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AUTOMATIC IRRIGATION SYSTEM USING MOISTURE SENSOR

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Abstract- Water is the basic need for the survival of the humans and many parts of world are still facing scarcity of water. Therefore, it becomes very crucial for us to save water. This system can be one of the tools to do so. Agriculture is one of those areas which consume a lot of water. Irrigation is a time-consuming process and must be done on a timely basis. The aim of the article is to develop an auto irrigation system which measures the moisture of the soil and automatically turns on or off the water supply system. In the proposed system, the data of the moisture content updated for regulating the water pump. This paper will give a clear knowledge about the suitable method for the better irrigation.

Keywords—Moisture sensor, Arduino, Microcontroller.

1. INTRODUCTION

The Project is based upon Closed Loop Control System. In closed loop control system, the feedback loop is there which continuously provide the data and with the help of that data the system configures its output. We can automatically water the plants when we are going on vacation or don't, we have to bother my neighbors, Sometimes the neighbors do too much of watering and the plants end up dying anyway. There are timer-based devices available in India which waters the soil on set interval. They do not sense the soil moisture and the ambient temperature to know if the soil actually needs watering or not. The purpose is to regulate water and optimize the water flow so that plants are not starved of water. This is particularly useful during summer seasons when water is scarce. During monsoon and winter seasons, the water flow can be optimized depending on the requirement, thus saving precious water.

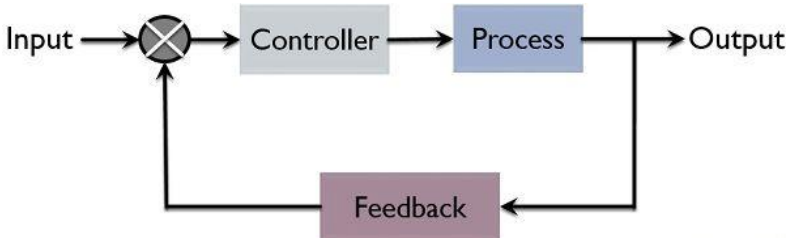

Fig-1 Closed Loop Control system

A properly configured soil moisture sensor can save up to 60 percent of water used in irrigation. The designed system can be used in turf grass or with small garden plants. The continuous increasing of food demand requires the improvement in food production technology. The food production requires continues monitoring of crops for irrigation with the help of humans. This continuous monitoring by humans is not possible for all the time. Hence automatic irrigation system is a suitable one which helps to irrigate the crops without the help of human intervention. This system will have continuous monitoring that helps better production. Assimilation is that the artificial application of water to the land or soil It is used to assist in the growing of agricultural crops [3], maintenance of landscapes, and re vegetation of disturbed soils in dry areas and during periods of inadequate rainfall. When a zone comes on, the water flows through the lateral lines and ultimately finally ends up at the irrigation electrode (drip) or mechanical device heads. Several sprinklers have pipe thread inlets on the lowest of them that permits a fitting and also the pipe to be connected to them. The sprinklers are usually used in the top of the head flush with the ground surface [9]. As the method of dripping will reduce huge water losses it became a popular method by reducing the labor cost and increasing the yields.

2. METHODOLOGY

The soil moisture sensor consists of two probes which are used to measure the volumetric content of water. The two probes allow the current to pass through the soil and then it gets the resistance value to measure the moisture value.

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When there is more water, the soil will conduct more electricity which means that there will be less resistance. Therefore, the moisture level will be higher. Dry soil conducts electricity poorly, so when there will be less water, then the soil will conduct less electricity which means that there will be more resistance. Therefore, the moisture level will be lower.

This sensor can be connected in two modes; Analog mode and digital mode. First, we will connect it in Analog mode and then we will use it in Digital mode. Once the microcontroller gets the data from the sensing material – it compares the data as programmed in a way, which generates output signals and activates the relays for operating the submersible pump. The sensing arrangement is done with the help of two stiff metallic rods that are inserted into the agricultural field at some distance. The required connections from these metallic rods are interfaced to the control unit for controlling the operations of the pump according to the soil moisture content.

