

# Smart Irrigation System Based on IOT

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## ABSTRACT

The Internet of Things (IOT) has been denoted as a new wave of information and communication technology (ICT) advancements. The IOT is a multidisciplinary concept that encompasses a wide range of several technologies, application domains, device capabilities, and operational strategies, etc. The ongoing IOT research activities are directed towards the definition and design of standards and open architectures which is still have the issues requiring a global consensus before the final deployment. Our main objective of this work is to for Farming where various new technologies to yield higher growth of the crops and their water supply. Automated control features with latest electronic technology using microcontroller which turns the pumping motor ON and OFF on detecting the dampness content of the earth and Wi-fi module is proposed after measuring the temperature, humidity, and soil moisture. Wi-Fi Module ESP8266-12 which connects the system to internet. This module controls a motor for supplying water to the field on the information obtained from soil moisture sensor.

## Index Term

*Aurdino microcontroller ; sensors ; relay ; pump ;LED ; etc.*

## 1. INTRODUCTION

In our country, agriculture depends on the monsoons which has insufficient source of water. India is the country of village and agriculture plays an important role for development So the irrigation is used in agriculture field. In Irrigation system, depending upon the soil type, water is provided to plant. In agriculture, two things are very important, first to get information of about the fertility of soil and second to measure moisture content in soil. Nowadays, for irrigation, different techniques are available which are used to reduce the dependency of rain. And mostly this technique is driven by electrical power and on/off scheduling. In this technique, water level indicator placed in water reservoir and soil moisture sensors placed root zone of plant and near the module and gateway unit handles the sensor information and transmit data to the controller which in turns the control the flow of water through the valves.

## 2. LITERETURE SURVEY.

Various researches have been carried out on how soil irrigation can be made more efficient .The researchers have used different ideas depending on the condition of the soil and

quantity of water Different technologies used and the design of the system was discussed by the researchers. This paper aims at reducing the wastage of water and the labor that is used to carry out irrigation manually. The proposed system aims at detecting the moisture content of the soil using sensors that are placed directly into the soil. This sensors sense the water level of the soil and if the water level is not adequate then the user will be notified through a message that will be sent to the application which would be installed on the user's mobile phone. The Arduino board, a microcontroller, controls the digital connection and interaction between objects in the proposed system, enabling the objects to sense and act . Also, with its powerful on-board processing, various sensors and other application specific devices can be integrated to it. In the system, sensors detect the water and moisture level and send readings to a fixed access point, such as a personal computer, which in turn can access irrigation modules installed in the field or the physical module in the water tank, wirelessly over the internet. A wireless application of drip irrigation automation supported by soil moisture sensors Irrigation by help of freshwater resources in agricultural areas has a crucial importance. Traditional instrumentation based on discrete and wired solutions, presents many difficulties on measuring and control systems especially over the large geographical areas. If different kinds of sensors (i.e. humidity, and etc.) are involved in such irrigation in future works, it can be said that an internet based remote control of irrigation automation will be possible.

## 3. PROBLEM STATEMENT

In India, agriculture is the need of most of the Indians livelihood and it is one of the main sources of livelihood. Agriculture also has a major impact on economy of the country. The consumption of water increases day by day that may leads to the problem of water scarcity. Now a days not only for crops outdoor plants in home becoming quite difficult for them.

### 3.1 Conventional Irrigation Methods

The conventional irrigation methods like overhead sprinklers, flood type feeding systems usually wet the lower leaves and stem of the plants. The entire soil surfaces saturated and often stays wet long after irrigation is completed. Such condition promotes infections by leaf mold fungi. On the contrary the drip or trickle irrigation is a type of modern irrigation technique that slowly applies small amounts of water to part of plant root zone. Water is supplied frequently, often daily to

maintain favorable soil moisture condition and prevent moisture stress in the plant with proper use of water resources. Drip irrigation saves water because only the plant's root zone receives moisture. Little water is lost to deep percolation if the proper amount is applied. Drip irrigation is popular because it can increase yields and decrease both water requirements and labour. Drip irrigation requires about half of the water needed by sprinkler or surface irrigation. Lower operating pressures and flow rates result in reduced energy costs. A higher degree of water control is attainable. Plants can be supplied with more precise amounts of water. Disease and insect damage is reduced because plant foliage stays dry. Operating cost is usually reduced. Federations may continue during the irrigation process because rows between plants remain dry.

### 3.2 Problems in Traditional System

In the case of traditional irrigation system irrigation is done manually by farmers. Since, the water is irrigated directly in the land, plants under go high stress from variation in soil moisture, therefore plant appearance is reduced. The absence of automatic controlling of the system result in improper water control system. The major reason for these limitations is the growth of population which is increasing at a faster rate. At present there is emerging global water crisis where managing scarcity of water has become a serious job. This growth can be seen in countries which have shortage of water resources and are economically poor. So this is the serious problem in Traditional Irrigation System.

### 3.3 Limitations of existing system

- Physical work of farmer to control drip irrigation
- Wastage of water
- Wastage of time
- As water sits in irrigation channels malarial mosquitoes can breed.

