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## AN IRRIGATION APPROACH AND SENSING OF PLANT MOISTURE CONTROL WITH AUTOMATION PROCESS

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**ABSTRACT:** Agriculture plays a vital role in human life. Irrigation is an essential practice in many agricultural cropping systems in our day-to-day life with water is a major concern. Efficient water management is a major concern in many cropping systems. This paper aims to find the exact field condition and to control the wastage of water in the field. A method of reducing this problem is associated with farming as well as increase in food crop production. This is the implementation of a controlled technique to meet the soil moisture requirement for different food crops in respective location. For precisely monitoring and controlling of the agriculture field, soil moisture sensor and PIC microcontroller (16F877A) are used. In this system of irrigation, critical information (soil moisture content) is sent to a microcontroller. The microcontroller process the information to schedule irrigation by turning ON or OFF a motor that supplies water to the field.

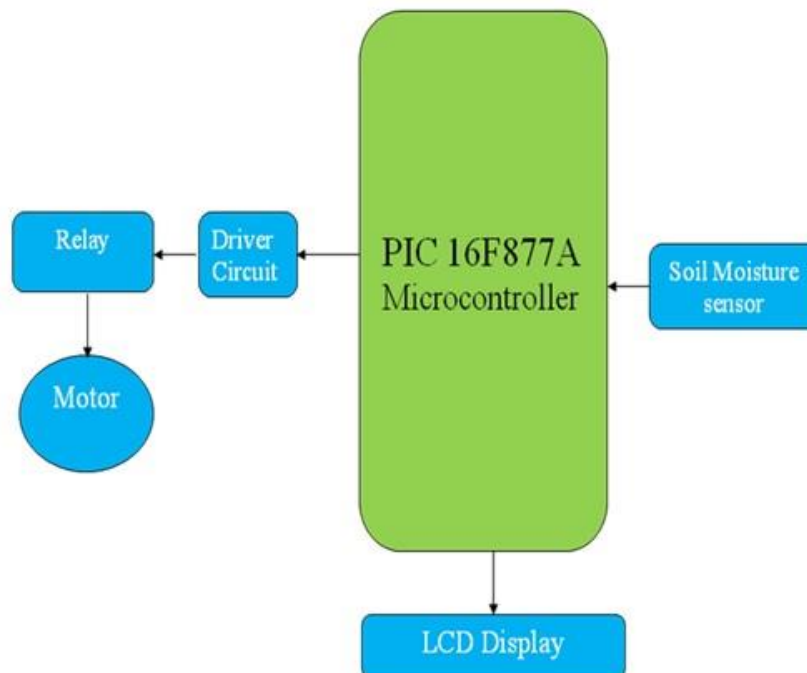
### INTRODUCTION

In India, agriculture is most important in the country's economy. Since scorching summers threatens our planet every year, our farmers are unable to cultivate our traditional crops at their suitable seasons. On other hand farmers wasting water abundant without proper management. This leads to scarcity of water at the time of requirement. In conventional irrigation system, the farmers use the irrigation technique in the country manually, in which farmers must irrigate the fields at every regular interval. This project makes the irrigation automated. Improving irrigation efficiency can contribute greatly to reduce production costs of vegetables, making the industry more competitive and sustainable. Through proper irrigation, average vegetable yields can be maintained or increased while minimizing environmental impacts caused by excess applied water and subsequent agrichemical leaching. Recent technological advances have made soil water sensors available for efficient and automatic operation of irrigation systems. Automatic soil water sensor-based irrigation seeks to maintain a desired soil water range in the root zone that is optimal for plant growth. This project allows the farmers to apply the right amount of water at the right time. It consumes low power. It is a simple and low cost method of automatic irrigation and affordable to poor farmers. It is suitable for all climatic conditions.

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**BLOCK DIAGRAM****DESCRIPTION OF BLOCK DIAGRAM:****SOIL MOISTURE SENSOR:**

The health of a plant is influenced by many factors; one of the most important is the ready availability of moisture in the soil. This Soil Moisture Sensor can be used to detect the moisture of soil or to judge if there is water around the sensor. This module can be inserted into the soil and then vary the on-board potentiometer to adjust the sensitivity [1]. The sensor will sense the moisture in soil and gives a high voltage when the soil is dry and a low voltage when it is wet [2][4]. The moisture content in soil can be displayed in LCD display as percentage.

**PIC 16F877A MICROCONTROLLER:**

A PIC microcontroller is the heart of this system. It is used for automatic irrigation process. PIC 16F877A is one of the most advanced Microcontroller from Microchip. The PIC Microcontroller consists of inbuilt analog to digital converter. It receives the values from the soil moisture sensor in the form of analog. According to the values it switch ON/OFF the motor to control the water supply [3].

**LCD DISPLAY:**

In this system 16 x 2 LCD display is used. An integrated Liquid crystal display (LCD) is used for real time display of data acquired from the sensor and the status of the motor [3].

