

AUTOMATIC DRIP IRRIGATION THROUGH SOIL MOISTURE SENSORS

¹Prof.Syed Akhlaque,²Khan Luqman,³Khan Nadeem,⁴Mohammad Akbar ,⁵Shaha Shahrukh

¹Assistant Professor,²Student,³Student,⁴Student ,⁵Student

¹Department Of Civil Engineering,

¹Everest College Of Engineering And Technology, Aurangabad, India

Abstract- This project on “Automatic Drip Irrigation System on Sensing Soil Moisture Content” the Design of Embedded system for the Automation of Drip irrigation is presented. The green house based modern agriculture industries are the recent requirement in every part of agriculture in India. In this technology, the humidity and temperature of plants are precisely monitored and controlled. Water is very precious to all the humans and as well as to the plants, trees. The major amount of fresh water is utilized by the agricultural industry for irrigation. By using drip irrigation the water will be maintained at the constant level that is the water will reach the roots by going drop by drop. This is very important because this can only ensure the survival of the plants. Water can be applied at a single point on the land surface through devices called emitters or as a line source from either closely spaced emitters or tubes with continuous or equally spaced openings that discharge water a drop at a time. If the field is irrigated heavily with water, there are chances that the plant may die because of excessive irrigation. The water could also wash them away during irrigation if very strong force of water is released at the same time. On the other hand, if there is insufficient water, then also there are chances that the plants may die due to lack of water. So, it is very important for the farmer to maintain the content on the field. In this Project the design of a Microcontroller based drip irrigation mechanism is proposed, which is a real time feedback control system for monitoring and controlling all the activities of drip irrigation system more efficiently. Irrigation system controls valves by using automated controller to turn ON and OFF. This allows the farmer to apply the right amount of water at the right time, regardless of the availability of the labor to turn valves or motor ON and OFF. This reduces runoff over watering saturated soils avoid irrigating at the wrong time of the day. It improves crop performances and help in time saving in all the aspects.

Keywords- Automatic, Sensing, Microcontroller, Irrigation

I. INTRODUCTION

“Water is life” in true sense, the word has meaning. Every living being requires water for their survival such as human beings , plants .crops etc. requirement of water vary from region to region.in India as we all know that ,the only source of water is rain which fulfil this demand.it means we highly depends on the monsoon season but in India monsoon is not faithful .sometimes there may be heavy rain causing floods ,which destroys and damage crop, sometimes there may not be rain at all creating scarcity of water for crop .though water is renewable source of nature ,but if monsoon is not faithful ,then huge scarcity of water specially in marathwada region, which is listed in drought region .hence to overcome these difficulties, there is need of implementing various methods and measures to store during period of excess rainfall and use that water during no rainfall or less rainfall. Hence there are various technics to conserve the water to overcome difficulties .we adopt the irrigation system or technique.

In India, where 60-70% economy depends on agriculture, there is a great need to modernize the conventional agricultural practices for the better productivity. Due to unplanned use of water, the ground water level is decreasing day by day. Lack of rain and scarcity of land water also results in decrement in volume of water on earth. In present drip irrigation system water is provided to root zone of plants drop by drop which results in saving of huge amount of water. Agriculture is the backbone of Indian Economy. Without agriculture living is impossible since agriculture produces the main source of food for us. Today the availability of labor for carrying out agricultural activities is less; therefore the automation in agricultural process is needed. In the present era, the farmers have been using irrigation technique in India through the manual control in which the farmers irrigate the land at the regular intervals. This process sometimes consumes more water or sometimes the water reaches late due to which the crops get dried. This problem can be perfectly rectified if we use GSM based automatic drip irrigation system in which the irrigation will take place only when there will be intense requirement of water.

A. Definition of Irrigation:-

“The artificial application of water to the land in accordance with the crop requirement is called irrigation”.

