



AUTOMATIC PLANT IRRIGATION SYSTEM

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Abstract:- Every farmer knows how important it is to maintain optimum moisture levels in their various soils, across different textures, crops, and slopes. Moisture holding capacity drives many crop production factors, including nutrient availability, leaching, runoff, and maintaining a healthy soil environment.

Having the ability to maintain soil-water levels in real-time at different depths across the profile enables you to optimize the timing and rate of your irrigation schedule which has far-reaching benefits. Minimizing saturated soils removes many barriers to maximum economic yields, like denitrification and leaching of nutrients, diseases, erosion, and more...Maximize yields-increase your ROI.

The working of the soil moisture sensor is pretty straightforward. The fork-shaped probe with two exposed conductors, acts as a variable resistor (just like a potentiometer) whose resistance varies according to the water content in the soil. This resistance is inversely proportional to the soil moisture.

As we know that water is a good conductor of electricity and has very low resistance. So, when water is present in the soil then its moisture level increases and conduction also increases with decrease in resistance. So, the probes start conducting and according to the amount of conduction, it gives the level of moisture present in the soil.

We are constructing system which can ascertain the moisture content of soil and at the same time maintains it without human interference. This in turn benefits our farmers by growing healthy crops. It will be very helpful for our farmers for irrigation in field and it can be used at our homes too for watering purpose.

Keyword:- Sensor, denitrification, ROI

I. Introduction

We all know the importance of plants and greenery in our environment. Plants and crops play a vital role in existence of life on the Earth. Irrigation helps to grow agricultural crops, maintain landscapes, and revegetate disturbed soils in dry areas and during period of less than average rainfall. It also does frost protection and prevents soil consolidation. Irrigation maintains moisture in the soil. Moisture is necessary for the germination of seeds. Seeds do not grow in dry soil. That is why irrigation is done before tilling. It is essential for the growth of the roots of the crop plants. Roots of the plants do not grow well in dry soil.

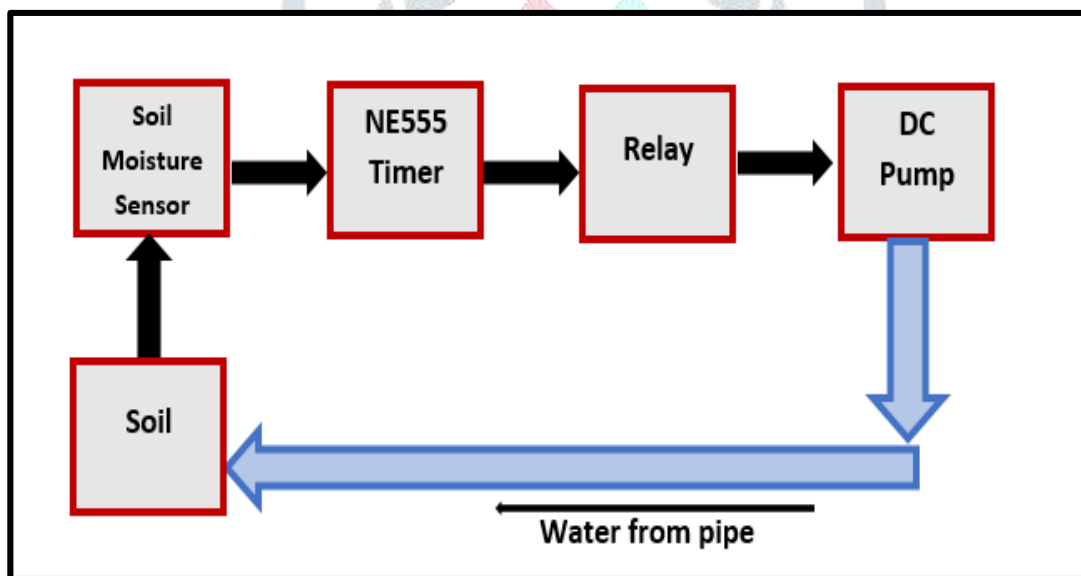
Irrigation is necessary for the absorption of mineral nutrients by the plants from the soil. Thus, irrigation is essential for the general growth of the plants.

For proper nourishment of crops certain amount of water is required. If rainfall is insufficient there will be deficiency in fulfillment of water requirement. We know that people do not be able to pour the water on the plants in their gardens and fields when they go to vacation or often forget to water plants. As a result, there is a chance to get the plants damaged. This article explains you how to design a simple and more useful system in watering plants automatically without any human interference.

