
SMART WATER IRRIGATION SYSTEM USING IoT

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ABSTRACT : Agriculture is very significant for India. Since, the people of India mostly depend on agriculture for their livelihood. Farming has seen a number of technological transformations in the last decades, becoming more industrialized and technology-driven. By using various smart agriculture gadgets, farmers have gained better control over the process of raising livestock and growing crops, making it more predictable and efficient. Incumbently a technology play an indispensable role for the development of this agricultural country and farming is also solemnly depends on water. Water irrigation is one of the methods to supply water in their farms but in some occasion it might be wasted. The traditional water irrigation system is very difficult due to the scarcity of water which is primarily caused by rapid growth of population and climate. Internet of Things (IoT) is a new methodology to empower the modernization of agriculture. Since through automation Iot can make agriculture and all sorts of farming process in an efficient way by reducing human interventions. So, due to this, it is proposed a novel method called automation of water irrigation system using IoT to save water and time. In this novel approach it is planned to use various sensors such as temperature, humidity, soil moisture sensors to measure the different parameters of the soil based on the value of soil moisture will get automatically make the motor status as on or off stage. With respect to these sensed parameters and the status of the motor will be displayed on mobile. Monitoring and collecting data for soil moisture, temperature, humidity and sunlight intensity across multiple fields will improve efficiency of water usage and crop yield of large and local farms and also when the soil in agricultural land becomes dry by using this method the pump will automatically start the flow of water for irrigation. Sensors are deployed on the farms to monitor the status of crops according to the climate changes in light, humidity, temperature, shape and size. Any deviation is identified by the sensors then the status of the crop will be displayed on the farmer's smart phone.

KEYWORDS: IoT, Sensors, Irrigation, Temperature, Moisture, Humidity

I. INTRODUCTION

In our Indian nation, agriculture is the prime source of income for the wide range of people. However to establish an agriculture sector in our country, still there is a need of technological development in the genre of agriculture. Even though several initiatives have been taken by the government of india for issuing online answers for the agricultural related queries and mobile messaging services for the farmers.

An automated water irrigation system is needed to assist the farmers to measure the quality of temperature, humidity and moistures of the soil by their smartphone. Based on the review it is identified that the contribution of agriculture is 27% to Gross Domestic Product (GDP) and provides an employment to 70% of Indian population. IoT is a growing technology in the field of agriculture and uplift the farmers to meet out the challenges. The agriculture should have to replenish the problem of water scarcity, constrained lands abreast of the population growth. This novel imitative of IoT may address these issues and increase the quantity, quality and sustainability as well as the cost effectiveness of agricultural production.

Agriculture is the heart of our Indian economy. At present, due to the rapid growth of population agriculture plays a vital role to fulfill the people's requirements. However, agriculture needs irrigation of water in every year and the necessity of water is more than the rainfall. So it is very crucial to conserve the water by the farmers to achieve the highest production yield. But incumbently the farmers use technical irrigation through the manual control at the periodical interval. According to survey, 85% of fresh water is presently used for agriculture. This situation would prevail in future for the growth of population and the demand of food. It is necessary to create a strategy with respect to science and technology for the sustainable usage of water which includes agronomic, technical managerial and industrial developments. Based on the requirements of crop an irrigation system needs to be provided using technology. By using both the internet and sensor network technology, it is possible to control the waste of water and enlarges the scientific methods for water irrigation. So, it will improve the water utilization and productivity.

The Internet of Things (IoT) is emerging technologies which may be in a mobile device used for observed in and around the place. It comprises communicating objects which are installed in several locations and it can be far away from each other. IoT is a kind of networking technology used for sense the information from various sensors and it is always prompt for exchanging the information. It is used for the adapt the status of the device. The central processing unit may comprise a communication device to collect the data from different sensors and transmits those information to another devices of the user. It will be done using a higher end communication device like Wi-Fi module. The central module may convert the processed data into meaningful data and communicate with other user. With the help of handheld device such as mobile a user may perceive the data. At present the dearth for water is a major concern in agricultural field. This work addresses an efficient method of water irrigation using automated irrigation system.

