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Arduino Based Automatic Plant Irrigation System

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ABSTRACT: In the present era one of the greatest problems faced by the world is water scarcity and agriculture being a demanding occupation which consumes plenty of water. Therefore a system is required that uses water judiciously. India is an agricultural country, wherein about 70% of the population depends on agriculture. Farmers have wide range of diversity to select suitable fruits and vegetables crops. However, the cultivation of these crops for optimum yield and quality produce is highly technical. It can be improved by the aid of technological support. The management of irrigation can be improved using automatic watering system. A system that will help a farmer to know his field status in his home or he may be residing in any part of the world. It proposes an automatic irrigation system for the agricultural lands. Currently the automation is one of the important roles in the human life. It not only provides comfort but also reduce energy consumption, increase efficiency and time saving. Now the industries are using automation and control machine which are expensive and not suitable for using in a farm land. So here we design a smart irrigation system in low cost which can be utilized by Indian farmers.

KEYWORDS: Automatic irrigation, Arduino , Smart irrigation, Arduino, Moisture sensor.

I. INTRODUCTION

In the present scenario, irrigation systems are operated manually. To use the water efficiently and effectively, a concept of smart auto irrigation is introduced. Sensor based irrigation system is based on soil moisture sensor that will measure the level of the moisture in the soil and propel the signal to the Arduino and accordingly it will irrigate the crops. The Arduino plays the role of micro controller. This will compare the values received from the moisture sensor with predefined moisture levels already stored in the system. Based on the values received from the sensors, Arduino will turn the irrigation system ON / OFF. OR we can ON and OFF it with help of mobile. The Arduino also provide the functionality of calculating the pH value of soil. pH is a term that is used to describe degree of acidity or basicity. In addition, the moisture sensor is attached so that the water content of soil is detected. Automatic irrigation system proves to be very helpful for those who travel. If designed and coded properly, the automatic irrigation systems can be very cost effective and can do a lot of water conservation. Watering with pipe or with oscillator wastes water and none of these method aim plant roots. Automatic irrigation system can be design in such a way that gives the required amount water in targeted area, and which will promote water conservation too.

II. LITURATURE SURVEY/BACKGROUND

In the research by the Chandan Kumar Sahu at all the authors present a prototype for full automation accessing of irrigation motor where prototypes include number of sensors placed in different direction of the farm field. Each sensor is integrated with a wireless networking device and the data received by the "microcontroller, which is an ARDUINO-UNO development board. The sensor is used to send the message through internet correspondence to the microcontroller process.

S.Harishanka at all suggested an automatic sprinkler irrigation system using solar power for automating the irrigation process using solar power and to optimize the use of water. When implemented for bore holes, the system was found to be successful. Solar pumps also offered clean solutions with no danger of borehole contamination.

In the work by Authors A. N. Arvindan at all The android smartphone was used as a remote control to make Arduino – based automated irrigation system easy -to-use and an economical one. The design of this system includes a voltage a soil moisture sensor that provides a voltage signal proportional to the moisture content in the soil, which is compared with a predetermined threshold value. On the basis of this comparison result, the appropriate data are fed to the Arduino uno processor, which is linked by module to an android phone. Android smartphone allows the user easy control for the irrigation system switch on, to drive motor.

III. WORK/SYSTEM

System Design:

The Arduino based system is designed in such a way that it turns the motor on and off on detecting the moisture content of the soil. The Arduino uno acts as a transmitter and receiver, which can be used to view the readings and stats of the sensors and the moisture level of the soil. The aim of the system is to monitor the moisture content of the soil using a soil moisture sensor. The objective is to turn the pump ON when the soil moisture falls below a certain reference value. Next objective is to display the status of the soil and the tank using soil moisture sensor and water level sensor respectively on LCD.

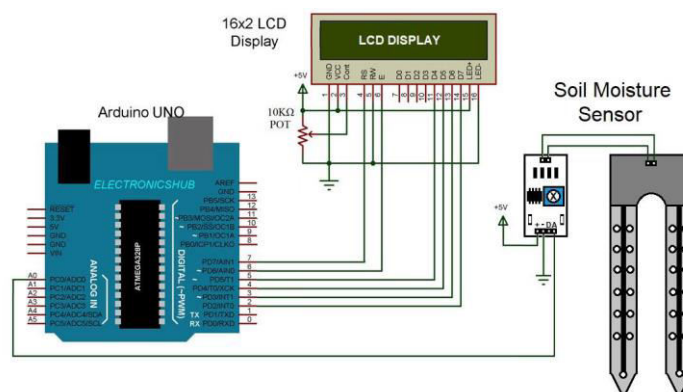


Fig.1 Circuit Diagram

COMPONENT

Arduino: An open source platform which consists of both a physical programming circuit board (Micro controller) and a piece of software (Integrated development Environment). The Microcontroller used here is an Arduino UNO. The UNO is a Microcontroller board. The UNO can be programmed with the Arduino software.

Soil Moisture Sensor: Soil Moisture sensor is used to measure the moisture content present in the soil. The Soil Moisture Sensor (SMS) is a sensor connected to an irrigation system controller that measures soil moisture content in the active root zone before each scheduled irrigation event and bypasses the cycle if moisture is above a user defined set point.

Water Pump: A submersible pump (or sub pump, electric submersible pump) is a device which has a hermetically sealed motor close-coupled to the pump body. The whole assembly is submerged in the fluid to be pumped. The main advantage of this type of pump is that it prevents pump cultivations, a problem associated with a high elevation difference between pump and the fluid surface. Small DC Submersible water pumps push fluid to the surface as opposed to jet pumps having to pull fluids. Submersibles are more efficient than jet pumps. It is usually operated between 3 to 12 V.

