

RESEARCH PAPER ON WATER IRRIGATION BY USING WIRELESS SENSOR NETWORK

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Abstract: Today's drip irrigation is very useful because water is limited. It is not unlimited and free forever. Drip irrigation system is best method to solve this problem in agriculture field. In a agriculture field to improve the water resources, crop's automatic, locate, time, and drip irrigation is very good choice. There is some kind of method to save water with drip irrigation like design of fuzzy drip irrigation, automatic irrigation based on sensor, precision irrigation and so on.

"In this paper main purpose to describe the many type of irrigation method and how is it work in agriculture?"

1. INTRODUCTION

India is called country of agriculture. Here 70-80% economy depends on agriculture. According to human population, agriculture is only one source to grow the seeds of food. Using of water without planning the ground water level is decreasing day by day, the lack of rains and land of water is decreasing also. It means the volume of water on earth and its level is down day by day. Today drip irrigation is necessary to control the level of water on earth. Drip irrigation system is provided the root to zone of plant drop by drop which results in saving of huge amount of water.

The target of this system is following:

- a) Save energy and water resources.
- b) Manually and automatic control the system.
- c) Detect the water level.
- c) To increase the productivity of crop.
- e) To increase the efficiency of water.
- f) Selection of irrigation based on the different parameter.

2. WATER MANAGEMENT

The main requirement of paddy is wet soil for its growth and sufficient water management according to need. Flooding is unnecessary if the weeds can be removed manually but if not then the fields are flooded to suppress weed growth and maintain nutrients such as phosphorus, potassium, and silica and calcium iron. Water is needed only at three critical stages, at the initial seedling period (10 days), flowering and panicle initiation stage. After the transplantation till the seedlings grow it needs standing water at a depth of 2-5 cm. Then till the dough stage of the crop, 5cm of water should be maintained. Then at last, water should be drained out from the field 7-15 days before the harvest. The amount of water required for a given crop depends on state of development of soil, quantity and type of fertilizer given, quality of water Used. The paddy needs a lot of water. Another big concern here is that the water should not be in excess nor it should be less than the required amount. Both are very harmful for the cultivation of paddy. Therefore, we need a method by which the amount of water in

the field can be monitored regularly and the water level can be controlled.

3. What is irrigation?

Irrigation is the artificial application of water to the land or soil. It is used to assist in the growing of agricultural crops, maintenance of landscapes, and revegetation of disturbed soils in dry areas and during periods of inadequate rainfall. Additionally, irrigation also has a few other uses in crop production, which include protecting plants against frost, suppressing weed growing in grain fields and helping in preventing soil consolidation. In contrast, agriculture that relies only on direct rainfall is referred to as rain-fed or dry land farming.

Irrigation is a system that is installed in land of agriculture to improve the efficiency of water.

Conventional irrigation methods like overhead sprinklers. A condition promotes infections by leaf mild fungi. Flood-type methods consume a large amount of water, but the zonally among crop rows flinches dry and accept humidity lonely from the incidental rainfall.

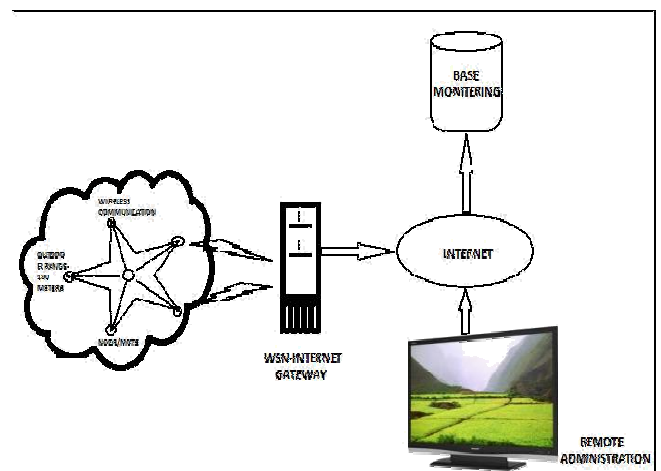


Fig.1 Block Diagram of wireless network system for irrigation

Implementation of automatic requires are following

- 1) The actual collection of water requirement.
- 2) For the remote transmission technology for water information and the control.
- 3) Drip irrigation control decision making.

4. NEED OF THE PROJECT

Irrigation is an artificial application of water to the soil. An irrigation system is a system that delivers water to an area where water is needed but not normally present in the required amounts. Generally, it is used for agriculture and landscaping purposes. Additionally, irrigation also has other uses in crop production, which include protecting plants against frost,

suppressing weed growing in gain fields and helping in preventing soil consideration. In contrast, agriculture that relies only on direct rainfall is referred to as rain-fed or dry and farming.

