

## Irrigation system in Modern Age

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### Abstract:

Agriculture is the backbone of Indian economy. About 50% of Indian population depending on agriculture sector to meet their day-to-day expenses. The current irrigation system practiced in India is sprinkler water irrigation, tank water irrigation, inundation irrigation, etc. these methods are less efficient as they do not scatter to the requirement of the moisture level of the soil and do not make efficient use of water resources. In the future, as population increases, demand for food crops increases, which eventually results in depending on water resource on a large scale. The electricity distribution in India is poorly organized and very unsettled. Currently, India requires technological up gradation to meet the demand for irrigation purpose. The IOT based Modern Farming enables efficient utilization of water as the soil is constantly monitored with the help of moisture sensor and based on the readings the crop is irrigated with the help of a motor. The power is supplied through the DC Adapter/battery 12V. All this can be achieved using IOT technology. The main ideology behind this project is to reduce human intervention and efficiently make use of water and electricity. This is made possible by sending received data to the android device using Bluetooth Module. The entire system is controlled and executed by the Arduino UNO Board microcontroller.

**Keywords:** IOT, Moisture sensor, DC Adapter, Bluetooth Module, Arduino UNO.

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### I. Introduction

India is an agriculture based country. At present farmers manually irrigate land at regular interval which is quite hectic and requires a lot of manpower, in this way they cannot monitor each and every field of their farming land, which may lead to underuse or overuse (wastage) of water as well as electricity as these resources are scarce. Thus the proposed designed a user-friendly android application for farmers to automatically monitor and control the irrigation system using a microcontroller, some sensors and other electronic components.

Farmers may automatically irrigate the farms, saving a lot of time and effort using the modern irrigation system.

### II. Literature Survey

[1] WATER IRRIGATION BY USING WIRELESS SENSOR NETWORK, In this paper, using the fertility meter and pH meter are used by the team to determine the percentage of potassium, phosphorus, nitrogen, which is the most important ingredients of soil. Now, after measuring fertility of soil, The implantation of the automatic plant irrigator for DRIP irrigation through wireless is done by the team. Both techniques will help to judge fertility and moisture content of soil. This application of sensor-based irrigation has some advantages such as preventing moisture stress on trees, diminishing of excessive water usage, ensuring of rapidly growing weeds, measuring fertility of soil.

[2] The paper on "Smart Irrigation System" is developed to create an automated irrigation mechanism which turns the pumping motor ON and OFF on detecting the moisture content of the earth using the soil moisture sensor without the intervention of human. The benefit of employing these techniques is to decrease human interference and it is quite feasible and affordable. This Smart irrigation system project is using an Arduino microcontroller, that is programmed to collect the input signal according to moisture content of the soil and its output is given to the op-amp that will operate the pump.

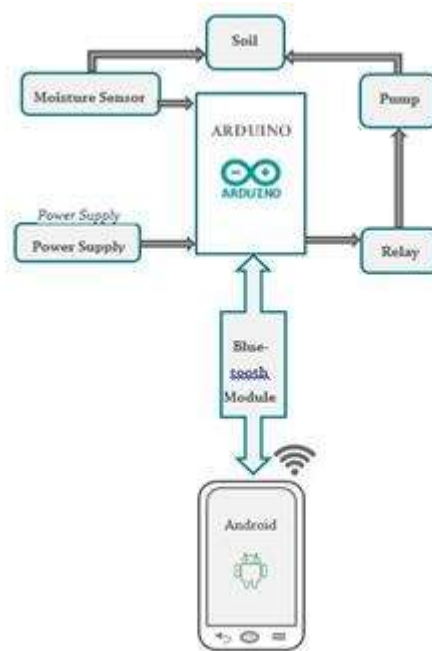
[3] Automation of Irrigation System Using ANN based Controller, This paper has described a simple approach to Irrigation control problems using Artificial Neural Network Controller. The proposed system is compared with ON/OFF controller and it is shown that ON/OFF Controller based System fails miserably because of its limitations. On the other hand ANN based approach has resulted in the possible implementation of better and more efficient control. These controllers do not require a prior knowledge of the system and have inherent ability to adapt to the changing conditions unlike conventional methods. It is noteworthy that ANN based systems can save a lot of resources (energy and water) and can provide optimized results to all type of agriculture areas.

[4] AUTOMATIC IRRIGATION SYSTEM USING WIRELESS SENSOR NETWORK, In this paper, we moisture in the soil and the threshold value decides when the pump should be turned on/off, saves a lot time and energy for the farmers, gives them extra time to manage their sales and purchases.

### III. Proposed Method

The Fig.1 shows the block diagram of the recommended system. It includes of a Soil Moisture Sensor to measure moisture level of soil and a Bluetooth module HC-05 which is a master/slave module, in the transmission and receiving process for transmitting data from sensors to mobile phone and receiving commands from mobile phone, which acts as a controller in Fig. 6. This prototype monitors the amount of soil moisture content in the soil. It's a very flexible system as the reference value of soil moisture can be set for varied crops, thus one system for diverse crops. In case the soil moisture deviates from the specified reference, the watering system is turned ON. The system will switch off by manual intervention at any time or when the set time is finished. This project is mainly based on developing a mobile app and controlled through it which acts as a replacement for the GSM method which is not very feasible and user friendly in use.

