

Smart Irrigation for Agriculture Using Internet of Things

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Abstract – India's agriculture is composed of many crops and it is backbone of our country. Many smart technologies are created to develop the agriculture sector. The main important thing for crop farming is water irrigation. The main objective of this project is to develop an automatic irrigation system using sensors, with Internet we can remotely control the system using a Android smart phone or any computer device. So that the agriculture lands are irrigated automatically without any physical presence of human. Smart irrigation for agriculture using IOT (Internet Of Things) provides a solution for the old people and physically challenged people to do farming. The smart agriculture is to provide higher productivity and better resource when we compared to traditional methods which gives low results. It plays an important role in identifying the temperature according to their weather report. IOT sensors are capable of providing information about their agriculture fields and weather report. By using IOT we will implement to get their environmental conditions is the major factor to increase the fields of their crops and productivity.

1. INTRODUCTION

India's population crossing 1.3 billion in 2016, a balance between the population growth and a healthy nation is far to be achieved. The rising population, there is need for increased agricultural production. Irrigated agriculture has been an extremely important source increased agriculture production. Now a days people want to observe their work from any where on their digital devices such as smart phones or computer devices.

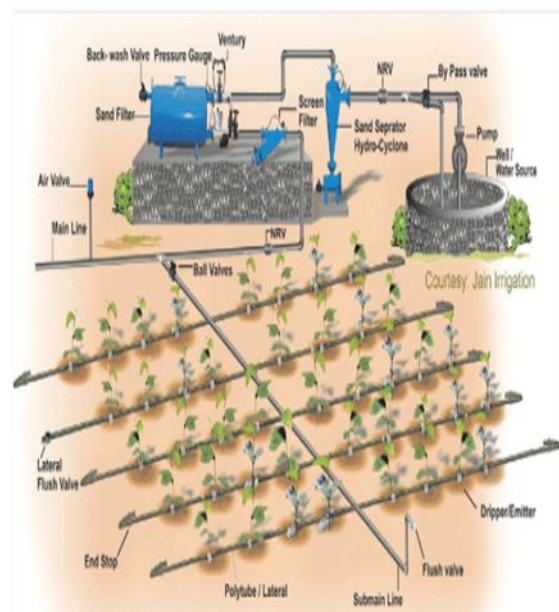
IOT based smart irrigation system is to create a IOT based irrigation mechanism which turns the pumping motor ON and OFF on detecting the water level and pass data through IOT platform. An irrigation system which is designed based on monitoring the climatic condition. In this gateway sensor is used to handle sensor information and helps the user to transmit the data, through Wireless Zigbee, Humidity and Temperature sensors is programmed with microcontroller based gateway. The proposed system consist of sensor nodes each having Temperature, moisture and humidity sensor. These source nodes are connected to Gateway through zigbee. The Gateway with WiFi enabled so that it will receive data from all sensor

nodes, store data on cloud and it will get displayed on smart phone and web portal on PC. It overcome labour intensive work and also controls the water management system.

Our project work is to supply water for the agriculture fields. It supplies water when the land is dry based on Internet of Things. The main objective is to decrease the human effect and to supply the water for the agriculture in current temperature for the increase of productivity.

2. CONSTRUCTION AND OVERALL PLATFORM

IOT (Internet of Things) is the network of physical devices which interconnects the information sensing devices such as sensors etc. It exchanges the information and communicates through the wireless or wired network. The sensors collect the information on temperature, soil moisture, humidity etc.



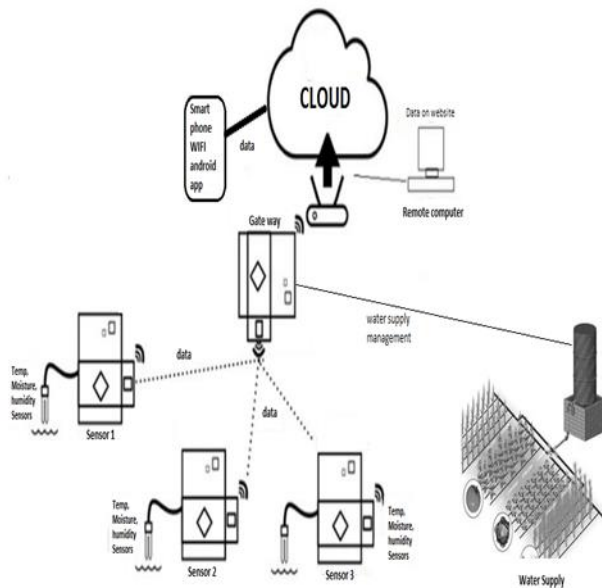
DRIP IRRIGATION

Our aim is to supply the water using IOT when the farm is dry and to remove the excess of water content. We use the sensors in IOT based smart irrigation. Sensors collect the information on temperature, soil moisture, humidity etc. and send to the gateway. The Gateway sends the information to the smart phone or computer devices whether to supply the water when the land is dry or to suck the water when the land is of excess of water,

Sensors control the water management system. The pipes are fitted with filters to avoid entering of other alien components than water.