PROCEDURE OF MODEL:

Block diagram of a Automatic Irrigation system is showing. This is system for watering plants; gardens also can be use for farm irrigation. In this system the time interval irrigation is not set. The irrigation is based on soil. When Soil goes dry irrigation/ watering is start. In this system there are two probes. From both of them one probe is use for sense the soil moisture and another probe used to on the relay switch on the particular dryness value. We can connect these relay to any watering system or foggier system for cooling any farm shed to switch the system on automatically for watering the plants.

In the system soil moisture is measure by the sensor which sends the parameters to Arduino Board. Arduino Board controls the whole system. When sensor senses the moisture value and sends it to Arduino if its drops to certain value then the relay module start the water pump. From this a certain amount of water is delivering to the crops. If moisture rate reaches on certain value. The Arduino sends again signals to relay module to stop the watering. LCD display is also interfaced with Arduino where Soil –Moisture displays. User can monitor or set threshold value of soil –moisture through android application on mobile device. Bluetooth Module is interfaced with Arduino Board.

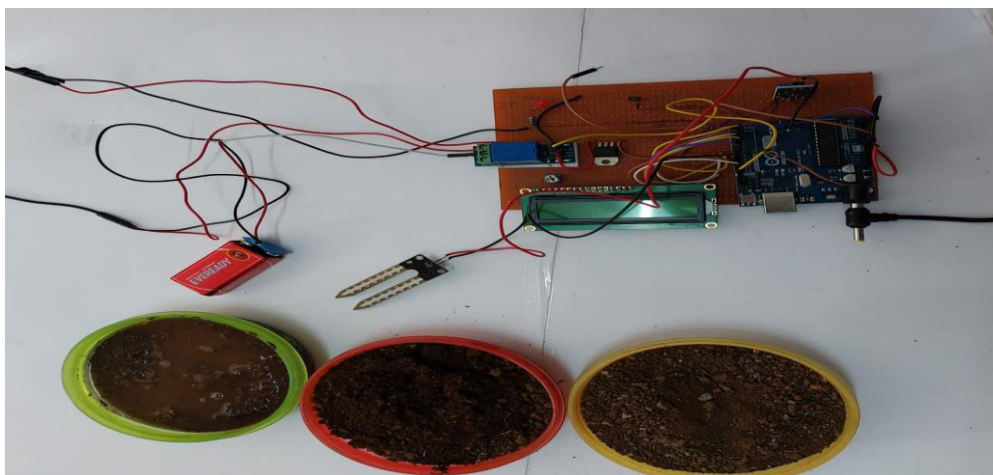
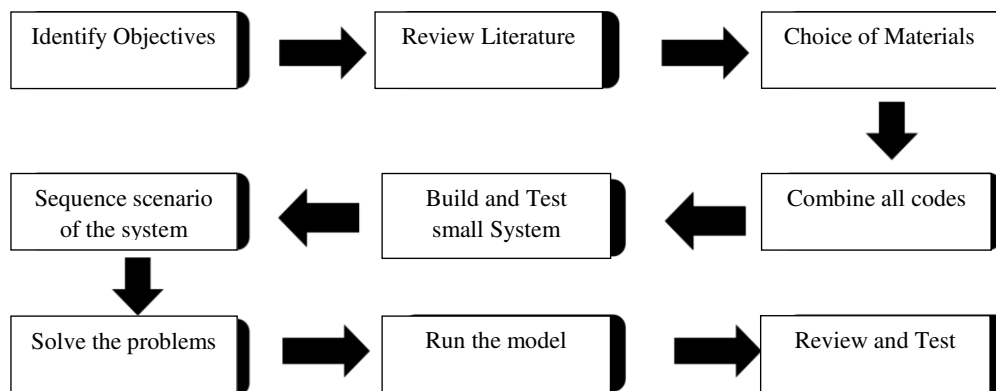


Fig 2. Setup Of The Project

IV. RESULT AND DISCUSSIONS

This project is feasible and cost-effective for optimizing water resources for agricultural production. This project allows cultivation in places with water scarcity thereby improving sustainability. It will prove that the wastage of water can be reduced. This system is very easy to implement. Here user should visualize his soil's moisture content from time to time and check whether the water level is sufficient or not. Smart irrigation system displays the values of the water level in mobile of the user so that user can operate them anytime.

- (a) The system does not require the presence of person at the field as it can be operated from anywhere.
- (b) The application that we will use displays the moisture content and amount of water being given to the crop.
- (C) This suppresses the need of manpower and also saves a lot of time.
- (d) This system only provides passable amount of water to the crop thereby saving water that is otherwise wasted due to water logging.

V. CONCLUSION

This project has been made in order to reduce the work load of the farmers and increase the efficiency of the irrigation process. With the help of this system, the water tank will be automatically filled with water, when empty, from reservoir, without any manual work. The whole world, nowadays, is mainly aiming towards fully automated systems with less human labor. This project has also been aimed at that sector. The problem of water wastage during irrigation has also been solved. Dry areas where water supply is limited, those areas can also be perfectly irrigated by the use of this system. Moreover, components of the system are also reliable, low cost and easily affordable. This system has not only meant for farmers only. It can be used in greenhouse plants also. In this world of advancement, money and time saving are two important factors to be kept in mind. This project also saves time and money by quick hassle-free work and affordable cost.

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