumed that you already have downloaded latest version of Arduino IDE.

VI. CONCLUSION

The application of agriculture networking technology is need of the modern Agricultural development, but also an important symbol of the future level of Agricultural development; it will be the future direction of agricultural development. After building the agricultural water irrigation system hardware and analyzing and researching the network hierarchy features, functionality and the corresponding Software architecture of precision agriculture water irrigation systems, actually Applying the internet of things to the highly effective and safe agricultural production Has a significant impact on nursing the efficient use of water resources as well as, Ensuring the efficiency and stability of the agricultural production with more advancement in the field of IoT expected in the coming years, these systems can be more efficient, much faster and less costly. In the Future, this System can be made as an intelligent system, where in the system predicts user Actions, rainfall pattern, time to harvest, animal intruder in the field and communicating the information through advanced technology like IoMT can be Implemented so that agricultural system can be made independent of human operation and in turn quality and huge quantity yield can be obtained

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