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IOT BASED IRRIGATION USING ARDUINO AND ANDROID ON THE BASIS OF WEATHER PREDITCION

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ABSTRACT: *In many countries agriculture is means of income for the farmers, and water is 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. Automation is one way in which we can precisely control the energy, water flow, etc. So the automation can be controlled by means of the embedded devices. From this energy conservation and labor 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 in this project the Arduino UNO ,soil moisture sensor ,ultrasonic sensor ,Node MCU, pump is used to water plants and as well as pipes with drippers are used to perform irrigation .With the help of these hardware we can program them and create a device which can automate the irrigation process and 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 on our finger tips .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.*

KEY WORDS: **IoT, Arduino, Irrigation, Android, Weather prediction**

1. INTRODUCTION

Agriculture is the field which contributes heavily to economy of the nation .Now a days Agriculture is on the run for automation. Numerous models have been created with a specific end goal to mechanize the field of farming .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 be on the soil moisture ,storage of water in tanks.

2. 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 introduced or coined by a Kevin Ashton in 1999 to encourage RFID technology. Since 2013 IoT has grown drastically into a system using different technologies like internet to wireless communication and MEMS (micro-electro mechanical system) to embedded system. GPS, control system, wireless sensor network all are used by IoT. IoT is simply a device with ON/OFF buttons which is connected to web. The invention of IPv6 helped in the advancement of IoT in various sectors.

3. OBJECTIVES

- 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 labor work and make a cost efficient system.

4. LITERATURE SURVEY

We have analyzed some papers below. This paper [1] has pro-posed 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 that uses multiple sensors i.e Temperature, moisture, humidity and 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 has 92% efficiency 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. The system make use of an arduino board, moisture sensors 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 adruino 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 an ultrasonic sensor that keeps monitoring the water tank level and ill notify the user with an 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 as a communication method between the two. The system can be controlled through cherry py with the ip address of the raspberry pi board, 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 user, so no mobile application. 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] pro-poses a method in which they use a GSM to control the system of watering the plants according to its threshold value. The sys-tem 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.

5. ALGORITHM

We are with all the Microsoft Azure mechanical device set of rules, Machine study is actually a info system approach that permits computers to use alive picture to foretell long run behaviors, outcomes, and trends. Using mechanical device research, computers be informed left out personality deliberately programmed.

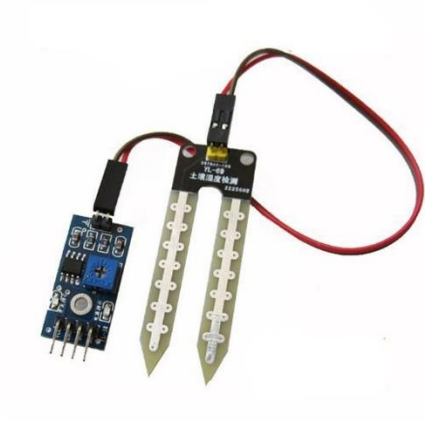
We are using machine learning to predict the weather data for a location set by the user. By these value predictions the plant watering will vary from plant to plant and season to season. Rainfall is also considered into this algorithm, an exception has been developed for this as weather predictions are not 100% accurate. We will keep 1 hour time for rainfall to occur, if it doesn't plant will be watered.

Steps for the Algorithm:-

1. The plant is selected from the mobile application along with the soil type.
2. The location of the farm is set from the mobile application.
3. Plants daily water requirement values will be fetched from the firebase server.
4. These values fetching will depend on the weather variations of the location.
5. Watering will take place as per schedule and threshold of soil moisture sensor of particular plant and also watering is done considering whether there are chances of rain in near future.
6. All these changes in weather helps the machine learner to study and predict new values in the near future.

6. REQUIREMENTS

1. Moisture Sensor



2. Node MCU

3. Solenoid Valve

4. UltraSonic Sensor

5. Water Pump

6. Arduino UNO

7. SYSTEM ARCHITECTURE

The Below architecture helps us in understanding the system and its components. The components required are mentioned below.

a. Arduino
b. Node MCU
c. Solenoid Valve
d. Moisture Sensor
e. Firebase
f. Weather API
g. Mobile Application
h. Multiplexer
i. Water Pump

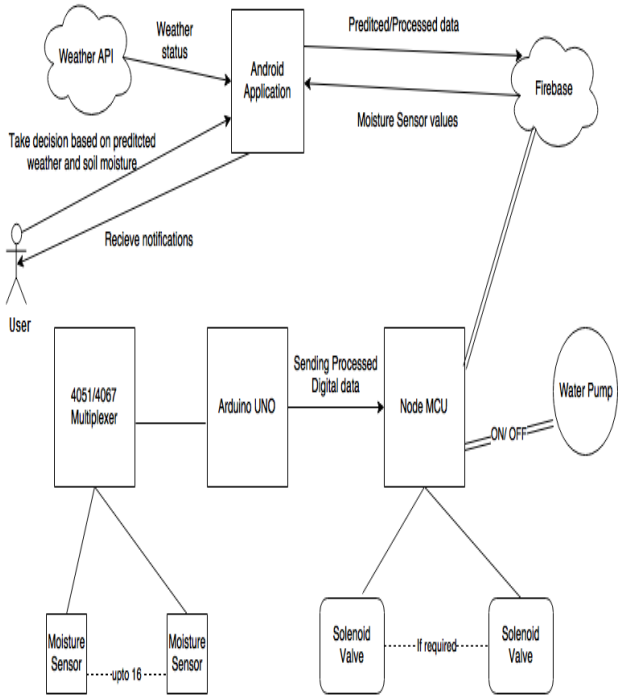


Fig 1:System Architecture

8. PROPOSED SYSTEM

Below are the images of the working system

9. RESULTS

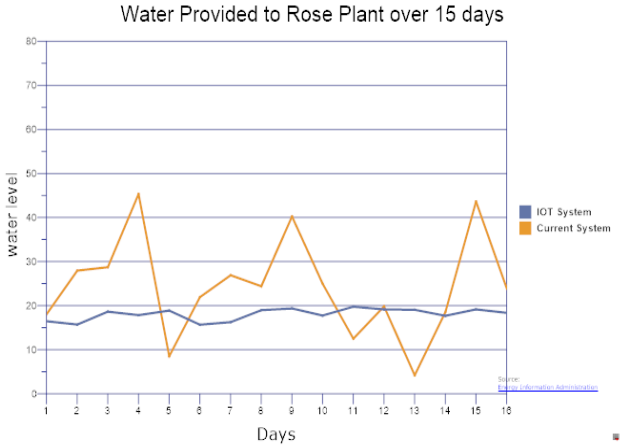


Chart 1:Difference between Traditional and new system

The above graph shows the difference between our system and current systems that use human intervention.

10. CONCLUSION

At the end we would bring to the conclusion that the project helps people who are new to farming. The system provides people suggestion as to which plant will suit the best for their soil type. Weather system predicts and sets the plant watering cycle as per the weather, this removes the element of human interaction completely from the plant watering. Only planting the seeds need to be done. The advent of water soluble fertilizers also removes the task of the farmer to fertilize the plants. Fertilizers could be just added to the water tank, and watering system would do the rest.

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