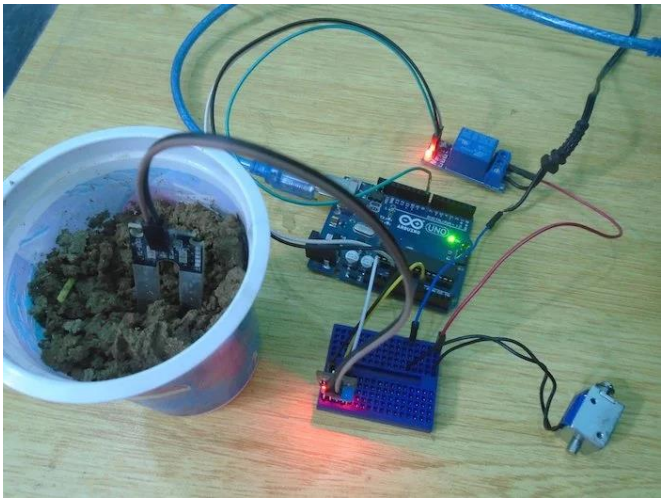

Fig-2 Model Diagram

3. EXIPERIMENTAL SETUP AND RESULTS

An automatic plant watering system using Arduino microcontroller UNO is programmed such that it gives the interrupt signals to the motor via the motor driver module. Soil sensor is connected to the A0 pin to the Arduino board which senses the moisture content present in the soil. Whenever the soil moisture content values go down, the sensor senses the humidity change, giving signal to the microcontroller so that the pump (motor) can be activated. This concept can be used for automatic plant watering system. The circuit comprises an Arduino UNO board, a soil moisture sensor, a 5V motor pump, a Motor driver L293D, motor driver IC to run the water pump. You can power the Arduino board using a 5V to 9V wall wart or plugin adaptor or solar panel. You need a separate 5V to 9v battery for the pump motor.

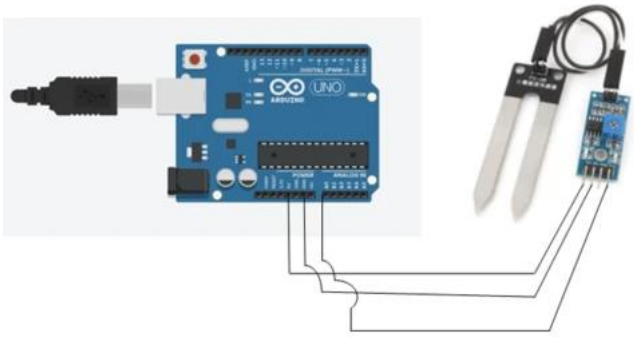

Fig-3 Circuit Diagram

4. LITREATURE REVIEW

In this chapter, we have discussed various types of Automatic Irrigation mechanism for better irrigation. Let us discuss each and every technique of Automatic Irrigation System. Irrigation Management System Using Soil Moisture Sensor and Arduino, SP.Maniraj et al., proposed that the automated irrigation system is done by soil moisture sensor and

