

AUTOMATIC PLANT WATERING SYSTEM USING SOIL MOISTURE SENSOR

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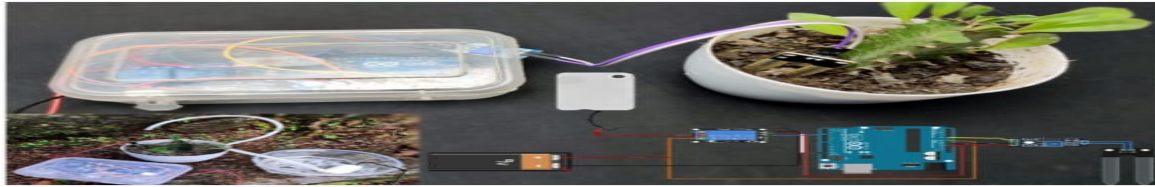
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ABSTRACT: This project is taken up as India is an agriculture oriented country and the rate at which water resources are depleting is a dangerous threat hence there is a need of smart and efficient way of irrigation. In this project we have implemented sensors which detect the humidity in the soil (agricultural field) and supply water to the field which has water requirement. The project is PIC16F877A microcontroller based design which controls the water supply and the field to be irrigated. There are sensors present in each field which are not activated till water is present on the field. Once the field gets dry sensors sense the requirement of water in the field and send a signal to the microcontroller. Microcontroller then supply water to that particular field which has water requirement till the sensors is deactivated again. In case, when there are more than one signal for water requirement then the microcontroller will prioritize the first received signal and irrigate the fields accordingly. This project uses PIC16F877A Microcontroller. It is programmed in such a way that it will sense the moisture level of the plants and supply the water if required. This type of system is often used for general plant care, as part of caring for small and large gardens. Normally, the plants need to be watered twice daily, morning and evening. So, the microcontroller has to be coded to water the plants in the greenhouse about two times per day. People enjoy plants, their benefits and the feeling related to nurturing them. However for most people it becomes challenging to keep them healthy and alive. To solve this problem we made a project for those who cannot water the plant due to their busy schedule or when they go outside for long time. The system automation is designed to be assistive to the user. We hope that through this project people will enjoy having plants without the challenges related to absent or forgetfulness.

KEYWORDS: Arduino, UNO, plant, system, sensor, bioengineering

I. INTRODUCTION

In present days, in the field of agriculture farmers are facing major problems in watering their crops. It's because they don't have proper idea about the availability of the power. Even if it is available, they need to pump water and wait until the field is properly watered, which compels them to stop doing other activities – which are also important for them, and thus they lose their precious time and efforts. But, there is a solution – “ An Automatic Plant Irrigation System “ not only helps farmers but also others for watering their gardens as well. Healthy plants can transpire a lot of water, resulting in an increase in the humidity of the Greenhouse air. A high relative humidity (above 80 – 85 %) should be avoided because it can increase the incidence of the disease and plant transpiration. Sufficient venting or successive heating and venting can prevent condensation on plants surfaces and greenhouse structure. The use of cooling system during the warmer summer months increases the greenhouse air humidity. During periods with Warm and humid outdoor conditions, humidity control inside the greenhouse can be a challenge. Greenhouse located in dry environments benefit greatly from evaporative cooling system because large amount of water can be evaporated into the incoming air, resulting in significant temperature drops. This automatic irrigation system senses the moisture content of the soil and automatically switches the pump when the power is on. A proper usage of irrigation system is very important because the main reason is the shortage of land reserved water due to lack of rain, unplanned use of water as a result large amounts of water goes waste. For this reason, we use this automatic plant watering system, and this system is very useful in all climatic conditions. Since the relative humidity alone does not tell us anything about the absolute water holding capacity of air, a different measurement is sometime used to describe the absolute moisture status of the soil. The vapor pressure deficit is a measure of the difference between the amount of moisture the air contains at a given moment and the amount of moisture it can hold at that temperature when the air would be saturated. Pressure deficit measurement can tell us how easy it is for plants to transpire: higher values stimulate transpiration (but too high can cause wilting), and lower values inhibit transpiration and can lead.



