Arduino-Based Automated Irrigation System Using Sensor

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ABSTRACT

In India, Agriculture is one of the most important areas of human activity. Most of the population depends on agriculture and farming. Indian economy directly depends upon agricultural production. Proper cultivation is very important to increase the production. The cultivation of plants includes various steps such as to analyze the environmental factors, analyze the soil moisture, temperature, and manage the water supply for proper cultivation of plants. A traditional way is very slow and unreliable for above steps. By referring this paper it comes to know that the Cultivation Management System explained here is based on cloud. The system architecture allows user to achieve the above mentioned activities in real time so that farmers can view their farm details from anywhere (and do not need to go to farm). System mainly includes Hardware module that placed in farm or farm field that contains various sensors, devices, ICs for data conversion and transfer. Then Cloud implemented as Software as a Services (SaaS) so that user can access the information from anywhere within range and finally the Android application through user can monitor system details, farm details and control the farm hardware remotely from anywhere within range. The advantage of this system is, it is not only specific to green house but it is also applicable to normal farm field. Using this system the environmental factors monitored and controlled correctly there will be improvement in the productivity.

Keywords— Cloud Computing, Software as a Service(SaaS), Sensors, Android Application

I. INTRODUCTION

In the present era one of the greatest problems faced by the world is water scarcity and agriculture being a demanding occupation consumes plenty of water. Therefore a system is required that uses water judiciously. Agriculture is the backbone of India, and plays an important role in economic development. It is the science or practice of farming, including cultivation of the soil for the growing of crops. Cultivation is most often used to talk about the ways that farmers take care of crops. However, it consists of various phases that are depends on the environmental factors such as Temperature, Soil moisture and water level. Farmers need to keep the records of these environmental factors manually to cultivate crops properly. In general, agricultural lands are so far away from farmers home so farmers need to go there and analyse the soil, write the records of these environmental factors on paper which is so tedious work to maintain and remember it. Furthermore, farmers need to know about these factors for some period of time so that they can take appropriate actions such as to manage hardware (i.e. to switch on/off water motor), to spray pesticides, to keep records of factors; to achieve these activities farmer should go to the farm field which is normally very far from farmers home and it causes inconvenience in hectic work. To avoid such burden from farmer, and to achieve such functionality farmers require a System which will be able to gather the information, from farm such as Temperature level, water level and soil moisture via various sensors. Furthermore, system should process this information to provide functionality to the farmers. To enable system accessible from anywhere it needs to be centralized and connected to Internet. Here, the concept of Cloud Computing comes .Thus, to manage all these functions Cultivation Management System comes into picture. This system allows farmers to view farm (or farm field) information such as sensors values, devices connected, etc. Apart from this, system allows farmers to control the farm hardware remotely such as to switch on/off bulb, to switch on/off motors, etc. with the help of microcontroller. All this information can be accessed via Android enable mobile phone, tabs, etc. by farmers.

II. EXISTING SYSTEM

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Existing irrigation controllers are based on fixed schedule. Farmers, Municipalities and commercial owners of green areas typically set a watering schedule that involves specific run-times and days, and the controller executes the same schedule regardless of the season or weather conditions. From time to time a technician may manually adjust the watering schedule, but such adjustments are usually only made a few times during the year, and are based upon the technicians' perceptions rather than actual watering needs. Smart irrigation control technology is based on everyday climate criterion and actual water need of plant. In this technology irrigation occurs when the water is required by plant. It supplies only that amount of water to the plant as plant needs. b. In conventional irrigation control technology, irrigation is done in the way in which large amount of underground or surface water is wasted. In smart irrigation control technology irrigation is done in a manner in which there is very little chance of water wastage.

III. LITERATURE SURVEY

I. EXPERIMENTAL INVESTIGATION OF REMOTE CONTROL VIA ANDROID SMART PHONE OF ARDUINO-BASED AUTOMATED IRRIGATION SYSTEM USING MOISTURE SENSOR.

- Author: A.N.Arvindan, Keerthika.D
- Year Of Publish: 2016
- Conference: IEEE

In this paper , the Android smart phone used as a remote control to make arduino-based automated irrigation system easy-to-use and an economical. The system design includes a soil moisture sensor that provides a voltage signal proportional to the moisture content in the soil which is compared with a predefined threshold value. On basis of this comparisons result the appropriate data are fed to the Arduino uno processor, which is linked by HC-05 module to an Android phone. Android smart phone allows the user easy remote control for irrigation system to switched on, off the drive motor. System has a potential to be used in the real time precision agriculture application.

II. A LOW COST SMART IRRIGATION CONTOL SYSTEM.

- Author: Chandan Kumar Sahu, Pramitee Behra
- Year Of Publish: 20115
- Conference: IEEE

In this paper author present a prototype for fully automation accessing of irrigation motor where Prototype includes number of sensor node placed in different directions of farm field. Each Sensors are integrated with a wireless networking device and the data received by the "ATMEGA-328" microcontroller which is on a "ARDUINO-UNO" development board. The RASPBERRY-Pi is use for send messages through internet correspondence to the microcontroller process. The objectives of this paper were to control the water motor automatically and select the direction of the flow of water in pipe with the help of soil moisture sensor. Finally send the information(operation of the motor and direction of water) of the farm field to the mobile message and g-mail account of the user.