5. System Hardware Design SYSTEM COMPOSITION

System based on wireless network, is made up of drip irrigation system. Due to real timing monitoring information of soil moisture, temperature, light intensity the crop water use law.

DRIP IRRIGATION SYSTEM

Drip irrigation requirements throttle filter pressure gauge should be installed at water source. Soil moisture sensor buried under the root of plant near the surface, light intensity and temperature sensor fixed to the side pole.

6. Today irrigation system: SURFACE IRRIGATION



Surface irrigation is known as the combination of techniques where water is present and divided into every row of plant soil by gravity. It is very traditional way to provide the water to soil of plants. Surface irrigation is done by flood irrigation. The distribution of water is uncontrolled. For example, surge irrigation a significant degree of management. The process of surface irrigation can be described using four phases. As water is moved to end point of the top of land it will flow or advance over the field length. The advance phase refers to that length of time as water is moved to end point of top the field and flows or advances over the field length. After the water reaches the end of the field it will either run-off or start to pond. The period of time between the end of the advance phase and the shut-off of the inflow is termed the wetting, pounding or storage phase. As the inflow ceases the water will continue to runoff and infiltrate until the entire field is drained. The recession phase describes the time period while the water front is retreating towards the downstream end of the field. The depth of water applied to any point in the field is a function of the opportunity time, the length of time for which water is present on the soil surface.

These are of three types:

- a) Level basin
- b) Furrow basin
- c) Border strip

Drip irrigation:

Drip irrigation is also called trickle irrigation, micro irrigation and localized irrigation. It is an irrigation method that saves water for future. Water is allowed to drip to the root of plant. There are two ways either onto the soil surface or directly onto the root zone by a network that is installed ia a land to irrigation. It is done with the help of narrow tubes which delivers water inside the plant under the ground. Modern drip

irrigation has arguably become the world's most valued innovation in agriculture since the invention of the impact sprinkler in the 1930s, which offered the first practical alternative to surface irrigation. Drip irrigation may also use devices called micro-spray heads, which spray water in a small area, instead of dripping emitters. These are generally used on tree and vine crops with wider root zones. Careful study of all the relevant factors like land topography, soil, water, crop and agro-climatic conditions are needed to determine the most suitable drip irrigation system and components to be used in a specific installation

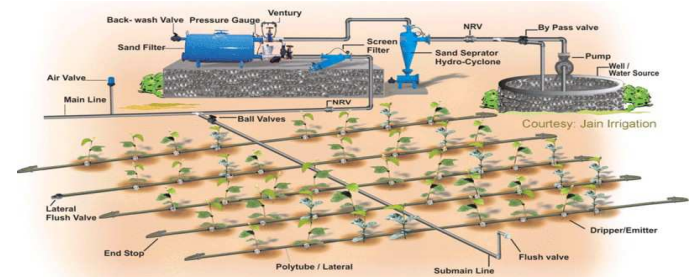


Fig. layout drip irrigation

SPRINKLER IRRIGATION

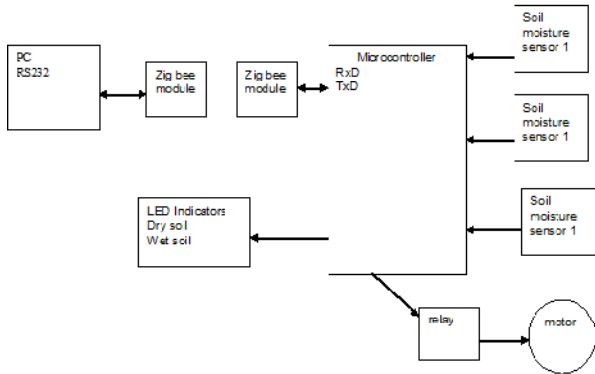


In sprinkler irrigation delivery of water is through a pressurized pipe network to the nozzles of sprinkler which spray the water into the air. In other words we can say that, it is a type of artificial rain. The basic components of this irrigation are water source, pressure pump to pressurize the water, a pipe network to distribute the water over the field, the Sprinklers to spray the water over the ground and Valves to control the water flow.

7. ADVANTAGE

- (a) It saves water due to possibility of using saline water.
- (b) Efficient and welfare use of fertilizers.
- (c) Installation is easy & flexibility in operation.
- (d) Suits to all types of land terrain & also suitable to waste water.
- (e) Enhances plant growth and yield & better quality of produce.
- (f) Weed growth is less.
- (g) Saves labour works.
- (h) No soil erosion which saves land.