II. METHODOLOGY

AUTOMATIC PLANT WATERING SYSTEM USING ARDUINO is project. Here we are using arduino for code execution, for sensing we used soil moisture sensor which will sense the moisture level of soil. Everything is getting with smart technology for the betterment of human being. So this help in maintaining the environment in best way with the help of technology. It is a sensor based automatic plant watering system so it would be easy to access/use for any age group. Our aim is also to make it cost effective so that many numbers of people can get the benefit from this. And it should be usable to anyone and helpful for them. To complete our project, we require some software as well as some hardware.

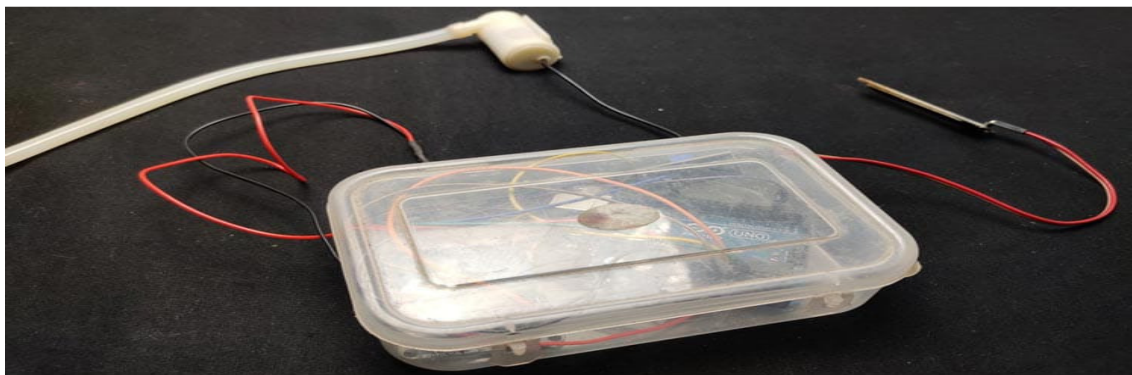
A. *Required Software:*

1. Arduino IDE
2. SOIL MOISTURE SENSOR
3. RELAY
4. LI-ON BATTERY
5. WATER PUMP
6. JUMPER WIRES

III. WORKING

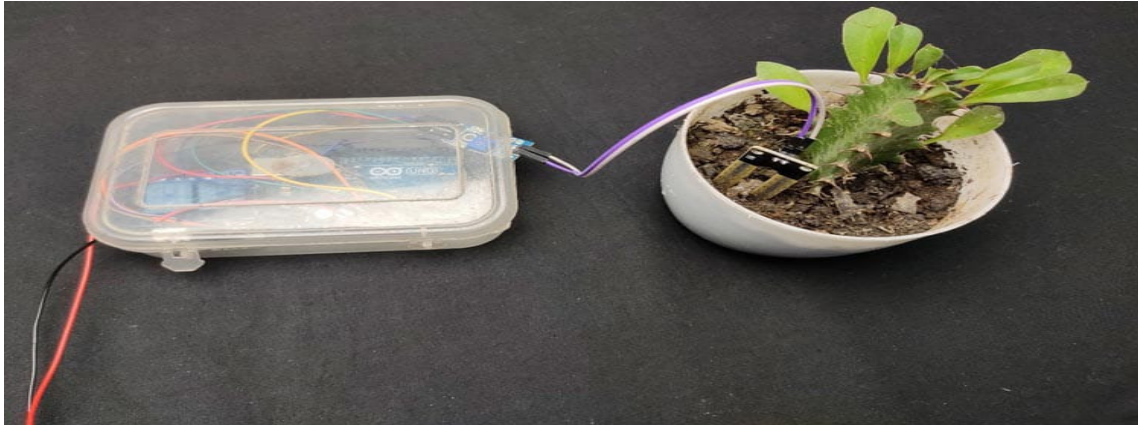
An automatic irrigation system is a device that operates irrigation structures without the need for the irrigator to be present. Smart irrigation systems use advanced sprinklers and intelligent controllers to automatically adjust watering levels for lawns. Although automatic irrigation systems initially cost more than alternatives, they can save amounts of water in a targeted area, which promotes water conservation.