B. Drip irrigation:-

In the drip irrigation technique, the water is provided to the root zone of herb drip by drip because of which the large amount of water can be saved. Figure1 shows typical drip irrigation system. At the present time, the farmers use the irrigation technique in country manually in which the farmers must irrigate the lands at every regular intervals. This technique may require additional amount of water or sometimes the water provide latterly to roots of the plants because of which the crops may be get dried. Slowed growth rate, lighter weight of fruits etc. like problems are arises because of slight water insufficiency. This issue can be resolve if farmers will use automatic and remote drip irrigation technique this paper proposes one way of controlling drip components like valves automatically and remotely by using micro controller and moisture sensors. The advantage of this technique is that farmer can control drip irrigation at any time. It reduces issue for flooding irrigation.



Figure 1: Typical Drip Irrigation

C. Why to Use Drip Irrigation?

- It's easy to install and simple to use
- Fertilize the plants directly through drip system
- Save 20 - 80% of water and fertilizer bills
- Control weed growth by watering only where it need
- Each plant can be watered individually
- Protect the property from erosion
- Reduce snail population
- Have healthier, faster-growing plants

D. Advantages of Drip Irrigation:-

- 1) Maximum crop yield.
- 2) High efficiency in the use of fertilizers.
- 3) Low labor and relatively low operation cost.
- 4) Soil erosion is eliminated.
- 5) Improved infiltration in soil of low intake.
- 6) No runoff of fertilizers into ground water.
- 7) Less evaporation losses of water as compared to other methods.
- 8) Less weeds growth.

E. Objectives of Automatic Drip Irrigation:-

Apart from all these advantages, there are some losses of water which occurs during the conventional drip irrigation, hence there should be some modernization in drip irrigation technique to make it more effective and beneficial that's why we have selected the drip irrigation method with some advancement called "Automatic drip irrigation through soil moisture Sensors."

F. Concept of Modern Irrigation System:-

The conventional irrigation methods like overhead sprinklers, flood type feeding systems usually wet the lower leaves and stem of the plants. The entire soil surface is saturated and often stays wet long after irrigation is completed. Such condition promotes infections by leaf mold fungi. The flood type methods consume large amount of water and the area between crop rows remains dry and receives moisture only from incidental rainfall. Water is supplied frequently, often daily to maintain favorable soil moisture condition and prevent moisture stress in the plant with proper use of water. 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. Fertilizers may continue during the irrigation process because rows between plants remain dry. Fertilizers can be applied through this type of system. This can result in a reduction of fertilizer and fertilizer costs. When compared with overhead sprinkler systems, drip irrigation leads to less soil and wind erosion. Drip irrigation can be applied under a wide range of field conditions.

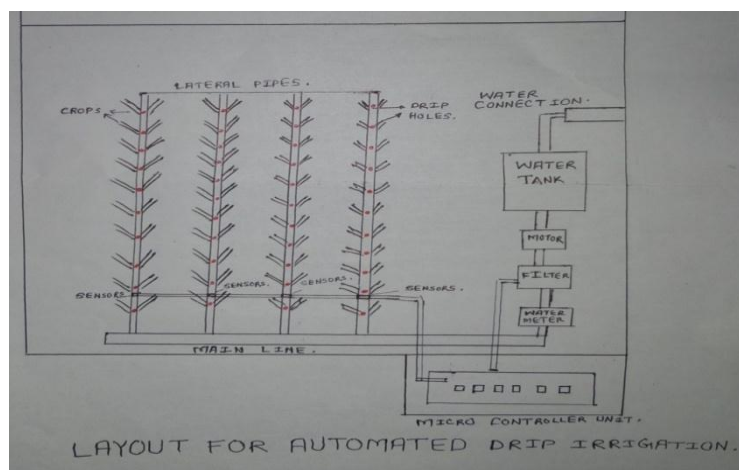


Figure 2: Automatic Drip irrigation System

Figure 2 shows the layout presentation of proposed automatic drip irrigation system through soil moisture sensors. In this automatic drip irrigation system the system works in plan manner. There are the various components those works in this system are as follows.

