

# Save Water, Save Earth Using Automated Agricultural Irrigation Method

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**Abstract**— Agricultural Irrigation is very essential for the production of crops. It is one of the important factors for the human to survive in his life. Irrigation is the method to plant the crops by water. Many methods of irrigation have been developed and are being practiced; but the selection of proper method of irrigation helps to improve the yield of the crops at an economical price thereby increasing the country's economy and development. Automated Irrigation is a modern technique, which saves 95% of the water and improves the production of crop. This paper proposes the different methods of automated agricultural operations, pros and cons of different methods, comparison between the traditional methods and modern automated irrigation methods.

**Keywords:** Agriculture, Irrigation methods, Automated Irrigation, Traditional Irrigation

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## I. INTRODUCTION

Agriculture in India is largely depends on natural rain and Irrigation based agriculture is proportionately smaller. Water being the limited natural resource, needs to be judiciously used. The dirt dampness based watering system control [1] utilizes Volumetric and Tensiometric procedures, which here are moderately straightforward however these sums are associated via a dirt water trademark twist which is particular to soil sort. Likewise the sensors utilized require routine upkeep for legitimate execution. Insightful programmed plant watering system framework [2] concentrates watering the plants frequently without the need of human checking utilizing a dampness sensor. With global warming and reduced rain in recent years, utmost significance has to be given for water conservation with improved crop yield and reduced labor. In the traditional methods of agricultural irrigation, there is lot of wastage of fresh water and also requires manual monitoring of the irrigation which insures additional labor and cost. The smart irrigation or automated irrigation system overcomes all the drawbacks of traditional irrigation system and helps in saving the precious natural resource, the water. The farmer can afford these techniques in his field so that manual monitoring of the agricultural field can be reduced. Even the farmer will come to know at what time he must put water to field. Finally, it provides the proper information to him about crops and saves his effort and time. Section II describes the Motivation of this paper. Section III portrays different types of traditional methods. Section IV describes the types of Modern Automated Irrigation Management System and Material Methods of the proposed framework. Section V describes the comparison

between Traditional Methods and Modern Automated Irrigation Management System. Section VI discusses the conclusion and future work.

## II. MOTIVATION

Earlier the farmers used to undergo physically checking the field, and even they do not come to know at what time to irrigate and how much to irrigate by water. But by using Automated Irrigation method a farmer will get to know how much the temperature and humidity of climate. Based on these calculations he can irrigate his field in a better way which even he can improve his field in a profitable manner.

## III. TRADITIONAL METHODS

Traditional Methods refers to monitor the field manually. Majority of the farmers are still using these methods. These methods are in less cost but takes time effort and maximum number of labors. There are many Traditional Methods of Irrigation which are as follows:

**1. Check Basin Process:** Here the entire area is separated into bowls or basins as indicated by the limit of water. Bowls are associated through like "Dhora" (A little deplete sort stream way), which seems like raised planet or earthen dividers on the both of sides. "Dhora" can be two sorts, one is the primary

"Dhora" and another is "Dhora" is associated with bowls. Size of bowls can be decided by the water flow. The advantage of this method is, it does not require any technical skills and is useful only in the case of levelled like fields, this can be disadvantage also.

**2. Furrow Watering System Process:** In this method, crops are grown in row wise. Most of the farmers go to this method because it takes less number of

labors. Here the advantage is more area of the field is irrigated. But the disadvantage is water wastage is more in this method. Even this process is not suitable for all types of crops.

**3.Strip Watering System Process:** Here the area is partitioned in to number of strips which are built depending on slope, width and structure of land. The pros of this process are even this method also requires less number of workers, more wastage of water is also not done. But it has limitation like it is not suitable to different types of soils and crops.

**4.Basin Watering System Process:** This method is suitable for horticulture rather than crops. Here the benefit of this process as more number of trees can this method leads to wastage of water and not suitable for crops.

#### IV. MODERN IRRIGATION

Modern method of Irrigation is a very important technique to use in the field of agriculture. It helps to improve the economy of our country because agriculture is the main source of India. There are different methods of modern irrigation like:

**1.Sprinkler Irrigation:** This method can be used to sprinkle fertilizers. Here the water is sprinkled through the pipes in the form of drops. This is like natural precipitation. The advantages of this watering system are large area is irrigated, and then every crop gets water. No much Technical skills required by the Farmer. The main disadvantages are cost is more initially to have Sprinkler Irrigation, water may get evaporated due to more temperature. They can be permanent, temporary, semi-permanent. In permanent type the pipelines of main and branch are fixed permanently. In semi-permanent, the branch pipelines are placed outside the ground and main pipelines are placed inside the ground permanently. But in case of temporary both the branch as well as main pipelines is kept outside the ground and they can be adjusted in the field where ever the farmer wants to irrigate the land.

