

Iot Based Smart Irrigation

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Abstract- Agriculture is the key occupation in many developing countries. In many countries agriculture is means of income for the farmers . And in the field of agriculture water the key element .Fresh water source may be scarce in some countries and in some countries it may be not .As freshwater source is about 3% in all over the world so we should find a measure to control its usage and not squander water . In the field of agriculture sometimes unnecessary usage of water may happen .So it should be controlled in someway .And automation is the way in which we can precisely control the energy ,flow ,etc. So the automation can be controlled by means of the embedded devices Not only energy conservation is to be considered labor – hard ,intensive work is also reduced . The labor in the field of agriculture has to face weather and he has to look after the crops or the plants day after the day . This can be reduced by means of automation I.e. by means of embedded devices .So this project the Arduino uno ,soil moisture sensor ,ultrasonic sensor ,wifi module ,pump to water plants and pipe to perform irrigation .With the help of these hardware we can program them and create a device which can automate the irrigation process .As well as in this project the farmer or the user of these equipment can also keep a check on the water level in the storage that we are using along with this we can get the detailed information of this system wherever we are and can control our system by just merely by our fingers .We hope that through this model we make the work of farmers or user of this model easy .And in the long run he can achieve greater benefits from it in terms of economy and many more .

Keywords- IoT, Arduino, Irrigation, Android, Data Mining

I. INTRODUCTION

Agriculture is the field which contributes heavily to economy of the nation .Now a days Agriculture is on the run for automation.Many models have been developed in order to automate the field of Agriculture .As we all know that it is very difficult for farmers not only farmers but for anyone to manage the water of plants very precisely without Watering them in excess .It is utmost need to manage the water efficiently because as freshwater source is very limited in the whole Earth .So automation by means of IoT can be achieved in the field of irrigation .This management helps to achieve high profits for the farmers .It will reduce the labor work from

the heads of farmers .This reduction in labor work can be achieved by controlling the irrigation system by means of mobile application .The farmers can receive the information what is happening in real time by means of the hardware that is used

This hardware provides various information to the farmers such as receiving the values of moisture content in soil .Controlling the flow of water in soil by means of application without any manual labor .Controlling the storage reserves of water i.e. receiving the values about how much water is present in reserve so by receiving the update regarding it the farmer can refill the tank on go .In the long terms we want to propose a system that can reduce manual labor of the farmers and in the long terms it can benefit them in terms of economy and also the we the people can also get the benefit from this by means of consuming their outputs and in turn providing greater returns to them .So the main proposal of this project is to develop a smart irrigation system using Arduino .The main emphasis would on the soil moisture ,storage of water in tanks.

II. HISTORY

With the onset of 17th century the concept of IoT began with the invention of electromagnetic telegraph, since then the various inventions came into picture but the term IoT was introduce by Kevin Ashton in 1999 to encourage RFID technology. Since 2013 IoT has grown drastically into a system using different technolo-gies like internet to wireless communication and MEMS(micro-electromechanical system) to embedded system. GPS, control system ,wireless sensor network all are used by IoT. IoT is sim-ply a device with ON/OFF buttons which is connected to web. The invention of IPv6 helped in the advancement of IoT in vari-ous sectors.

III. OBJECTIVE

- To measure the soil moisture.
- To check the water level in the tank.
- Through Data Mining suggest the user which configuration is better, based on the classification of Soil and plant.
- To reduce the labour work and make a cost efficient system