ZIGBEE system is efficient for water management in the irrigated agricultural cropping systems. The system is based on soil condition identification and consists of zigbee module for communication purpose. In order to produce "More crop per drop" Zigbee is a low-cost, low-power, wireless mesh network standard. The low cost allows the technology to be diffused in room of controlling and watching petition. Mesh networking provides high reliability and more extensive range.



Block diagram of agricultural zigbee irrigation system

9. WORKING

Soil moisture sensing network is used to monitor the moisture contained in soil. Three different sensors are used to monitor three layers of soil. And according to that further action is taken by microcontroller as the output of network is given to the microcontroller. Indicator indicates whether the soil is dry or wet. Microcontroller is the heart of the system; it controls the overall irrigation system. It takes the input from moisture sensor 1, 2, 3 etc. & according to the written program it turns ON or OFF the motor pump. It also indicates the condition of soil. Also it provides the data to the PC through zigbee module. When soil is dry motor is on and when soil is wet motor is off. Thus microcontroller controls the operation of motor. Zigbee module is a communication technology just like a Bluetooth but different that it is a full duplex communication. It is used here to have wireless link between PC & the main irrigation system. So that data can be logged into PC. In our project we have one master and one slave device. AC or DC motor can be used for whole system. On the basis of soil moisture detection, motor ON/OFF working will be done. Provision of water and considering the need of water to the crop is done by controlling motor. Along with this the valves are made on depending on the state of the soil. LCD is also used at field .It indicates message from the microcontroller soil state, motor state.

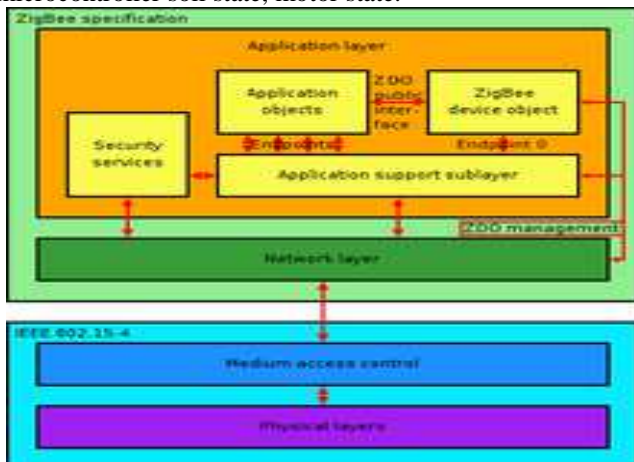


Fig. ZIGBEE module for drip irrigation

10. ADVANTAGE

The system becomes advantageous because -

1. Moisture level of soil is measured. So that, we can provide water as per requirement of the soil. It prevents water clogging of soil.
2. Valves are controlled in our system. Therefore labour is not required for valve controlling.
3. Message is sent to the user's pc so he can understand the moisture level and user can handle the situation also at the distant location.

11. FUTURE SCOPE

In our work, we deploy 200 sensors for the delivery of water level information to the monitoring station.

When the number of sensors is increased, then there is a large amount of power consumption by sensors to deliver the water/packet information to the monitoring station. So it is mandatory to minimize the power consumption by using optimization techniques.

12. CONCLUSION

In this paper we are using fertility meter and ph. meter to determine the percentage of potassium, phosphorus, nitrogen which is the most important ingredients of soil. Now after measuring fertility of soil, we have implanted the automatic plant irrigator for DRIP irrigation through wireless. 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 of trees, diminishing of excessive water usage, ensuring of rapid growing weeds, measuring fertility of soil.

REFERENCES

[1] AWATI J.S., PATIL V.S. (Automatic Irrigation Control by using wireless sensor networks) Journal of Exclusive Management Science - June 2012-Vol 1 Issue 6 - ISSN 2277 – 5684.
 [2] MahirDursun* and SemihOzden (drip irrigation automation supported by soil moisture sensors) Scientific Research and Essays Vol. 6(7), pp. 1573-1582, 4 April, 2011 ISSN 1992-2248 ©2011 Academic Journals.
 [3] AlineBaggio (Delft University of Technology – The Netherlands)A.Baggio@ewi.tudelft.nl.published at journal magazine of Delft University of Technology.
 [4] The Toro Company Micro-Irrigation Business1588 N. Marshall Avenue, El Cajon, CA 92020-1523,
 [5] Purnima, S.R.N. Reddy, Department of Electronics & Communication IGIT, GGSIP University, Delhi, India (International Journal of Computer Applications (0975 – 888) Volume 47– No.12, June 2012)