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# Sustainable Irrigation system using moisture sensors with master and slave control system

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**ABSTRACT**
Sustainable irrigation system using moisture sensors with master and slave control system. In agriculture field divide one main field and others is slave field. In main field contain bore well and master control system and other field contains slave system. The master system communicates with former and slave system. The farmer communicates with master system through DTMF signal and master system communicates with former through playback system. The soil moisture, temperature and humidity sensors are used in each master and slave system side. The solenoid valve is used to control water flow direction on each field side.

In slave field the system will check the status of field if water required it will turned on solenoid value on that side of field and send request signal to master system to turn on the motor. After some time it will turned off the valve on the corresponding side based on the sensing the sensor value and send a request signal to master system to turn off the motor. The master will communicate with slave system using ZIBEE communication. The user can change the temperature value, soil moisture sensor value, and humidity value on individually .so that in different field area in different crops are planting and providing different sensor condition.

**Keywords:** DTMF, ZIBEE communication, Master and Slave Systems,Sensors

## I. INTRODUCTION

Indian agriculture is dependent on the monsoons which is not a reliable source of water, so there is a need for an automatic irrigation system in the country which can provide water to the farms according to their moisture and soil types. Modern drip Irrigation is today‘s need because water resources are very limited, diminishing day by day and most of them depend upon monsoons. The one and only one solution to this problem is automated Drip Irrigation system. This paper is organized into 4 sections. An introduction in first section is followed by background of the topic. Third section describes the implementations done in given area. Fourth section briefly describes advantages and Applications. Conclusion and future work is stated in the fifth and sixth.

**Section-I**

In the field of agriculture, use of proper method of irrigation is important and it is well known that irrigation by drip is very economical and efficient. Taking into consideration all the problems that arise in the irrigation system it is very difficult to control it normally by the farmers. It will also be a hectic process for a human being to continuously monitor all required actions that has to be carried out in the field. So this project has been implemented in order to solve all these problems.

It will also help in a great way to reduce the man power and water wastage by the introduction of efficient devices. This system allows the user who will be monitoring the entire flow process of the irrigation system to control it both in the manual and automatic mode. Hence it is very easy and reliable method of monitoring and controlling the irrigation system using a long distance ZigBee module.

A soil moisture sensor was modeled, simulated and tested for achieving, with low-cost, accurate and reliable measurements. A low-cost high-performance and small temperature sensor is used, with the same PCB circuit it can measure humidity also. The tipping bucket rain gauge is used to measure rain fall. After a pre-set amount of precipitation falls, the lever tips, dumping the collected water and sending an electrical signal. An anemometer is a device used for measuring wind speed, and is a common weather station instrument.

Hence current research focuses on precision agriculture, soil conservation and crop irrigation scheduling and water quantity control for increasingwater use efficiency. There is a need to develop new indigenous irrigation controller to

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improve farm productivity and input use efficiency of water and other nutrients.The system consists of microcontroller, peripherals including RTC, LCD and driver circuit relay to switch on/off a motor. With the use of this technique we can reduced water consumption. It can be set to lower and upper thresholds to maintain optimum soil moisture saturation and minimize plant wilting. It can contribute to deeper plat root growth, reduced soil runoff/leaching, less favorable conditions for insects and fungal disease. It is also possible to control the nutrition levels in their entirety thus, lower nutrition costs. No nutrition pollution is released into the environment because of the controlled system. Hence will have great saving of irrigation water, stronger, healthier plants and stable, high yields. Hence definitely will have improvement in biological fertility

**Section-II**

Agriculture has been the most important practice from very beginning of the human civilization. It has seen many iterations of development in technology with time. A good agricultural practice is still an art. Environmental parameters such as soil moisture, temperature, humidity, pH, solar radiation etc. plays very important role in overall development of the plant. Temperature affects many of plant activities such as pollination, germination etc. It is observed that, at higher temperature, respiration rate increases that result in reduction of sugar contents of fruits and vegetables. At lower temperatures photosynthesis activity is slowed down .