#### I Control system



*x. Block Diagram of IOT based Modern Farming*

**Figure 1** Block Diagram

### IV. Resource Planning And Working Mechanism

#### A. Arduino UNO R3 Board

The Arduino UNO is a microcontroller is shown in Fig.2 that has 14 digital input-output pins.6 analog inputs, 16 MHz ceramic resonator. It is connected with a computer with the help of a USB cable or powers it with ac to dc adapter or a battery for power supply.



**Figure 2** Arduino UNO R3 Board

### B. Soil Moisture Sensor

Soil moisture senses the moisture level in the soil and based on the value that is shown on the display, according to the control circuit motor will be start ant it will pump the water with the help of a pump and the pumping actions will continue till it fulfills the conditions. With the help of this sensor which is shown in Fig.3 we can detect the moisture level of the soil. A local circuit connection is shown in Fig. 4



Figure 3 Soil Moisture Sensor

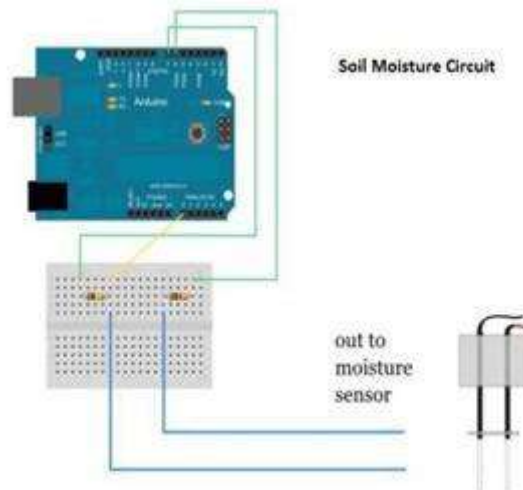


Figure 4 Local Circuit Connection

### C. Relay

The 5V relay module is suitable for SCM development, home appliance control. It is with 5V

- 12V TIL control signal which can control DC / AC signal. The module is perfect for the common Arduino microcontroller application.



Figure 5 Relay

### D. Water Pump

A simple 12 VDC submersible water pump. Specifications:

- Rated voltage: 12V DC.
- Max rated current: 350mA.



**Figure 6** Water Pump

### **E. Bluetooth Module**

The Bluetooth module HC-05 is a master/slave module. The data collected by the moisture sensor is transferred to the android application in the smart phone via Bluetooth technology using this module. It works on serial communication.



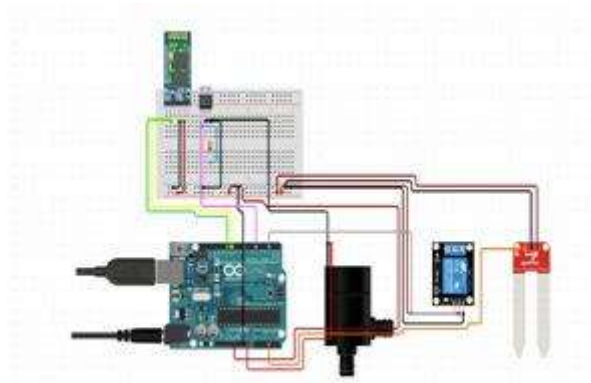
**Figure 7** Bluetooth Module

### **F. Working mechnisum**

There are functional components of this project are:

- The Bluetooth module
- The relay
- The moisture sensors
- The motor/water pump.

The Arduino Board is programmed using the Arduino IDE software. The function of the Bluetooth module is to establish connectivity with smart phone, the function of the moisture sensor is to sense the level of moisture in the soil. The motor/water pump supplies water to the plants which gets on/off with the help of relay.



**Figure 8** Circuit Diagram of Modern Irrigation System

## II CONTROLLER

Figure.9.shows a pictorial representation of the application run screen. The Moisture level values from the Moisture sensor will be displayed in the allotted widget after selecting the parameters in the application, the user now will be allowed to access the control to the motor either to start or stop the process. The application screen must be in run mode as the data and the control can be done over to the Arduino.



**Figure 9** User Interface (Controller)

## V. Result Analysis And Conclusion

### A. Results analysis

As the goal of the project is to design a smart drip irrigation system to reduce the wastage of water and electricity as well as the workload of farmers and water plants with the use of devices like Arduino UNO, Moisture sensor and other components. From the Fig.9.the controller shows the number of hours it should work and a number of times it should water the field and the duration between each cycle, after selecting these parameters the status of the motor is to be selected.

### B. Conclusion

This project provides an attractive user interface with the most efficient way of controlling the irrigation system. It gives the idea to monitor the soil moisture content in a farming area and the user can control watering system using Android device provided with Bluetooth facility. So, the overall implementation cost is cheap and it is affordable for a common person. Considering the present situation, we have chosen an Android platform so that most of the people can get benefits. The design consists of the Android App by which user can

interact and send a control signal to the output of the valve which will control sensors and also monitor the environment. This system is highly recommended in the region where there is scarcity of water to improve their sustainability and give farmers a hope.

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