### 3.4 Smart Irrigation System

Smart irrigation systems offer a variety of advantages over traditional irrigation systems. Smart irrigation systems can optimize water levels based on things such as soil moisture and weather predictions. This is done with wireless moisture sensors that communicate with the smart irrigation controls and help inform the system whether or not the landscape is in need of water. Additionally, the smart irrigation controlled receives local weather data that can help it determine when a landscape should be watered. The Smart Irrigation System is an IoT based device which is capable of automating the irrigation process by analysing the moisture of soil and the climate condition (like raining). the data of sensors will be displayed in graphical form on BOLT cloud page.

The advantages of these smart irrigation systems are wide reaching. The smart irrigation system will help you have better control of your landscape and irrigation needs as well as peace of mind that the smart system can make decisions independently if you are away.

You will save a significant amount of money on your water bills because through intelligent control and automation, your smart irrigation system will optimize resources so that everything gets what it needs without needless waste. Additionally, we have all seen many places in the country that have experienced droughts and we know that our water

resources are precious. With smart irrigation systems we can be better stewards of our resources which is better for the environment. The opportunity to save dramatically, have better control and be more eco-friendly while maintaining a lush and beautiful landscape are just a few of the advantages a smart irrigation system provides and would make a wonderful addition to any home. Smart Irrigation System uses valves to turn irrigation ON and OFF. These valves may be easily automated by using controllers and solenoids. Automating farm or nursery irrigation allows farmers to apply the right amount of water at the right time, regardless of the availability of labour to turn valves on and off.

Benefits of Smart Irrigation are

- Save water and money
- Save your customers money
- Make maintaining yard easy and convenient
- Minimize the infrastructure to store and carry water
- Protect the water resources for future generations

This paper proposes irrigation system which describes the combination of the IoT communication technology and cloud server to accomplish performance of system and data storage. The proposed system provides remote monitoring and automated controlling of irrigation with real time sensing of atmospheric and soil conditions like air temperature, humidity and soil moisture. IoT based irrigation improves farm production without any human interloping.

## 4. IMPLEMENTATION USING IOT

This project uses concept of IOT for monitoring and controlling the system using a public server called MQTT server. It uses an android app called My MQTT. In this app, one has to subscribe a topic and publish a message of specific function. The server will call-back to perform the function.

## 5. PROPOSED SYSTEM

This system is a combination of hardware and software components. The hardware part consists of different sensors like soil moisture sensor, photocell sensor, etc whereas the software part consists of an android based application connected to the arduino board and other hardware components using Internet of Things (IoT). The android based application consists of signals and a database in which readings are displayed from sensors and are inserted using the hardware. The improvement in irrigation system using wireless network is a solution to achieve water conservation as well as improvement in irrigation process. This research tries to automate the process of irrigation on the farmland by monitoring the soil water level of the soil relative to the plant being cultivated and the adaptively sprinkling water to simulate the effect of rainfall.

### 4.1 Moisture Sensor

The Soil Moisture Sensor is used to measure the volumetric water content in the soil. This makes it ideal for performing experiments in plants by having constant information about the amount of water currently present in soil and accordingly providing water to the plants for proper nourishment. This includes constant checking of moisture content in soil and sending the readings to the android application. If the moisture content is less than the threshold value (which is pre-fed into

the arduino board), a prompt message is sent to the device and automatically a sprinkler connected to the arduino will start sprinkling water on the affected area.

## 4.2 Arduino

Arduino is an open source computer hardware and software company, project and user community. It is the best board to get started with electronics and coding.

The main working principle behind this system is in connecting the soil moisture sensor, which was previously embedded into the plant, to the Arduino microcontroller, which is also connected to other electronic components. Measurement of soil moisture is done by the sensor which forwards the information and parameters regarding the soil moisture to the microcontroller, which controls the pump. If the level of soil moisture drops below a certain value, the microcontroller sends the signal to the relay module which then runs a pump and certain amount of water is delivered to the plant. Once the enough water is delivered, the pump stops doing its work. Power supply has a task to power the complete system and the recommended voltage should respect the input supply range for the microcontroller.

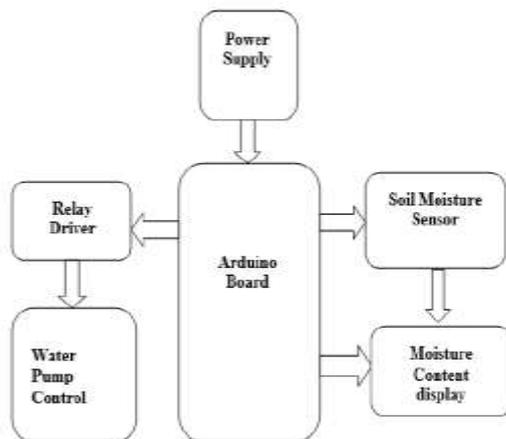


Fig 1 Block Diagram of Smart Irrigation System

## CONCLUSION

The agriculture field is being monitored and controlled by android app at user end. The ESP8266 is the device at field end which receives the messages from broker network and manipulates it and will perform the function mentioned in message. After it will send the messages to broker network and in turn it will be published to the Client (user end). The ESP8266 is the best device for IOT projects. Since it is small, compact, lightweight, easily programmable, and easily installable and have enough IO pins to use them.

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