This proposed approach would overhaul the unnecessary water irrigation on to the farmlands. The values of temperature, moisture, humidity are periodically monitored by temperature, moisture, humidity sensors respectively and transmit these values to the allocated IP address. An android application would gradually gather the data from the allocated IP address. When the soil moisture reaches the threshold values then the arduino microcontroller resist the

motor for water flow. The android application is very user friendly application with some menu driven option. This consists of status of the motor, moisture, temperature, and humidity values. The status of the motor reveals the current status of the pump.

II.LITERATURE SURVEY

Zhang.s [1] et.al proposed intelligent water saving irrigation control system based on water balance. this paper introduced a water saving irrigation control system by using agricultural internet of things. The outcome of this work reveals an intelligent water saving irrigation with respect to water balance in an effective irrigation method. Ashika.et.al [2]proposed a method using aurdino for sensing moisture and controlling the water flow and microcontroller unit for identifying the status of the water irrigation system for the farmers using mobile communication. The status of the entire pump in a whole agricultural land will be updated to the farmers through smart mobile. Less lev dow[3] discussed about improving water efficient irrigation and also addressed its prospects and difficulties. This method enhances the water efficiency and economical improvements to the farmer. This will also improve the integrate water and nutrient management. Srishar[4]et. al proposed a smart irrigation system that emphasizes a technique which is incorporated for monitoring the moisture of the soil. The outcome of this result would provide effective crop treatment and water management and also this work addresses the landsite irrigation management to treat the desiccated fields and given effective results to the producers.

Aarathi rao[5] addressed an environmental monitoring using Wireless Sensor Networks(WSN) based IoT which collects data from the sensors and the data collects end tags which may send it to the router and router to the multi supply nodes. The entire data will be recorded in the base station and those data will be deliver to the cloud. This would be perceived by the client at remote location. Deepak[6] et.al stressed the importance of farm beats data driven in an agriculture using IoT which enables flawless data collection from the different sensors and cameras. This method is mostly suitable for weather related power and provides a gateway to ensure the services are available in the cloud.

Saraf[7].et.al proposed an IoT based smart irrigation monitoring and controlling system that specified an importance of zigbee to make a communication between sensor nodes and base station. Monitoring field irrigation system using wireless diminish the intervention of a human in lieu of this it permits remote monitoring and controlling using android mobile. This paper even addressed the cloud computing techniques to gather different data from various sensors to assess the status of the plants in an farming land. Abubakr Muhammad [8]. Et.al stressed the importance of water irrigation system using IoT enabled analysis of irrigation rosters in the Indus basin irrigation system which is capable for real time reporting of flow discharge through GPRS and backend server services.

III.PROPOSED SYSTEM

The underneath figure exhibits the overall automatic irrigation system using arduino. This system comprises three different types of sensors which are connected to controller and collect the sensed values from these sensors and transmit to the smart phone.

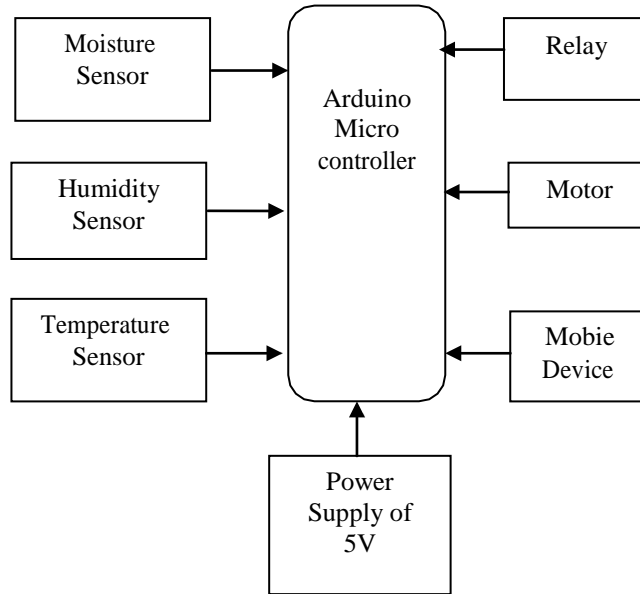


Figure 1. Automatic Water Irrigation System

Figure 1 demonstrates the block diagram of smart irrigation system using IoT. The farmers can initiate and use different monitoring and controlled system to increase the productivity with an assist of automation of agricultural parameters like temperature, humidity and soil moistures are observed and manage the system which would help the farmers to increase the productivity.