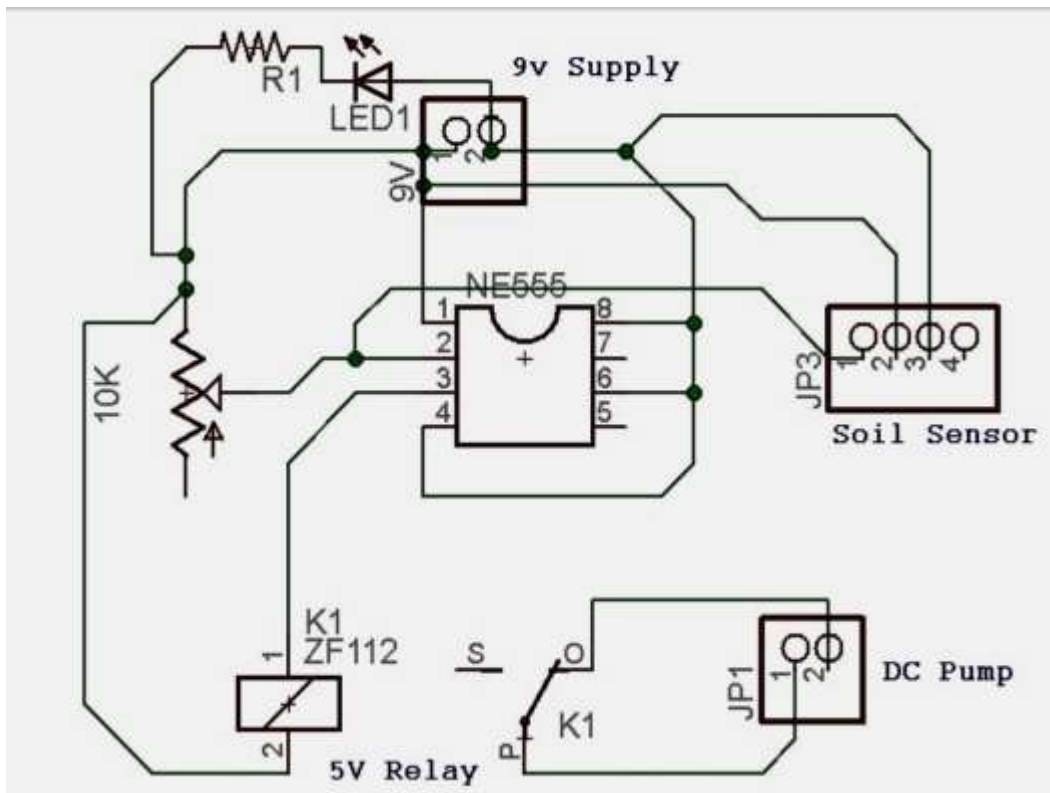
It uses 'Soil Moisture Sensor' to sense moisture present in the soil. When the soil becomes dry, then the system starts the water supply to the plant and when the soil gets wet enough then it stops the water supply.

The system is very simple and yet significantly helpful to protect our plants and thus retains greenery. It is a great source for protecting our environment by reducing wastage of water and level of Carbon Di-Oxide in our atmosphere. It will be very useful for our farmers to grow healthy crops and ensure proper irrigation in any condition of obligation when manpower availability is not there.

II. Theory



2.1 BLOCK DIAGRAM



2.2 Circuit Diagram

Here we use the basic concept in this circuit i.e. soil has high resistance when it is dry and has very low resistance when it is wet.

By using this concept, we will make the system work. We insert two probes of **Soil Moisture Sensor** in the soil. They will conduct when the soil is wet, and they will not conduct when the soil is dry. So, when the probes do not conduct, the system will automatically detect this condition and because of **Normally Closed Relay**, connected with the **DC Pump**, water supply will remain on.

Output from the Soil Moisture Sensor will be given to the **NE555 Timer**. NE555 Timer's output terminal is connected to the **Relay** which is Normally Closed type. The Relay operates **DC Pump** associated with it to feed water to the plants.

When the probes are in a non-conducting state, the relay will not get any output and hence it will keep the water supply to the plants On.

When the plants will get appropriate amount of water, the soil will be wet and hence the probes will conduct and **the Soil Moisture Sensor** will give signal to the **NE555 Timer**. It will give output to the **Relay** and its circuit will become open. Hence the **DC Motor** will be disconnected and the water supply will be Off.

III. Limitation

- Battery should be continuously monitored from power outage.
- Probes must be inserted properly into the soil to sense its moisture properly

- Placement of the probe should be in the area where water take time to reach otherwise the area may remain dry if the sensor will sense soil conductivity before water reach to that place

IV. Conclusion

This Automatic Plant Irrigation System is designed successfully. It can be easily used for watering plants in absence of manpower without being concerned about wastage of water. It is portable because of its small size but should be carried carefully. This system is adequate for domestic usage and can be used in fields too. For large scale usage it could not provide the desired results. But this limitation can be tackled by using the components of higher specifications. The proposed system can be efficiently used for one flowerpot irrespective of number of plants planted in the flowerpot. Battery should be monitored for power outage but we can overcome that by using 9V DC Supply Adapter. Probes of Soil Moisture Sensor must be inserted into the soil rather than just keeping it on the soil. There should not be excess air gap between the probes and soil to get best result. By making it more Automated with microcontroller, we could even control the level of moisture i.e. amount of water in the soil.

V. Reference

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