Humidity is responsible for moisture loss and temperature management of the plant. For high humid environment, evapo transmission will be less and more water will saturated in the leaf area. This results in enlargement and formation of fungus in the porous area of the leaf. Moisture is critical for seed germination and uptake of nutrients by the plant. Excess water may stop gaseous exchange between soil and the atmosphere which reduces root respiration and root growth. Optimum level of moisture ensures healthy growth of the root and overall development of the plant.

A sustainable approach is required to maintain balance between these parameters and environment. Hence there is a need of efficient monitoring and control system. In today's era, the traditional methods that are used for irrigation, such as overhead sprinkler and flood type, is not that much efficient. They results in a lot of wastage of water and can also promote disease such as fungus formation due to over moisture in the soil. Automated irrigation system is essential for conservation of the water and indirectly viability of the farm since it is an important commodity. About 85% of total available water resources across the world are solely used for the irrigation purpose.

In upcoming years this demand is likely to increase because of increasing population. To meet this demand we must adopt new techniques which will conserve need of water for irrigation process. In automation system water availability to crop is monitored through sensors and as per need watering is done through the controlled irrigation. The advancement in the technologies has enabled the use of state of art technology at a reasonably low cost. Wireless sensor network (WSN) can be used in such system to enhance its monitoring capability by distributing sensors all over the field and monitoring environmental parameters remotely.

WSN consist of small nodes which work on its own and has a sensors embedded. They collect the data and transmit it over wireless medium to a central system where data from all the nodes is collected and processed. In this paper technological review is undertaken for various sensors which are used for measurement of environmental parameters. And also various type of wireless protocols which are used to form a network of wireless sensors.

**Related Work**

| PROBLEMS IN THE EXISTING SYSTEM | SOLUTION IN PROPOSED SYSTEM |
|---|---|
| More water pump power is required | Single water pump is required |
| More power required | Single power supply required for water pump |
| More maintenance | Very less maintenance |

**Section-III**

**Experimental procedure**:

In this project the main work will happen in the master system. the master system will check the status of sensor, send one by one request to slave system and waiting for request acknowledgement and then master will receive the data and based on that data the motor will turn on

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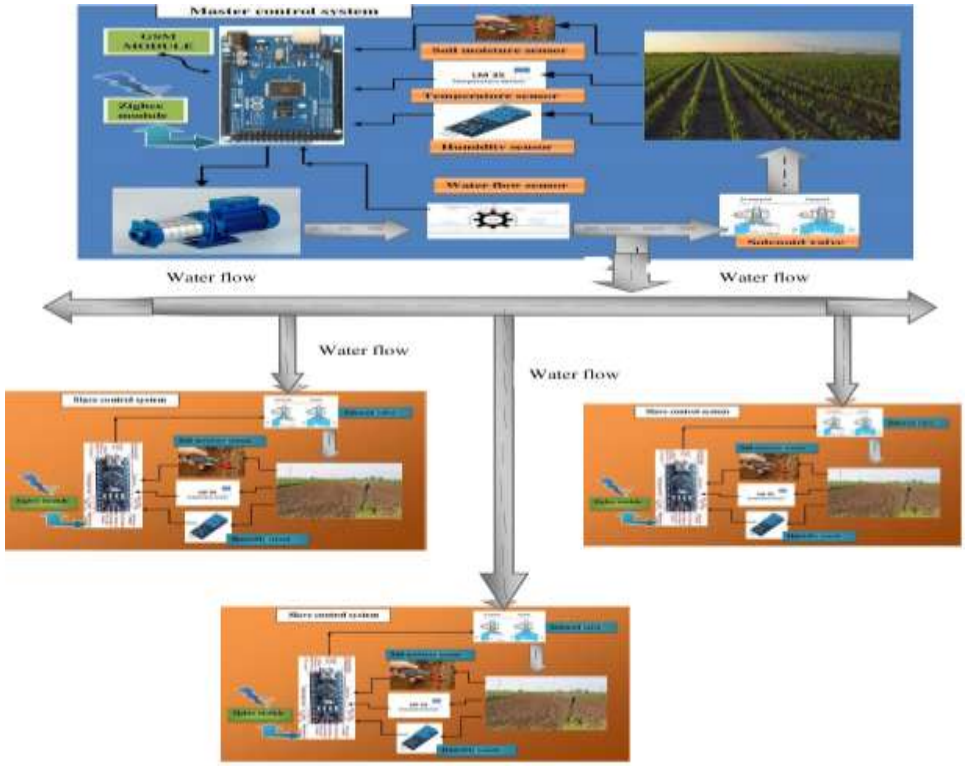
or turn off. If the motor is turned on, every 3 minutes the master will check the water is flowing or not. If water does not flow the error voiced will send to user. Also master will be go to Idle mode.