- 1) water tank:
To store the water.
- 2) water motor:
For pumping of water.
- 3) screen filter:
This prevents and not allow dust and sand particles to pass through main line and lateral.
- 4) water meter:
 - a) To know consumption of water per week.
 - b) To know consumption of water for crop at various stages.
- 5) soil moisture sensors:
It is an important component of system, inserted into the soil. It determine the moisture content of soil and give the signal to micro controller unit.

G. Sensing Logic:-

In this automated process, moisture sensors are inserted into the ground surface. where the moisture content of soil goes below the requirement of crop, these sensors give the signal to micro controller unit. this unit then give signal to water meter, then this to water motor. After this automatic drip irrigation starts. It automatically turn off when soil get moisture content in required amount.

Wireless Sensor Network in Agriculture Drip Irrigation is highly important in the crop production everywhere in the world. Indian economy is basically depend of the agriculture. In Agriculture used mostly available fresh water resource plant and used of fresh water resource will day-by-day increase because population growth increased and food demand is increased. irrigation system is allowed to the scale up for large farm or open fields. Drip irrigation is used in farms, commercial greenhouses, and residential gardeners. This is a system of irrigation which supplies water to the plant equivalent to its consumptive use. this is highly water use efficient system of irrigation having very less irrigation water requirement. Especially in arid region, drip irrigation is very benefitting technique of irrigation. In arid areas there are two basic constraints of surface irrigation. during the land level is the very costly venture and also with low water availability, getting production becomes a question. Drip irrigation system server both the purpose. It is equally effective in undulated land terrain. As the water is applied through drippers, the system naturally takes care of limited water availability.

II. LITERATURE SURVEY

A. Tupe Alok R, Gaikwad Apurva A, Kamble Sonali U. [1] Drip irrigation is artificial technique of providing water to the roots of the plant. It is also called micro-irrigation. Drip irrigation system is based on remote monitoring as well as controlling. In proposed system both mobile and computer are monitor and control the drip devices. In Intelligent Drip Irrigation system, an android mobile sends commands to computer to control drip irrigation system, here different sensors like humidity, temperature, light etc. will use for detection purpose. These sensors send the real time values to micro-controller and micro-controller send these values to computer (Cloud server) via serial communication. According to sensor values the graph will be show on computer and mobile and by using this graph user can switch on or off drip devices. Through modular design, the system builds hierarchical management structure to meet different applications requirements. It can monitor the changes in soil humidity, air temperature, humidity and light and feedback the sensor signals by wireless sensor network. Farmer can control as well as monitor the drip devices from anywhere. Proposed system removes drawbacks of previous systems like distance problem, range problem. Due to the automatic mode, drip devices can be controlled automatically by hardware. This approach is very beneficial for increasing crop production. Rest of the paper followed by Introduction, Related work, proposed system, hardware schematics, experimental results, wireless sensor network, advantages, disadvantages, conclusion.

B. Er. Sukhjit Singh, Er. Neha Sharma [2] In this paper we are giving brief outline of improving Throughput and Average end to end delay of information gathered from the agriculture field for Precision Agriculture. This algorithm provides the Throughput of 180 bits/seconds. Besides delivery of water level information packets/signals to base station as it also computes a threshold as well as does calculates values based on transmission range. This over all computational mechanism helps us to build a robust mechanism for delivery of information to base station thus reducing the packet loss. A WSN is a system consisting of radio frequency (RF) transceivers, sensors, microcontrollers and power sources. Recent advances in wireless sensor networking technology have led to the development of low cost, low power, multifunctional sensor nodes. Sensor nodes enable environment sensing together with data processing. sensors are able to network with other sensor systems and exchange data with external users. Sensor networks are used for a variety of applications, including wireless data acquisition, environmental monitoring, irrigation management, safety management, and in many other areas.