The proposed method consists of an embedded system for automatic control of water irrigation. It has wireless sensor network for sensing real time irrigation system. This method would provide appropriate water to the agricultural land and avoids wastage of water. When the moisture level comes down below the threshold level then the system will automatically switch ON the motor for irrigation. When the water level reaches above the threshold level then it will automatically OFF the motor. The current status of the motor and the sensed parameters will be displayed on the user’s smart phone.

The DHT 11 is a fundamental, digital temperature and humidity sensor. It uses the value and capacitive humidity sensor to measure the air and spits out a digital signal on the data pin. It is very easy for usage, but it will; take certain time to collect the data. The moisture content in the atmosphere is measured by humidity sensors. The humidity values and the present temperature will be send it to the microcontroller and it will be displayed on the user’s smart phone.

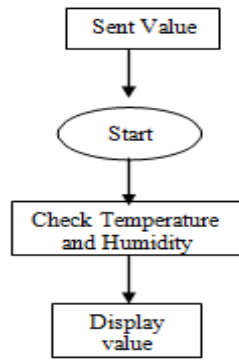


Figure 2. Flowchart of Temperature and Humidity sensor

Soil Moisture Sensor

Soil moisture sensor determines the content of water in a soil. The moisture in the soil is a vital factor in the atmospheric water cycle. Sensor module gives a high level of resistance when the soil moisture becomes low. It consists of both analog and digital signal. Digital output is very simple but not accurate when compared with the analog output based on the level of the moisture the motor will be either ON or OFF state.

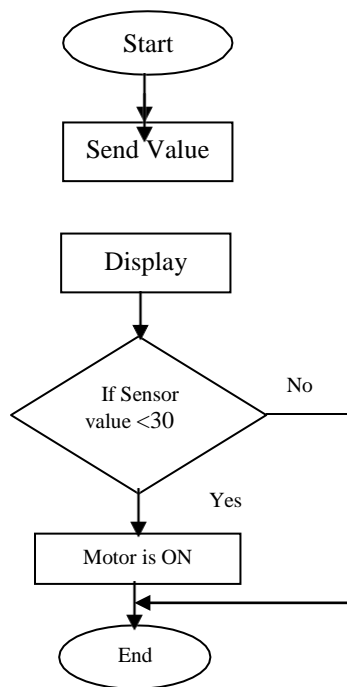


Figure 3. Flow Chart for Soil Moisture Sensor

IV.RESULT AND DISCUSSION

Figure 4 demonstrates a prototype of an automated water irrigation system. The temperature sensor, humidity sensor, soil sensors, relay and motor are connected with the microcontroller. These sensors are used for sensing the various parameters of the soil, the motor is used for irrigation of the water to the land and the motor will be controlled by relay.

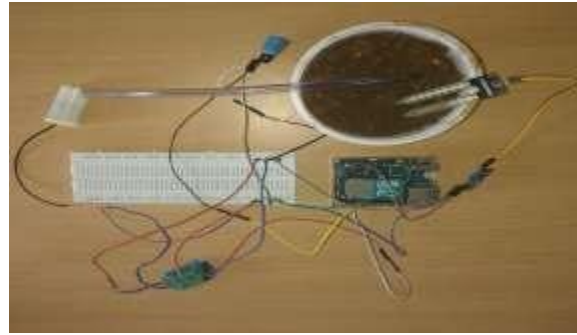


Figure 4 Prototype of an automated irrigation system

Sensors are deployed on the farms to monitor the status of crops according to the climate changes in light, humidity, temperature, shape and size. Any deviation is identified by the sensors then the status of the crop will be displayed on the farmer's smart phone.



Figure 6 Sensed values displayed on user android application.

The Sensors such as temperature, Moisture and humidity sensors would sense the corresponding values and alert the smart phone to display the values for the farmers.

V. CONCLUSION

The agricultural networking techniques application is required for modern agricultural development and also it enhances the development of agriculture. This proposed method would provide a considerable impact on assuring the effective usage of water resources and the efficiency and steadiness of the agricultural production. With more enhancement in the genus of IoT in the forth coming years, these systems can be more capable much faster and cheap in cost. In future, the system may forecast about users movement, weather forecasting pattern, harvesting time, the intrusion of animal in the farm land and communicating the information via smart phone to the users. Due to this in the forthcoming days agriculture would be independent of human intervention and in turn quality as well as excellent quantity of production can be obtained.

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