Automated irrigation system

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Abstract

India's population is reached beyond 1.2 billion and the population rate is increasing day by day then after 25-30 years there will be serious problem of food, so the development of agriculture is necessary. Today, the farmers are suffering from the lack of rains and scarcity of water. The main objective of this project is to provide an automatic irrigation system thereby saving time, money & power of the farmer. The traditional farm-land irrigation techniques require manual intervention. With the automated technology of irrigation the human intervention can be minimized.

With the temperature and moisture sensors placed , the changes in the corresponding values in the surrounding are read by the microcontroller and then depending upon the code based on the plants which are being watered the microcontroller decides either to open the value for the water flow or not.

Acknowledgement

This proposal describes the research and development that was done to accomplish the project. The project was carried out under the umbrella Electronics section Indian Institute of Technology, Roorkee in association with ***IEEE*** , Indian Institute of Technology, Roorkee and Gardening Section Indian Institute of Technology ,Roorkee.

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Introduction

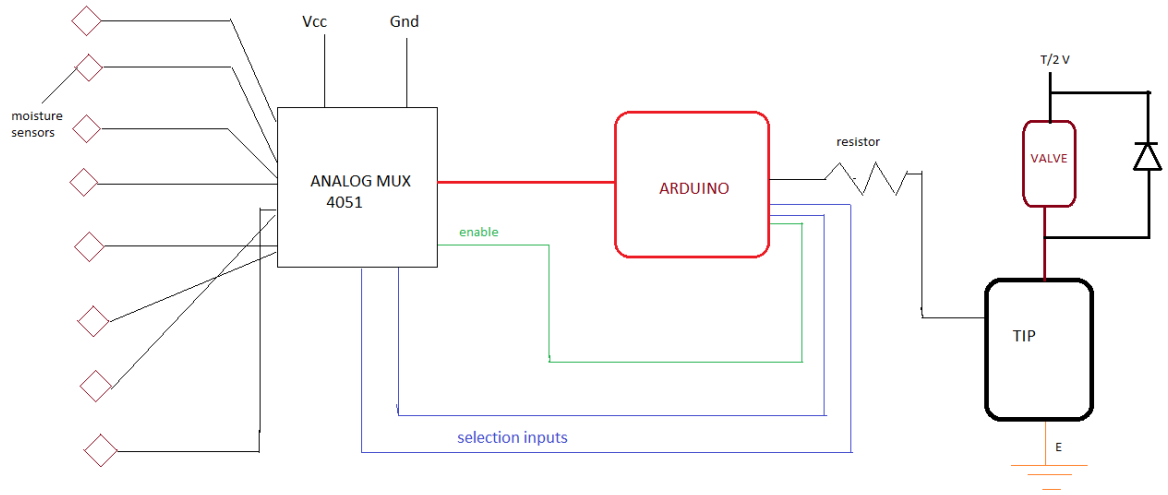
In a country like India, the agriculture plays the important role in the economy and development of the country. At the present era, the farmers have been using irrigation technique in India through the manual control in which the farmers irrigate the land at the regular intervals. This process sometimes consumes more water or sometimes the water reaches late due to which the crops get dried.

There is a need in the residential/commercial irrigation industry for an irrigation controller that responds to soil moisture sensors in individual zones as a way of conserving water. An ideal controller should be "user friendly", i.e., easy to program and requiring a minimum number of keys or push -buttons to operate the controller. It should also allow irrigation to take place in zones where watering is required, while bypassing zones where adequate soil moisture is indicated.To improve the flexibility of this kind of projects and to ensure the growth of plants in a healthier manner it should be possible to selectively deacvtivate any of the required moisture sensors and overwrite the code so as to work according to the required conditions.The sensors used and the circuit diagram which shows the components and the way in which they are connected are shown ahead.

Program Overview

Moisture sensor gives the information about the soil moisture content to the arduino	→	The mux receives the information from sensors and directs one at a time to the arduino ↓
If the moisture content is Less than the threshold arduino opens the valve ↓	←	Arduino receives the information from the sensor and checks the code to verify the conditions
If the moisture content is more then the valve remains closed		

Circuit Diagram



Components and Explanation

Soil Moisture Sensor ：

This is a simple water sensor, can be used to detect soil moisture .Module Output is high level when the soil moisture deficit, or output is low. It can be used in module plant watering device, and the plants in your garden no need people to manage.

- 1. 2 Adjustable sensitivity by adjusting the digital potentiometer
- 2. Dual output mode that is digital and analog both. Analog interfacing can be used for accurate output.
- 3. Has an east to insert soil probe that can be placed in the soil to be monitored
- 4. With power indicator (red) and digital switching output indicator (green)
- 5. Having LM393 comparator chip, stable

The soil moisture sensor can be easily interfaced to any microcontroller to its digital pin if the required output is digital like to put on and off the water pump depending on the water content. It can be interfaced via an ADC to the microcontroller for multi level monitoring like if the flow of water is also to be controlled.

Working ：The Soil Moisture Sensor uses capacitance to measure dielectric permittivity of the surrounding medium. In soil, dielectric permittivity is a function of the water content. The sensor creates a voltage proportional to the dielectric permittivity, and therefore the water content of the soil.

Microcontroller :

Arduino is an open-source prototyping platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. The one that we used was a UNO arduino.

Real Time Clock (RTC):

A real-time clock (RTC) is a battery-powered clock that is included in a microchip in a computer motherboard. This microchip is usually separate from the microprocessor and other chips and is often referred to simply as "the CMOS" (complementary metal-oxide semiconductor). A small memory on this microchip stores system description or setup values - including current time values stored by the real-time clock. The time values are for the year, month, date, hours, minutes, and seconds. When the computer is turned on, the Basic Input-Output Operating System (BIOS) that is stored in the computer's read-only memory (ROM) microchip reads the current time from the memory in the chip with the real-time clock.

Multiplexer(mux):

A multiplexer (MUX) is a device allowing one or more low-speed analog or digital input signals to be selected, combined and transmitted at a higher speed on a single shared medium or within a single shared device. Thus, several signals may share a single device or transmission conductor such as a copper wire or fiber optic cable. A MUX functions as a multiple-input, single-output switch.

Solenoid Valve :

A solenoid valve is an electromechanically operated valve. The valve is controlled by an electric current through a solenoid in the case of a two-port valve the flow is switched on or off; in the case of a three-port valve, the outflow is switched between the two outlet ports.

The one that we used was a ¾ “ 12 V solenoid valve.

Few other components:
Transistor (TIP122),Resistor

This is the region over which our project is being implemented in the rock garden

Uses and Applications:

By the implementation of such kinds of automated systems in our country many problems like the wastage of water ,manual labour for watering plants etc can be reduced to a large extent.Implementing this kind of systems is a challenge that we are facing as it includes several safety measures and to educate the one who is using it how to change the code in case of the improper functionality of some sensors.

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