

# DESIGN OF AUTOMATED DRIP IRRIGATION SYSTEM

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**Abstract:** The arduino based automated drip irrigation control motor pump assembly. The motor pump is switched on and off automatically as and when moisture content is less than the desired value and more than the desired value. This system helps in to reduce the task of controlling the motor by an agriculturalist and finally yields good crop. This system supplies the water to the plants whenever it is required without any deviation. This arrangement is a closed cycle operation hence the human interaction is very negligible. This arrangement has an Arduino board ATmega8 microcontroller which is programmed to read the moisture level of the soil and perform the necessary action.

**Key words -**Arduino, Automated Watering Mechanism, Soil Moisture Sensor.

## I. INTRODUCTION

In a country like India where agriculture is a mainstream occupation. Irrigation is one of the most prominent aspects which help in significant growth of crops for easy and successful cultivation. The main aim is to minimize the water wastage, reduce power consumption and to maximize profit we must supply the water as per the requirement of the crop for better yielding. The challenge of climate change gives us more responsibility to protect and manage our natural resources. As there are many research and developments in the field of agriculture technologies that allows cultivators to utilize resources more efficiently. The technology of building soil health through precision agronomic system and hybrid seeds takes a part and other big challenge is about the water which is to be supplied to the crops. By using this system we can accomplish the task to subject the physical conditions to nearly accurate environmental conditions.

## II. LITERATURE SURVEY

Continuous increasing demand of food requires the control in highly specialized greenhouse vegetable rapid improvement in food production technology [1]. Agriculture is a heart of any nation as it is needed for survival of the mankind for betterment of crops irrigation is a most essential part. In India about 85% of the water is used for irrigation [2], which is here irrigation is very important because over centuries it's been the work of our forefathers, it's the artificial application of water to the soil is shown in Fig.1. It is the process of storing the water and using it in off seasons it is also used when there is a drought or even less rains. Major role of irrigation is to provide the required amount of water to the soil. The water to the irrigation is obtained either by storing the water on the surface or by ground water or the flowing stream like rivers canals and many more. Main aim of irrigation is to keep the plants healthy and protect them from other unwanted plants and protecting from soil erosion. Three to six times of water that exists at any given time in all the world's rivers is now stored behind giant dams [3]. Main types of irrigation are drip irrigation and sprinkler irrigation among these drip irrigation takes a better place. In drip irrigation the water is directly supplied near the roots and in sprinkler as shown in Fig.2, water is supplied to a certain radius around the plants. In ancient days there were tulsi plants outside the house which were irrigated by hanging a mud pot above it which consisted tiny holes which would supply water drop by drop. In some states of India where water is not abundantly available they used bamboos which had consecutive holes and had long length and water is provide through it. In this model we are using drip irrigation system because it most efficient and there is less wastage of water compared to other techniques and soil erosion is also prevented in this method. It can also be applied in large variety of crops especially in crops which are grown throughout the year .Drip irrigation system has well known application in closed farming like growth of onion and ladies finger(okra).Nowadays insufficiency of water is becoming one of the biggest problems in the world. Hence to overcome this issue microcontroller based automated drip irrigations is presented [4].



Fig.1 Irrigation process



Fig.2 Drip irrigation system

### III. SOIL MOISTURE CONTENT DETECTION

Moisture content in the soil plays a vital role in atmospheric-water cycle growth in small agricultural fields and large scale agricultural lands the growth of crops and their vegetation always depends on the amount of moisture and water available to the plants especially to the roots for accurate supply of water by irrigation requires a soil moisture content test, knowing all the properties of the soil helps to get away with the risk of oversupply of water which intern damages the crop.

The moisture sensor as shown in Fig.3 consists of two probes which are used to measure the content of water present in the soil. The two probes allow the current to pass through the soil and then it gets the resistance value to measure the moisture value. When there is more water, the soil will conduct more electricity which means that there will be no resistance for the flow of current. Therefore, the moisture level will be higher. Dry soil conducts electricity poorly and offers high resistance. Therefore, the moisture level will be lower. This sensor can be operated in two modes which are Analog mode and Digital mode.

In this system it has a microcontroller which is preprogrammed to give a digital or analog output of moisture content status the relationship between the water and the system is not constant and depends on the requirement of the crop this system proposes the moisture content test on local soil and to modernize the small agricultural lands based on soil moisture

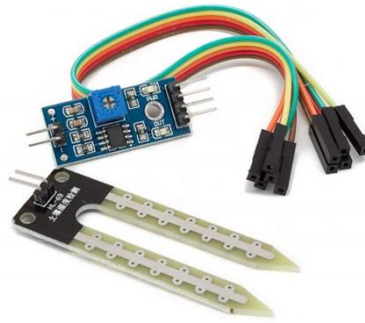


Fig. 3 Soil Moisture Sensor

### IV. ARDUINO

Arduino Board NG ATmega8 microprocessor is an open source platform used for building electronics projects. Arduino is a programmable circuit's board which we can write a program based on your projects. Arduino program will be uploading with IDE (Integrated Development Environment) software that runs on your computer, it is used to write and upload computer code to the Arduino physical board. Arduino language is merely a set of C/C++ functions that can be executed from your code.