IV. LITERATURE SURVEY

We have analyzed some papers below. This paper[1] has proposed a system that is very basic and doesn't bring anything new to the table. It uses a system that has sensors for moisture, temperature and humidity, and uses arduino to execute its functions. It is partially automated as the user needs to keep a check on the water level of the system. This system uses a GSM module for communication. This paper [2] proposes a method that uses multiple sensors i.e Temperature, moisture, humidity, light to make a smart irrigation system. The data is sent to a web server for data analyzing and processing, it is stored in JSON format. The light sensor senses the light, to maximize the functioning of the plant, a light is deployed as well. They plan to use smart algorithms to optimize the system. It advertises that it is 92% efficient than the rest. [3]IoT is used for irrigation in this project as the moisture sensor detects the content of water inside the soil and accordingly informs the user through the computer it is connected to via a notifications. The system compares the moisture with the threshold value and starts the water pump in accordance and stops the pump accordingly. The system has limited range as it is using a computer to connect to the arduino board via usb cable since it is not feasible to use for a farm. This project uses an arduino, moisture sensor and an water pump. The system[4] proposes a method in which it will use a master and slave configuration where the raspberry pi will control various arduino devices with Zigbee protocol. The raspberry pi will keep checking its email for any commands which will be in the form of "Turn on the pump for Y minutes." This command will turn on the relay to the water pump for the said Y minutes. There is a ultrasonic sensor that keeps monitoring the water tank level and will notify the user with a email only. The system[5] proposes a method to implement a method for smart irrigation with an Arduino and a Raspberry pi. The system uses Zigbee for communication between the two. The system can be controlled via cherrypy with the ip address of the raspberry pi, i.e it has a short range. In this system the raspberry pi does all the calculations and directs the result of it to Arduino's via zigbee. The system[6] proposes a method in which it will scan the soil for moisture and act accordingly i.e start the pump and stop as well. The system is different than others because it uses Bayes theorem to predict the values of future via Data mining. This helps the user understand the pattern of water pumping process in different seasons and can act accordingly for water storage as well. This system has been developed for a web based user. This is done so as to reap the benefit of the computer to store the values and predict the values as well as it requires some amount of computation. This system[7] proposes a method in which they use a GSM to control the system of watering the plants according to its threshold value. The

system uses a temperature, humidity, Rainfall, Water level sensors. The system will not pump water if there is rainfall, Which saves resources! The system is controlled via a smart phone, it conveys the command to the system either via a SMS or via internet, This makes the system operatable via long range, thus giving the user freedom to be anywhere and operate the system. This system[8] proposes a method in which it calculates the amount of water required by the plant under the current/ongoing scenario. It calculates the light intensity as more the intensity the more is water loss by evaporation. It calculates the wind as well to find the loss of water done by wind. This information that is generally not calculated and comes under the error part, and is generally omitted. The larger this is not calculated the output is faulty.