**2.Drip Irrigation:** This method of Irrigation has been used since ago. It allows the water to reach till roots of the plants or crops slowly. The main advantage of this method it saves water. Next is nutrients of the soil is not destroyed. But the cons are initial investment is more. During high temperature the sun rays will fall and damage of tubes can occur in drip irrigation[3].



*Fig1 : Drip Irrigation in New Mexico vineyard, 2002[src]*

**3. Pot Irrigation:** This method is more reasonable for ranges having sparse rainfall. In the saline ranges where stream watering system is not well suited, pot watering system strategy is effective. An earthen pitcher is utilized as a part of this technique. Pitcher is repaired in soil up to the neck.

#### 4.1 Automated Irrigation Method

In this method, two components are used. One is wireless sensor unit and other is wireless information unit. Both of these are connected by radio transceiver where the values obtained from sensors are sent to micro-controller [8].

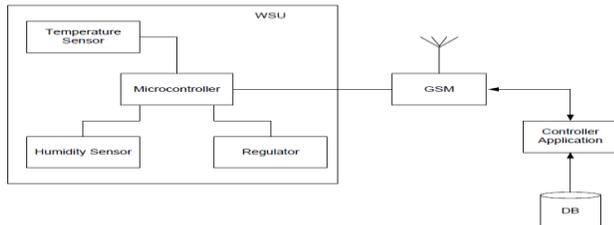
##### 4.1.1 Material and Methods

This project uses an algorithm named as wireless sensor unit for checking the soilmoisture and temperature of the field which requires small micro-controller, humidity sensors, and temperature sensors. The project uses a microcontroller which can be Arduino which is programmed to receive an input signal of different moisture condition of the soil via the sensors. In this paper the DHT11 sensor is used to measure the moisture content of the soil and temperature. Then through a controller application we set the temperature and humidity to a particular value.

The algorithm steps are:

- Step1: Start
- Step2: Reads value from the sensors
- Step3: Checks the threshold value
- Step4: The values are sent to the microcontroller
- Step5: If temperature is greater and less humidity
- Step6: Then pump will on and water is supplied
- Step7: The message will be sent to the farmer
- Step8: Stop

**4.1.2 Architecture**



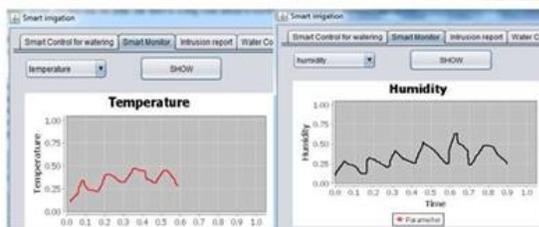
**Fig2: Architecture of the framework**

In this proposed framework, Arduino microcontroller is used which collects value from the sensors and sends it to the GSM gateway. Then the message is sent to the farmer about his field details. Through the controller application like laptop, result can be viewed which are stored in the database. Finally we can analyze the temperature and humidity variations with respect to time by graph.

**V .COMPARISION**

TRADITIONAL METHOD	AUTOMATED IRRIGATION METHOD
Requires manually monitoring the area of the farmer.	Does not require manually monitoring the area of the farmer.
Wastage of water is more in this method.	Wastage of water is less in this method.
The farmer does not get the knowledge of his field's condition.	The farmer will get to know the details of environment condition and irrigate in a proper manner
May or may not get benefited economically.	Gets benefited economically by knowing the soil details
Does not require any technical knowledge.	Here requires a less technical knowledge
Consumes time effort and requires maximum labors.	Minimizes time and labor effort.

**Results**



**Snapshot 1: Graph of temperature of humidity**

In the above snapshot, the values of humidity and temperature obtained from the sensor, sends to the micro controller where it stores in to the mysql database. Then through the controller application we can see the graph of temperature and humidity.

**VI. CONCLUSIONS AND FUTURE WORK**

The objective of our paper is to have Automated Agricultural Irrigation Method which is one of the best ways to save earth. The IOT based automated agricultural irrigation system is cost effective, conserves water and reduces labor. By saving the natural resource the water for the next generation, we will be able to save earth. The electricity power is required to put on or off the pump which is required to irrigate the field. If any constraints in electricity then pump may not work. So for the future work we can use solar power technology rather than electricity which even helps to save electricity and use the natural resource.

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