C. Prashant S. Patil, Shubham R. Alai, Ashish C. Malpure, Prashant L. Patil [3] India is an agricultural country, and hence a lot of water is required for farming. Water should be used in a proper way. We propose a microcontroller based system for automatic drip irrigation. We make use of the various sensors like soil moisture sensor, water flow meter to keep a check on the amount of water used. By this project we can control the moisture content of the soil in the cultivating field. The water flow will be monitored and based on the data available, analysis and prediction will be done. This will help the user to use water wisely in future. India is an agricultural country where 60-70% economy depends on agriculture, the modernization the conventional agricultural practices for the better productivity is must. Day by day water is getting depleted due to unplanned use of water. And hence, the ground water level is decreasing. Lack of rains and scarcity of land water also results in decrement in quantity of water on earth.

In drip irrigation system the drips are placed near the surface of the ground where the water reaches to the root zone of the crop. The objective of the system is to a) Water resources b) Handles the system automatically c) Detects the level of water d) Based on the data available, analysis and prediction will be done e) Builds such system which enhances crop productivity.

D. Karishma Patel, Krishna Patel, Kajal Patel, Sandip Delwadkar [4] India is a country, which totally depends on agriculture, so it requires huge amount of water for irrigation water resource is major problem in agriculture, so efficient distribution of available water is expected. so, reduce water wastage a sensor network based irrigation system can be developed so, this paper introduce the drip irrigation system to optimize use of water for the agriculture crops. This system is consist of nodes, which consist of sensor, and uses radio frequencies for communication using sensors water level of crop field can be determined. Further sensor can part of water level information

to computer. On the basis of water level information decision can be taken to supply water or not entire sensor network can be connected to internet and remote controlling of pumps and irrigation system can be possible.

Wireless Sensor Network in Agriculture Drip Irrigation is highly important in the crop production everywhere in the world. Indian economy is basically depend of the agriculture. In Agriculture used mostly available fresh water resource plant and used of fresh water resource will day-by-day increase because population growth increased and food demand is increased. irrigation system is allowed to the scale up for large farm or open fields. Drip irrigation is used in farms, commercial greenhouses, and residential gardeners. This is a system of irrigation which supplies water to the plant equivalent to its consumptive use. this is highly water use efficient system of irrigation having very less irrigation water requirement. Especially in arid region, drip irrigation is very benefitting technique of irrigation. In arid areas there are two basic constraints of surface irrigation. during the land level is the very costly venture and also with low water availability, getting production becomes a question. Drip irrigation system server both the purpose. It is equally effective in undulated land terrain. As the water is applied through drippers, the system naturally takes care of limited water availability.

E.E.Soorya, M.Tejashree, P.Suganya[5] A semi-automated irrigation system was developed in order to facilitate continuous and efficient irrigation under water and labor scarcity conditions. Due to reliability, robustness and limited resources, resistive sensors were chosen. A field with okra crops was prepared and divided into two equal areas. One half was non-automated drip irrigated and other area was drip irrigated and sensor operated. The volumetric data of water utilized and crop yield were collected and the results showed that the water consumption is reduced in the automated field as compared to the manually irrigated field.

III.CONCLUSION

Through the comparison, we can conclude that automatic drip irrigation system has lots of advantages then general drip irrigation. This system not just save the money, time, labor work but also increase the food production. It also reduce the soil erosion. Through this system dependency of labor can be neglected. If this technique adopted in region like marathwada, It will ensure the minimum losses of water and creating a healthy atmosphere to achieve the sustainable development goal for nation.

REFERENCES

- [1] TupeAlok R, Intelligent Drip Irrigation System ,February 2015,Volume 2,Issue 2,Page No.120.
- [2] SukhjitSingh,Drip Irrigation Management Using Wireless Sensors, August 2012,volume 2,issue 4, Page NO.461.
- [3] Prashant S Patil,An Intelligent and Automated Drip Irrigation System Using Sensors Network control system, December 2014,Volume No 2,Issue 12,Page No.7557.
- [4] KarishmaPatel,Drip Irrigation System Using Wireless Sensor Network,2015, Volume 6,Issue 6,Page No.5500.
- [5] E.Soorya,Smart drip irrigation system using sensor networks,May 2013,Volume 04,Issue 5,Page No.2039.