### V. BLUETOOTH MODULE

The Bluetooth serial module allows all serial enabled devices to communicate with each other using bluetooth and has 6 pins. The HC-05 is a Bluetooth module designed for wireless communication. This module can be used in either a master or a slave configuration. It uses serial communication to communicate with devices. It communicates with microcontroller using serial port (USART). In this system the module is used to display the moisture content of the soil and the pump status to a Smartphone. The arduino board connected with bluetooth module is shown in Fig.4

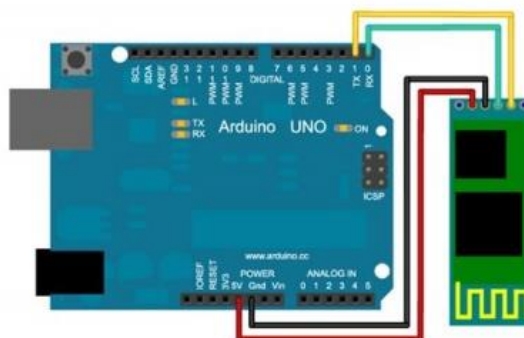


Fig.4 Arduino with Bluetooth module

### V. CODING

The LM393 comparator will look at the sensor yield esteem and the edge esteem and after that gives us the yield through the advanced stick. At the point when the sensor esteem will be more prominent than the edge esteem, at that point the computerized stick will give us 5V and the drove on the sensor will illuminate and when the sensor esteem will be not as much as this edge esteem, at that point the advanced stick will give us 0V and the light will go down.

In the setup, it has been designed that, the driven can be supplanted by hand-off or a submersible siphon stick as the yield stick since, it has been self-disciplined to drive through that stick. At that point, it has proclaimed that the sensor stick as info stick in light of the fact that the arduino will take the qualities from the sensor through that stick.

On top of its work, we have perused from the sensor stick. In the event that the yield estimation of the sensor will be higher than the edge esteem, at that point the advanced stick will be high and the driven will illuminate. In the event that the sensor esteem will be lower than the limit esteem, at that point the drove will go down.

**VI. RESULT**

The arduino board with bluetooth module receive the feedback from moisture sensor which is placed in soil. Based on the feedback received the microprocessor will take necessary action based on the set value. i.e if moisture value is less than set value the motor will be switched on else it will switched off. The working model of moisture content controller is shown in Fig.5  
 Red soil sample was taken and tested, the following results are obtained. The delay in sensor was set to 1 milli second. Threshold range value for dry soil is from 1015 to 1023. Threshold range value for wet soil is from 40 and 280. Moisture content is sent to handset in real-time through bluetooth module. Status of the pump is displayed along with time. A sample of the result displayed in user handset is as shown in Fig.6

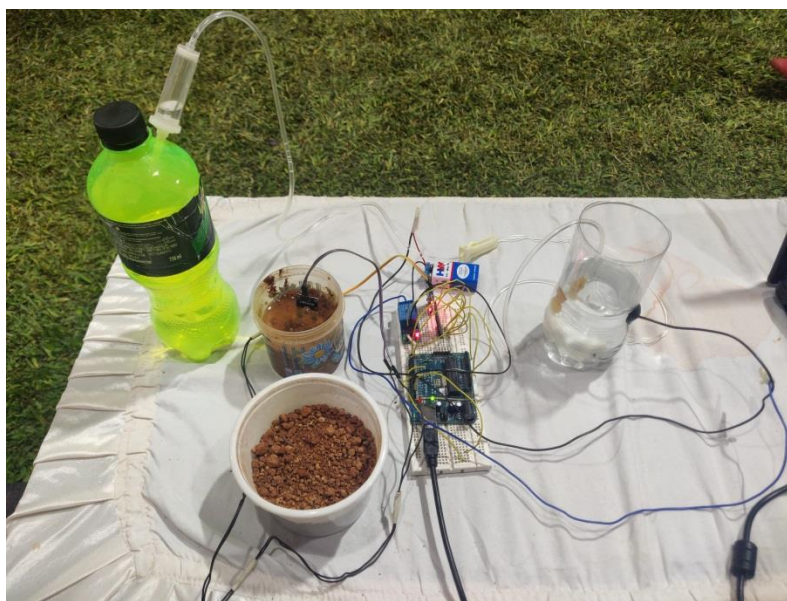


Fig.5 Working Model



Fig.6 Display of result

## VII. CONCLUSION

The essential applications for this undertaking are for ranchers and nursery workers who don't have sufficient opportunity to water their Crops/plants. It likewise covers those ranchers who are inefficient of amid water system. The task can be stretched out to nurseries where manual supervision is far and few in the middle. The rule can be reached out to make completely mechanized greenhouses and farmlands. Joined with the rule of downpour water reaping, it could prompt enormous water funds whenever connected in the correct way. In agrarian terrains with serious deficiency of precipitation, this model can be effectively connected to accomplish extraordinary outcomes with most kinds of soil.

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