

# Automatic Irrigation System using Soil Moisture Sensor

Amol Yadav, Tejas Abnave, Sahil Chavan, Pradip Bhore,  
Abhijeet bondar

*Assistant professor Mechanical Engineering Department Jaywantrao Sawant College Of Engineering  
Hadapasar , pune*

*UG Student Mechanical Engineering Department Jaywantrao Sawant College Of Engineering  
Hadapasar , pune*

*UG Student Mechanical Engineering Department Jaywantrao Sawant College Of Engineering  
Hadapasar , pune*

*UG Student Mechanical Engineering Department Jaywantrao Sawant College Of Engineering  
Hadapasar , pune*

*UG Student Mechanical Engineering Department Jaywantrao Sawant College of Engineering  
Hadapasar ,pune*

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## ABSTRACT

Now a day's water is becoming very precious due to scarcity in obtaining clean water for domestic purpose including irrigation. In order to optimize the use of water, mechanism to develop water conservation is the need of the hour. Also, automation in agricultural systems is a necessity to optimize water usage, reduce water wastage, and to implement modern technology in agriculture systems. Soil moisture sensor is a novel device which senses the moisture content in the soil, and with suitable mechanism allows water to be irrigated depending on the moisture content of the soil. This allows flow of water or stoppage of water to the plants by using an automated irrigation system. The device consists of an mcu node esp8622 board, which is the micro controller which activates the water pump and supplies water to plants through Rotating Platform Sprinkler. A submersible motor pump is used for this purpose of pumping water. This system uses low power consumption and pumps water up to 100 litres/hour. Necessary tunings for pumping and supplying water is arranged depending on the consumption of water. This involves a power supply of 2.5 V to 6 V. Soil moisture sensor is inserted in the soil which contains a probe to measure the moisture content of the soil.

**Keywords**—Moisture sensor, Arduino, Microcontroller.

## I. INTRODUCTION

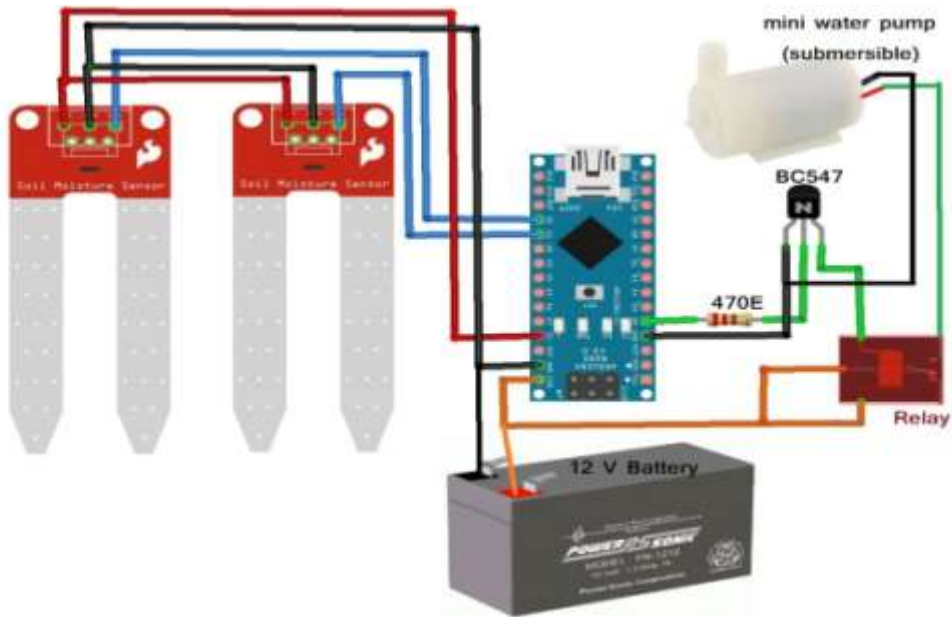
This is a microcontroller based control system used for data processing. The activation of the pump to supply water through the tunings connected to the pump depends upon the signals received through the sensing mechanism. The purpose is to regulate water and optimize the water flow so that plants are 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. As the technology is improving day by day, the basic idea is to develop a new device to this project GSM, (Global System for Mobile) controlled soil moisture sensor. GSM module is used to operate the soil moisture sensor. The device is very sensitive and care is taken to use a 5V microcontroller device and interfaced with 240 V energy meter, used for domestic power consumption

## II. METHODOLOGY

The major components used in this project are:

- Microcontroller based control system with regulated power supply
- Soil moisture sensor
- Electromagnetic relay to control the electrical motor (pump)
- Relay driver
- GSM modem attached to Microcontroller for remote communication

LED Indicators:

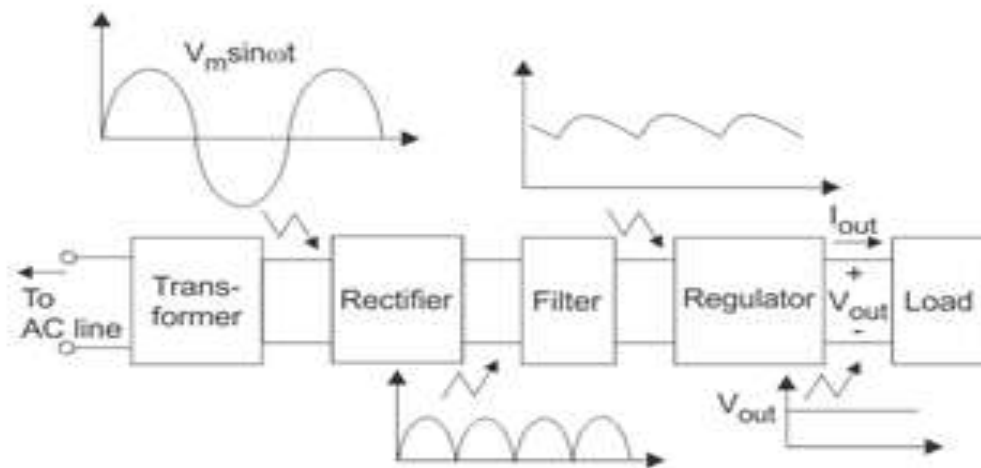


A. Power supply:

- As this electronic device is power operated, the controller and other devices used are low

