

# Embedded Based Low Cost Automatic Irrigation System

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## ABSTRACT

The project is designed to develop an automatic irrigation system which switches the pump motor ON/OFF on sensing the moisture content of the soil. In the field of agriculture, use of proper method of irrigation is important. The advantage of using this method is to reduce human intervention and still ensure proper irrigation. The project uses an 8051 series microcontroller which is programmed to receive the input signal of varying moisture condition of the soil through the sensing arrangement. This is achieved by using an op-amp as comparator which acts as interface between the sensing arrangement and the microcontroller. Once the controller receives this signal, it generates an output that drives a relay for operating the water pump. An LCD display is also interfaced to the microcontroller to display status of the soil and water pump. The sensing arrangement is made by using two stiff metallic rods inserted into the field at a distance. Connections from the metallic rods are interfaced to the control unit.

**Keywords:** Agriculture System, Sensing Arrangement, Microcontroller.

## I. INTRODUCTION

8051 microcontroller is the contemporary general purpose microcontroller in the embedded market used in industrial level applications yield. In the field of soil environmental monitoring and water level monitoring can correctly guide agricultural production and improve crop. If installed and programmed properly, it can even save us money and help in water conservation. Watering with a hose or with oscillator wastes water. Neither method targets plant roots with any significant degree of precision. This can be programmed to discharge more precise amounts of water in the field, which promotes water conservation. At present, labor-saving and water-saving technology is a key issue in agriculture.

Agricultural system needs to be monitored on a regular basis. The use of this project is to reduce the wastage by automatically sensing the moisture of the soil and the level of the water. The water or moisture

sensor is placed in the field which continuously senses the moisture content in the field. If the field is dry, then the microcontroller unit automatically turns on the motor. If the field is wet, the microcontroller automatically turns off the motor.

## II. OBJECTIVES

As agriculture is the largest employment source in India but due to unplanned use of water, the ground water level is decreasing day by day. Lack of rains and scarcity of land water also results in decrease in volume of water on earth, farmers are suffering from the unavailability of water problem. One major reason of insufficient water for irrigation is that an unnecessary wastage of water due to traditional irrigation system. Most of the crops are very sensitive to water levels and available nutrients for proper growth. If water level with sufficient amount of nutrients are not maintained then the crops results in

improper growth. So this system will help to maintain the precise level of water.

### III. METHODOLOGY

The prototype model real-time atomization of agricultural environment for social modernization of Indian agricultural system will be made in the following steps:

- Soil moisture sensor sense the condition of the soil whether it is dry or wet and the water level sensor senses the water level in the water source and sends the information to the microcontroller.
- Microcontroller sends the information to the relay then on/off of the motor is done.

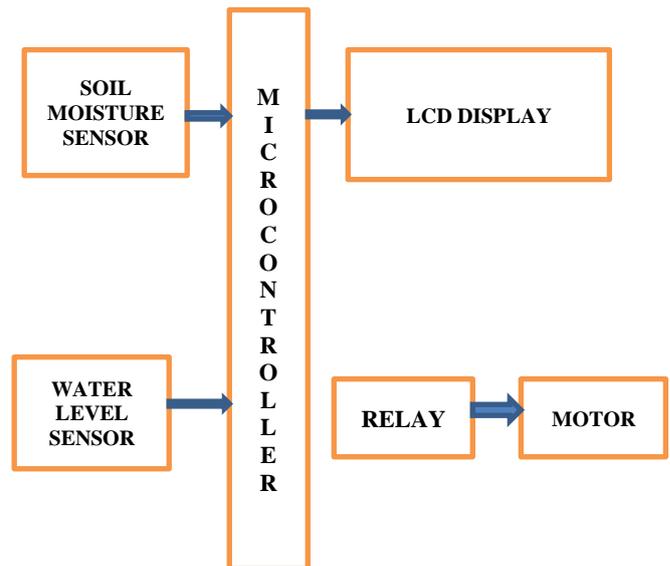
### IV. MICROCONTROLLER

It is a low power high performance “CMOS 8-bit” microcontroller with 8KB in system programmable flashon chip. Flash allows the program memory to be reprogrammed in system or by a conventional non volatile memory programmer by combining a versatile 8bit CPU within system programmable flash on a monolithic chip.

Moisture Sensor:

In the soil moisture sensor we check conductivity of the soil .for this purpose we insert two probes in the field. If the field is wet then conductivity is more and resistance is less. If the field is dry then conductivity is less and resistance is high. To measure the conductivity we use one NPN transistor circuit. Emitter of the NPN transistor is connected to the input of ADC and collector of the transistor is connected to the positive supply 5volt. Base is biased through positive voltage through 100 ohm resistor in series with the conductivity probe.

### V. BLOCK DIAGRAM



Emitter voltage is also set by the one variable resistor 10 k. One point of the 10 k ohm resistor is connected to the positive point and third point of the 10 k ohm resistor is grounded. Centre point of the 10 k ohm resistor is connected to the emitter of the transistor and go through the input of ADC IN2.As the base voltage is change according the resistance of the field, ADC input is also change.

#### Relay:

It is electrically operated switch. Many relays use an electromagnet to operate a switching mechanism mechanically. It is generally used where it is necessary to control a circuit by a low power signal (with complete electrical isolation between control and controlled circuits) or where several circuits need to be controlled by one signal.

### VI. LIQUID CRYSTAL DISPLAY

A liquid-crystal display (LCD) is a flat panel display, electronic visual display, or video display that uses the light modulating properties of liquid crystals. Liquid crystals do not emit light directly. LCDs are available to display arbitrary images, such as preset words, digits, and 7-segment displays as in a digital clock.

## VII. CONCLUSION

Traditional or old-type farming involved much more manual labour and for longer hours than the more modern methods of today. Farmers were highly dependent on climate and weather. In traditional agricultural system the farmer is used to stay at nights in order to ON the motor when power comes. Instantly the farmer comes to the field to monitor its condition. This project finds application in domestic agricultural field. This can be used to ensure faithful irrigation of farm field, since we have the option of finding out moisture level of soil in a particular area.

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