3. COMPONENTS

The working components are explained here. The components involved in the smart irrigation are Gateway, sensors (on the various fields), mobiles or computer devices. A Smart Microcontroller lies at heart of the irrigation infrastructure. Soil sensors and temperature sensors, which are placed on the fields, send the data to the gateway. The gateway collects the data or information from the various sensors on the various fields and stores the information. Then the Gateway sends the information on temperature level, soil moisture, humidity etc. to the mobile phone or computer devices. By the information given by the gateway the farmer decides whether the water supply is required or not. It is designed to monitor the weather conditions.

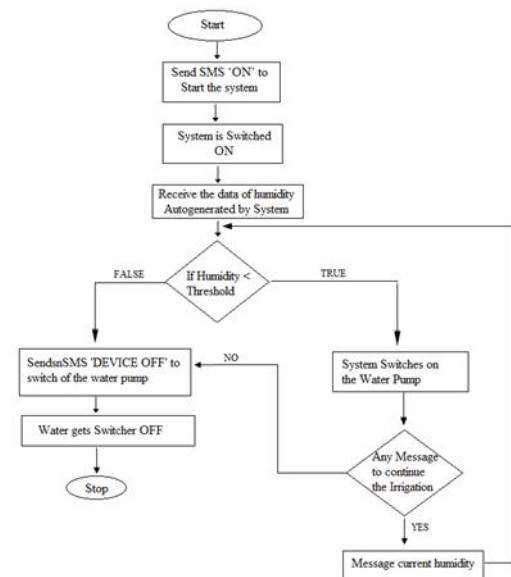


SYSTEM ARCHITECTURE

The Gateway also has servo motors to make sure that the pipes are actually watering the fields uniformly so that no area gets clogged or is left too dry. The entire system can be managed by

the user through a particular mobile application. Smart irrigation makes it possible for the users to monitor and irrigate their fields remotely, without any difficulties.

Here the farmer with the help of mobile or computer devices sends the message "ON" to start the system to the gateway. The system is ON then the sensors collect the data or information (temperature, soil moisture, humidity etc.) and send to the gateway. Then the gateway stores the information and sends the information to the mobile or the computer device. The farmer decides by the temperature level, soil moisture, humidity whether the water supply is required or not. If the weather condition is not normal on the field, the farmer sends the switch 'ON' the water pump then the sensors ON's the water pump and the water supply is given to the agricultural field.



FLOWCHART OF SMART IRRIGATION

4. NECESSITY OF CLOUD

Formation of WSN(wireless sensor networks) environment requires consideration of many things with suitable operating system, adequate RAM requirements and storage. Also host monitor has to be run for a long period continuously. A virtual platform is required to achieve above requirements that is based on the cloud. Later it includes running the irrigation algorithm for detecting, whenever the crops need irrigation".

The cloud storage usage provides advantages as

- 1) Data can be accessed from anywhere.
- 2) Hardware requirement and cost reduces.
- 3) Security of data increases.

5. PROPOSED SYSTEM

It helps the user to improve the quantity and quality of their farm yield by sensing the humidity values, temperature values and soil moisture values and water level content from the field without any human interference. By using the IOT system, it can be more efficient. The system contains the wireless sensors based in the fields to acquire the temperature, humidity, soil moisture values, a gateway to receive and transmit the particular information to the control section, and it controls the drips for watering subsystem. Each node includes the temperature, humidity, soil moisture and the water level sensors as well as microcontroller and relay the switching unit. The sensed data from each sensor is transmitted to the gateway. The received data from the gateway is stored at the cloud server. The cloud server performs the decision making by comparing between the sensed values and the threshold values as per the crop selection in the fields. Once the data is processed and decision is determined at the control section with the help of irrigation algorithm, the controlling action is sent to wireless sensor node. Report system that is an application is developed to deliver recent corals information to user. Also it asks the user to respond to an essential incident such as raise in temperature and water requirement for agriculture. The proposed system helps the user to improve the quality and quantity of the yield by sensing the temperature and humidity values, soil moisture value and water level from the field without any human interference. By using the concept of IoT system can be more efficient. The system contains wireless sensor units which are placed in the field to acquire the real time values, a master node to receive and transmit acquired information to the control section, and by which it controls the drips for watering subsystem. Each sensors includes temperature, humidity, soil moisture and water level sensors as well as gateway and relay switching unit. The sensed data from each node is transmitted to the gateway. The received data from the gateway is stored at the cloud server. The cloud server gives the solution by comparing both the sensed values and predefined threshold values as per crop selection. Once the data is processed and

decision is determined at the control section with the help of irrigation algorithm, the controlling action is sent to wireless sensor node. The microcontroller from the node controls relay switching unit and watering subsystem accordingly. Report system that is an android application is developed to deliver recent field information to user. Also it asks user to respond to an essential incident such as rise in temperature and water requirement for plants.

6. CONCLUSION

The smart irrigation system is effective in cost for optimising water resources for crop production.

This irrigation system allows farming in places with water scarcity thereby improving productivity of crops.

I conclude that this system is used to implement and time money and manpower saving solution for irrigating fields

A farmer should visualise his agriculture land's moisture content from time to time and water level of source is sufficient or not

IOT based smart irrigation system displays the values of the sensors continuously in smart phone or on computer's web page and farmer can operate them anytime from anywhere.

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