power devices. The voltage has to be step down to obtain a constant DC output

- The block diagram of regulated power supply is as shown in Fig.



Components of typical linear power supply

The following components are used in the circuit.

B. The NodeMCU ESP8622:

- It is a microcontroller based board connected to the power supply.

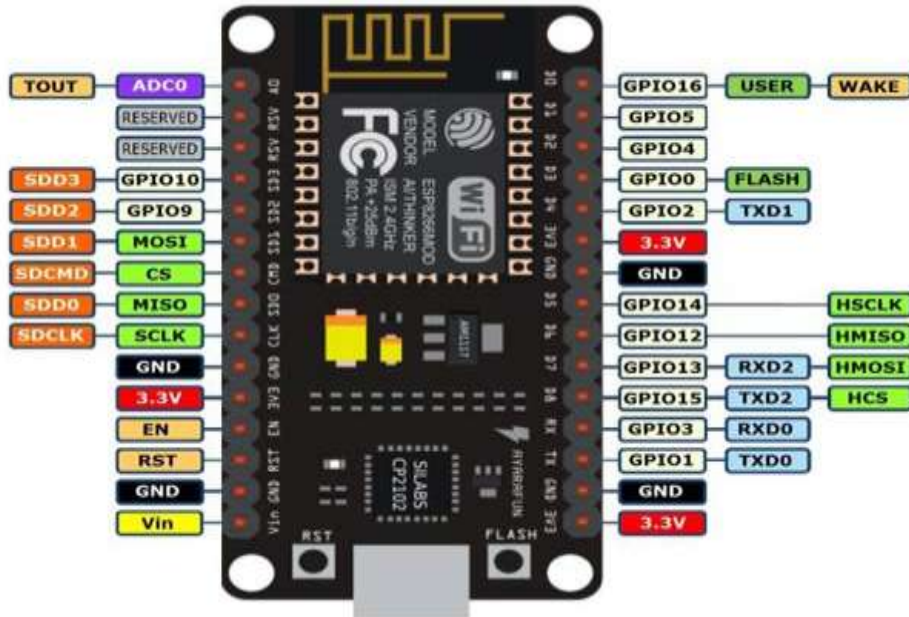


Image From –  
<https://components101.com/development-boards/nodemcu-esp8266-pinout-features-and-datasheet>

**GSM Module:**

- It is used to send and store messages. It also alerts the user of any specific data. It is handy and can be carried anywhere easily. Fig:

**D. Relay MODULE:.**

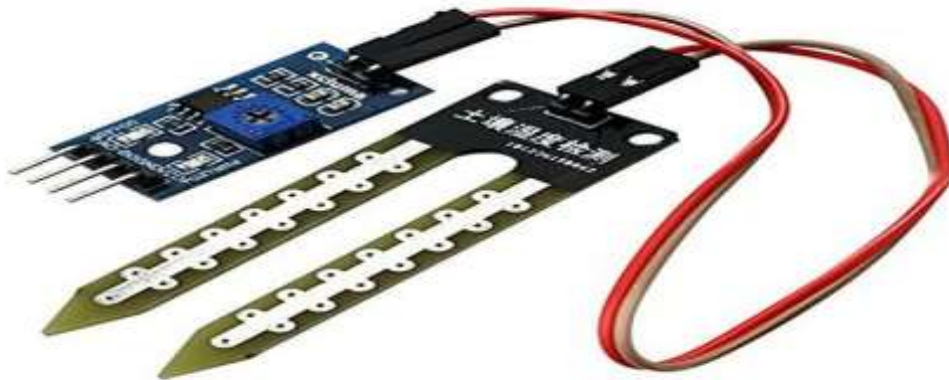
- A simple relay is used to open or close a circuit. It can energize and de-energize the system according to the inputs.

**E. LED:**

- It is a light emitting diode used as flash lights to emit light during operation and used as indicator.

**F. Soil Moisture sensor:**

- It consists of a probe consisting of moisture sensors which can be inserted in the soil, in order to measure the moisture content of the soil. When the field is in dry condition, the sensor device senses the condition of the soil and the signal is transmitted to the microcontroller, which in response makes the motor ON. Now, the water is pumped and the irrigation is done at the dry places only. This is done by moisture sensor device. Where there is moisture present in the soil, irrigation process will stop and vice-versa. Soil moisture sensors measure the water content in soil.



### G. Submersible pump:

This is a low cost, small size Submersible Pump Motor which is operated from a 2.5 V to 6 V power supply. It is used to deliver about 100 litres of water per hour. The pipe tubing are connected to the motor outlet and submerged in water. Power is activated when water is to be pumped. Care is taken to ensure the level of water is higher than the motor...

### III. CONCLUSION

The 'Automatic Irrigation System using Soil Moisture Sensor' has been developed and tested successfully and found to function automatically

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