In other field area the slave system will check the status of that side of the area. Its will waiting for request if request is arrived from master system then slave system will send the acknowledgement to master system along with sensor data.

Each slave system and master will have single solenoid valve to allow water or not on each side. Communication between the master and slave is done by ZigBee module. Its is one type of wireless data transceiver.

Solar power will have used for power supply for slave system. No external power required from the master area. The user will communicate through the call and master will replay back the voice stored in the SD card.

- Insert or implement more number of bore well along with extra power circuit is used to turn on or off.
- In some time miss location of drilling for bore well then loss occur to former.
- Former as to go every location to check status of field and he is to turn on or off based on status.
- In SMS based automatic irrigation system the user as to use type the message to turn on or off either automatic with one direction communication from system to former, but if the former is cannot type message then this system cannot used.
- In some time motor will cannot pump the water for certain condition in that time automatic turn on or off system will always motor in turned on condition so that there is power loss and damage the motor.




**Section-IV**

**Advantages & application**

It requires no operating system for this hardware which results in reduction of cost and portability. The data collection, monitoring and materials application to the crops allows for higher yields and lower cost, with less impact to the environment. Each area receives only what is required for its particular space, and at the appropriate time and duration. Remote monitoring is possible from field to farmer's home. Continuous surveillance is done through monitoring section. Low power consumption and easy to install. Intelligent agricultural and environmental sensing is the most important application. Precision agriculture is one of the most promising application domains where wireless sensor networks may deliver a feasible or even optimal solution. It

concentrates on monitoring micro-climates in field. It has been instrumented a field with sensor nodes equipped with sensors for measuring air temperature, relative humidity and soil moisture.

## II. RESULT:

The master system will control the overall operation and slave will perform the sensing each status of field area and send the request signal master system.

The master can easily communicate with user so its is user friendly and also low maintenance

## III. CONCLUSION AND FUTURE SCOPE:

The primary applications for this project are for farmers and gardeners who do not have enough time to water their crops/plants. It also covers those farmers who are wasteful of water during irrigation. As water supplies become scarce and polluted, there is a need to irrigate more efficiently in order to minimize water use and chemical leaching. Recent advances in soil water sensing make the commercial use of this technology possible to automate irrigation management for vegetable production.

However, research indicates that different sensors types perform under all conditions with no negative impact on crop yields with reductions in water use range as high as 70% compared to traditional practices.

## REFERENCES:

[1]. B. P. Ladgaonkar and A. M. Pawar, "Design and Implementation of Sensor Node for Wireless Sensors Network to Monitor Humidity of High-Tech Polyhouse Environment", IJAET July 2011 ISSN: 2231-1963 1 Vol. 1, Issue 3.

[2]. Guobao Xu, Weiming Shen, and Xianbin Wang, "Applications of Wireless Sensor Networks in Marine Environment Monitoring: A Survey", Sensors 2014.

[3]. Web based service to monitor automatic irrigation system for the agriculture field using sensors DOI:10.1109/ICAEE.2014.6838569 Conference: 2014 International Conference on Advances in Electrical Engineering (ICAEE)

[4]. Design of a Wireless Communication Drip Irrigation System using nRF24L01 Technology Joseph Azeta*1 , Christian A. Bolu1 , Famous Alele1 , Emmanuel O. Daranijo1 1 Department of Mechanical Engineering, Covenant University, Ota, Ogun state, Nigeria

[5]. Water Management for Sustainable Irrigation Systems Using Internet-of-Things Sensors (Basel). 2020 Mar; 20(5): 1402. Published online 2020 Mar 4. doi: 10.3390/s20051402