IV. OBJECTIVE

The main objective of this system is complete solution to field activities, irrigation problems, and smart irrigation system and a smart warehouse management system respectively. This prototype monitors the amount of soil moisture and temperature. A predefined range of soil moisture and temperature is set, and can be varied with soil type or crop type. In case the moisture or temperature of the soil deviates from the specified range, the watering system is turned on/off. In case of dry soil and high soil temperature, it will activate the irrigation system, pumping water for watering the plants and it will also able to control by mobile application where user can see live updates

V. WORKING

A pipe is connected from water pump and the other opening is kept near the root of the plant, with rain gun irrigation mechanism attached to it. The flow of the water from the pipe is controlled by a solenoid valve. The opening and closing of solenoid valve is done by microcontroller The microcontroller gives signal to the valves which causes it to get open. The water is given to the root of the plant drop by drop, and when the moisture content becomes sufficient, the sensor senses this and gives back the signal to the microcontroller and the buzzer becomes off Then by pressing the button in the calling function again. The power supply needed by the controlling system is +5V.

- In this project, we implement Smart Farming using IoT.
- We continuously monitor water level of Well and control the Motors from Android Application.
- We will monitor physical parameters of farm which will be Temperature, Soil moisture, etc.

The system architecture allows user to achieve the above mentioned activities in real time so that farmers can view their farm details from anywhere (and do not need to go to farm).

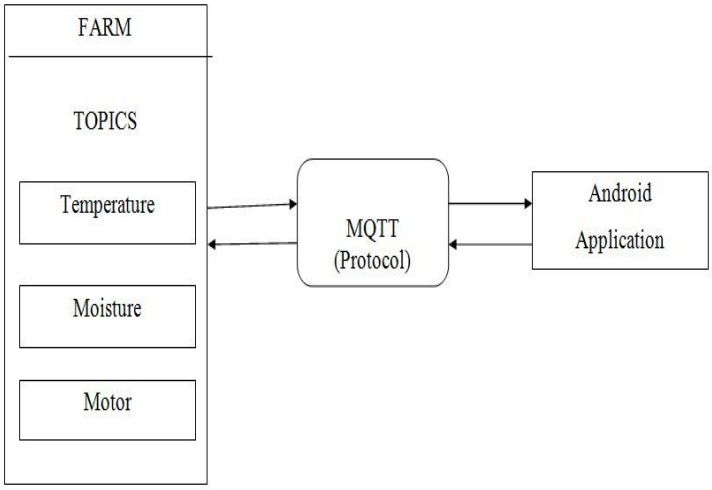

Fig.1 Proposed System Architecture

VI. ALGORITHM

Step 1: SDE.
Step 1.1 : Collect multiple sensor data.
Step 1.2 : Send Sensor data to FM.

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Step 2: FM
Step 2.1 : Process incoming data from SDE.
Step 2.2 : Log data into database.
Step 2.3 : Perform required operation since sensor data.
Step 3: Farm Sensors.
Step 3.1 : Detect value of Moisture.
Step 3.2 : Send data to FM.
Step 4: FM will increase or decrease water flow based on incoming sensor data.
Step 5: Stop

VII. FUTURE SCOPE

Our project can be improvised by adding a Webs caper which can predict the weather and water the plants/crops accordingly. If rain is forecasted, less water is let out for the plants. Also, a GSM module can be included so that the user can see this reports the system via smart phone. A water meter can be installed to estimate the amount of water used for irrigation and thus giving a cost estimation. A solenoid valve can be used for varying the volume of water flow.

VIII. ADVANTAGES & DISADVANTAGES

Advantages :

1. This system can be use for conserving water planning and irrigation scheduling which is extendable to other similar agricultural crops.
2. Maximum absorption of the water by the plant is ensured by spreading the water uniformly using a servo motor.
3. There is minimal wastage of water.
4. This system also allows controlling the amount of water delivered to the plants when it is needed based on types of plants by monitoring soil moisture and temperature. This project can be used in large agricultural area where human effort needs to be minimized. Many aspects of the system can be customized and fine tuned through software for a plant requirement.

Disadvantages:

1. Internet connection is must for android app updates.

IX. CONCLUSION

We conclude that Cloud based Cultivation Management System is system for the user who cultivates plants in Green house or farm field. Farmer can monitor farm details from anywhere within the range. Farmer can also monitor the temperature, soil moisture details, water level, etc. If such environmental factors are monitored and proper actions such as to on/off water motor, etc. are taken, there can be increase in the productivity by using automated irrigation system which uses Moisture Sensors, Arduino Uno processor and connected to the Android smart phone via HC-05 bluetooth device.

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