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Arduino. In this system, the control is used to on and off the motor without the help of humans which is done by microcontroller. The LED is provided for the indication of working of the Arduino. The moisture level of the soil will be checked and the irrigation status will be sent to the local host or server. Automated Irrigation System Using a Wireless Sensor Network and GPRS Module, Joaquín Gutiérrez et al., proposed an automatic irrigation system was introduced to help farmers. In this a wireless network of soil moisture and temperature sensor are employed to senses the information. The gateway unit initiate the actuators and transmits the data which is between the web application and the farmer for the irrigation schedule. The photovoltaic panels are used for the power supply of the system. Development of Software for the Microcontroller Based Automated Drip Irrigation System Using Soil Moisture Sensor, N.V. Gowtham Deekshithulu et al., proposed the design of irrigation system based on the soil moisture sensor and microcontroller to help the farmers to irrigate the lands with right amount of water. keil vision 3 software is employed with 8051 microcontroller and sensor. When the land reaches the 70% of moisture the pump will turn off and for below 70% the pump will turn on till it reaches particular level of moisture. The regulating of water pump is done with solenoid valve. Shiraz Pasha B.R., Dr. B Yogesha (2014) The International Journal of Engineering and Science (IJES) developed the Microcontroller Based Automated Irrigation System to irrigate the land with the automation technique. The moisture sensor is inserted into the soil. The sensor senses the information and sends the data to the microcontroller. The controller indicates the relay to turn ON the pump if the moisture is below the threshold value and the pump will turn OFF automatically after the moisture level is sensed from the sensor. It will be displayed in the LCD of the controller. S. R. Kumbhar, Arjun P. Ghatule (2013) International Multiconference of Engineers and Computer Scientists developed the Microcontroller based Controlled Irrigation System for Plantation for irrigating the lands without the manual support. It was developed with the humidity sensor and the microcontroller. If the set-point value of the humidity sensor goes low the microcontroller turn on the motor to supply the water, after reaching the set-point value then the motor will turn OFF. Karan Kansara (2015) proposed Sensor based Automated Irrigation System with IOT for the welfare of farmers in the field of irrigation. The connection of the microcontroller from the android app and to the GSM is done by GSM and MAX232 respectively. The moisture level becomes low, the microcontroller initiates the mobile to activate the buzzer for the opening and closing of the valve.

Pavithra D. S, M. S. Srinath (2014) proposed GSM based Automatic Irrigation Control System for Efficient Use of Resources and Crop Planning by Using an Android Mobile in which the low moisture content of the soil will be deducted. The moisture data will be sent to the microcontroller. The microcontroller calls the mobile to press the button after hearing the buzzer indication. After that the valve is opened for the supply of water, and then it will attain the certain level of moisture content the sensor updates the moisture level and the valve will be closed by the signal of the microcontroller. M.Jagadesh (2018) International Journal of Creative Research Thoughts (IJCRT) Wireless Sensor Network Based Agricultural Monitoring System proposed to monitor the field with the help of sensors such as moisture, temperature, pH and water level. The data from those sensors will be transmitted to the Arduino with the help of ZigBee technology. The data also processed in the Raspberry pi for regulating the water pump. The live status of the field will send over the webpage which is obtained from ip address which is pre-defined in the module. Indu Gautam and S.R.N. Reddy (2012) International Journal of Computer Applications proposed an Innovative GSM-Bluetooth based remote controlled embedded system for irrigation which predefines the irrigation time according to the sensor's data and also depend of crop type for the automation of the system. The system interacts with the user via the SMS. The GSM technology is employed for the message transformation. The SMS charging will be avoided by the use of Bluetooth technology within the particular meters. Purnima, S.R.N. Reddy (2012) International journal of computer Applications proposed Design of Remote Monitoring and Control System with Automatic Irrigation System using GSM-Bluetooth for remote controlling and monitoring of the irrigation with low cost and less power consumption. The system is designed with sensor and the microcontroller which is interfaced with the Bluetooth for the data transformation within the short range of place for eliminating the charging of the SMS. The GSM technology is employed for the sending of data such as CO2 concentration, low moisture level and the high temperature via the SMS to the farmer.

5. APPLICATION

- The System can be used to measure the loss of moisture in the soil over time due to evaporation and intake.
- Minimizes water waste and improves plant growth.
- The System is designed to work automatically and hence, there is no need for any human intervention.
- The System is intended for small gardens and residential environment. By using advanced soil moisture sensor, the same circuit can be expanded to large agricultural fields.

6. CONCLUSION

The Automatic Irrigation System using moisture sensor has been designed and tested successfully. It can used in the domestic level as well as agricultural level for the farmers and help us to save the water thus contributing for the

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betterment of the world. This automatic irrigation system can be further enhanced by using advanced technology that consumes solar energy from solar panels.

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