V. REQUIREMENTS

1. Arduino UNO:



Figure 1: Arduino Uno

2. Moisture Sensor

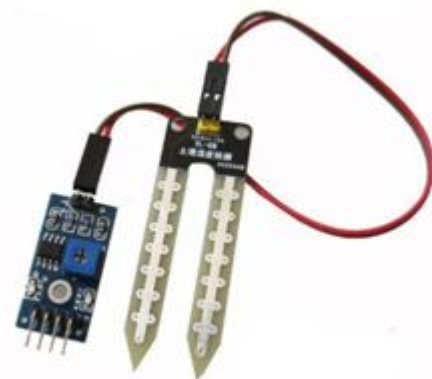


Figure 2: Moisture Sensor

3. Ultrasonic Sensor



Figure 3: Ultra sonic Sensor

4. Relay



Figure 4: Relay/Switch

5. Wifi Module



Figure 5: Wifi Module

VI. BASIC ARCHITECTURE

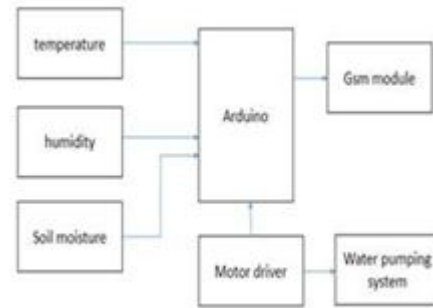


Figure 6: Basic Architecture

VII. APPROACHES

Various approaches have been used in the previous years to im-plement modern automated irrigation techniques. In the initial stages, the main focus was on hardware. Hardware such as sen-sors, GSM or WiFi module, Bluetooth, Zigbee as well but a re-cent addition of software has made things quite simpler for the crop cultivators and farmers as well. Software provides a Graph-ical User Interface which is an easy way of interaction with the user. Different Interfaces like mobile applications and web based applications enable the users to communicate with the hardware and control them. Nowadays, User can control and monitor the farms with the help of smart phones. Numerous types of sensors like Moisture sensors, Water-Level sensors and Temperature sensors are set on the farmlands to measure different environmental parameters. Electronic development kits like Arduino and Rasp-berry Pi provides power and instructions to other devices in the entire setup. All these hardware devices communicate with each other with the help of communication protocols like:

GSM:(Global System for Mobile Communication) it is a module which consist of SIM card and it can be used for communication between different devices by means of SIM card which connect to network and the network supports different bandwidths .This module is mainly used for commu-nication purpose .In IOT this module is connected to Ar-duino board by means of USB .

Bluetooth: It is a wireless protocol that operates using radio waves for device communication. It has the ability to communicate with many different devices with any interruption. It is a standardized protocol for short range communication and data transmission from point to point or multiplier applications. There are various types of Bluetooth protocols for example (TCS Binary, SDP, TCP/IP).

Zigbee: It is a wireless protocol. It is an IEEE 802.15.4 based specification used for higher level communication protocols. Zigbee can be used for creating PAN with less power digital radios. It can be used in medical device data collection, automated home system. It can also be used for small scale projects. It is comparatively cheaper compared to other WPANs like Bluetooth or Wi-Fi. Zigbee can be used for transmitting data over large distances by passing through a mesh network

VIII. PROPOSED SYSTEM

Our System Proposes a method that will bring some old concepts and new ones together, We are working on a model in which we plan to deploy Data mining algorithm where we will analyze data recorded in various scenarios and situations. We will use the data and provide information to the user as to which combinations of scenarios will benefit the user the most. All of this will be done through the help of an Android application, which will be developed in house.

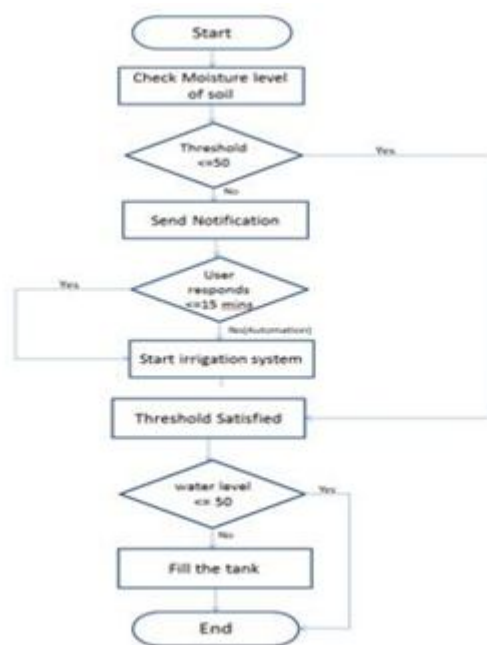


Figure 7: Proposed System

IX. FUTURE SCOPE

Creation of Database which contains values from multiple places in accordance to the types of plants, soil, temperature etc. By creation of Database we plan on implementing Data Mining.

Data Mining will be done from the Database which will be collected from multiple places, We plan to find

information from the database based on the location, types of soil and plants which would grow efficiently based on the provided parameters.

Android application will be implemented in 2 sub parts. One will contain full Automation of watering of plants Second part will manual/human intervention.

X. CONCLUSION

In the present situation the farmers do manual work i.e. they water the plants manually, they fill the tanks or water sources manually and many more work is done by them manually. So in order to reduce their manual labour and helping the farmers to increase their profit gains we have tried to implement this system. This system though it has initial investments but in long run it has high profit gains.

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