**DESIGN OF POWER SUPPLY:**

Power supply consists of a transformer, bridge rectifier, and voltage regulating ICs 7805, 7812, 7912. +5 V, -5V, +12V DC power supply is designed to provide VCC as well as reference voltage to the various ICs.

**RELAY AND DRIVER CIRCUIT:**

The driver circuit is used to drive the relay to switch ON/OFF the motor. The driver circuit is made by using NPN transistor [5].

**WORKING PRINCIPLE OF THE SYSTEM**

This system works in a simple way, it consists of soil moisture sensor, PIC microcontroller and motor. PIC microcontroller constantly monitors the parameters of sensor. The PIC microcontroller converts the analog signal from the sensor which is buried inside the soil, to digital values. This is compared with a value which representing the minimum allowable moisture content of the soil. If that soil moisture content is low from predefined value, PIC Microcontroller will turn ON the relay, to run the motor and the water supply is made through the system to fields. And the moisture content of soil in percentage and status of the motor are displayed in 16 x 2 - Liquid Crystal Display (LCD) as shown in Fig 1. Once the soil has reached desired moisture level the sensor transmits the signal to PIC microcontroller and it turn OFF the motor. It updates the moisture content of soil and status of the motor in 16 x 2 - Liquid Crystal Display (LCD) as shown in Fig. 2. This system helps to save energy as well as improves the crops health. This process is termed scheduling. Every procedure in scheduling is controlled by the program fused in the PIC microcontroller.



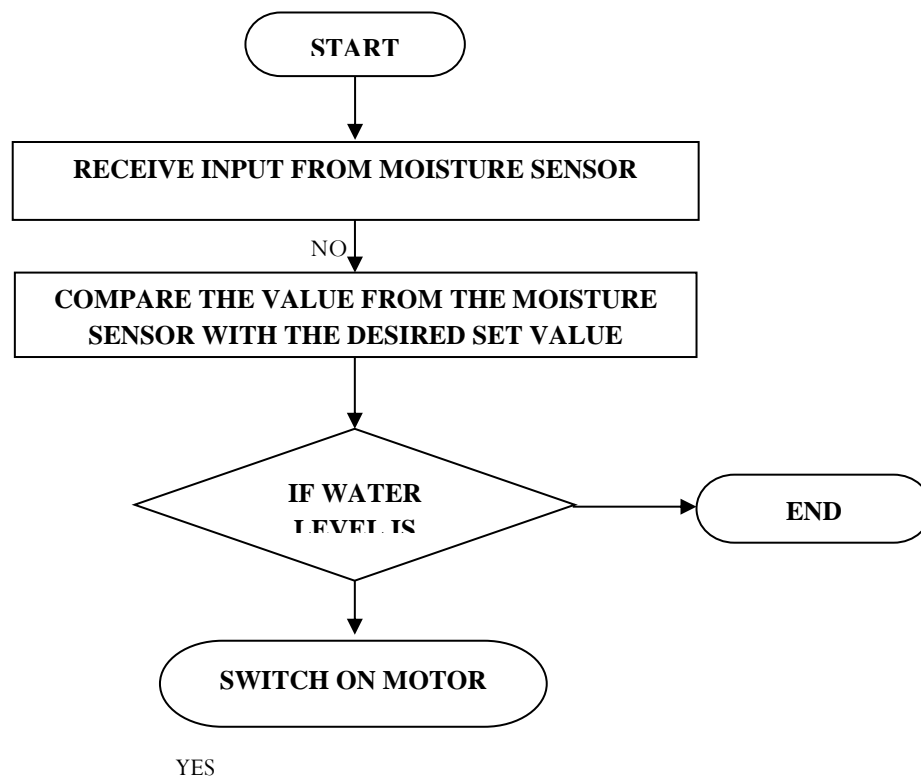
**ADVANTAGES**

- Increases growth – Right amount of water supplied at the right time. So it increases the growth and prevents soil erosion and nutrient runoff. Water penetrates deeply into the soil to get well down into the root zone.
- Saves time – It supplies the water to the field when it needs and it saves the time.
- Saves water – we can save water by using this method.
- Controls the disease to plants - It helps to grow quickly under moist conditions and controls the fungal disease to the plants.
- Easy Maintenance and low cost – This system is constructed with simple circuits, the process of maintenance is easy and it cost low.

**APPLICATIONS**

- Roof Gardens
- Lawns
- Agriculture Lands and Home Gardens

**FLOW CHART**



**CONCLUSION**

The proposed system provides with several benefits and can operate with less manpower. The system supplies water only when the moisture in the soil goes below the reference. With the help of this system, water is only delivered where it's needed. So the desired moisture level is maintained in the field, which helps to increase the food production. Thus the system is efficient and compatible to changing environment. In future we planned to add many features such as humidity sensor, temperature sensor and timer modes to enrich the automatic irrigation.

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