A. *Automatic Irrigation System Testing:*



Now place the moisture sensor into the soil. Place the sensor as close to the roots of the plants as possible for higher accuracy.

B. *Arduino based Automatic Irrigation System:*



The final step is to place your motor in a container filled with water and your automatic irrigation is ready to take care of your lovely plants when you are not around.

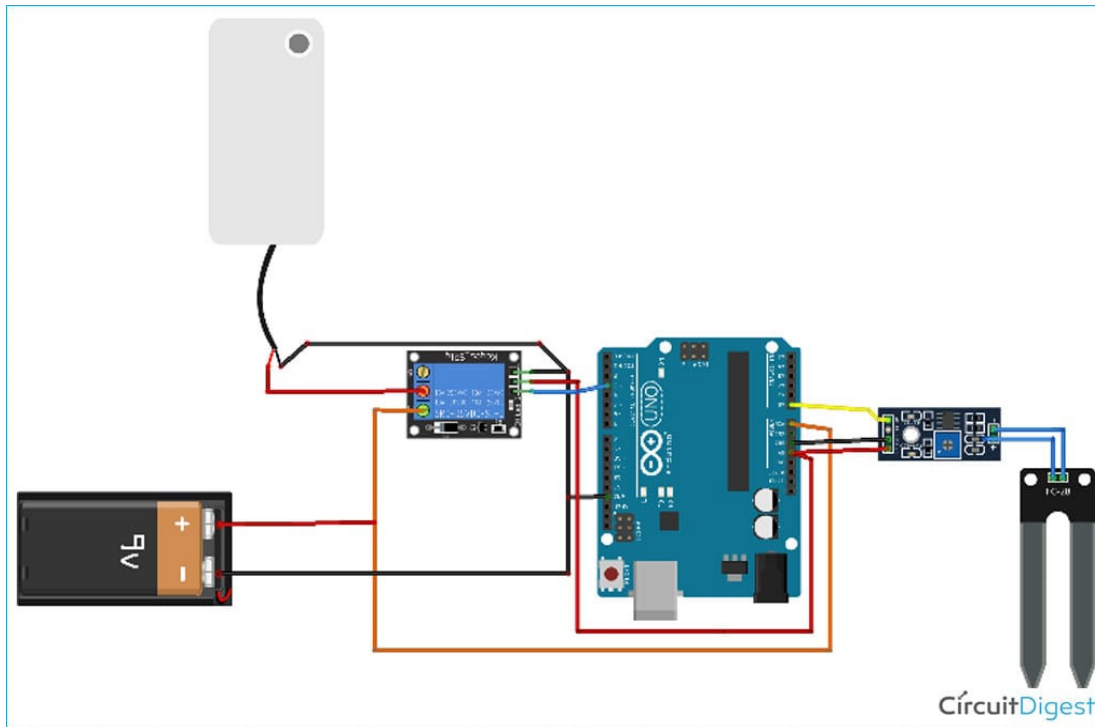
c. Automatic Irrigation System using an Arduino Uno:



You might have to change the moisture percentage to start and stop the pump as different plants have different water requirements. Hope you enjoyed the project and are ready to build your own automatic irrigation system using Arduino

IV. SIMULATION RESULTS

A. Circuit Diagram::



In this section, I will explain all the details with the help of the schematic diagram. The Arduino UNO is the brain of this whole project. It controls the motor pump according to the moisture in the soil which is given by the moisture sensor. To power the circuit, I am using an external Battery. You can use any 9v or 12-volt battery. The battery is connected to the Vin and ground pins of Arduino and we can also connect the motor to this battery via a relay. Moisture sensor output is connected to the analog pin of Arduino. Do remember to use the Arduino's 5volt pin to power the sensor and relay.

V. CONCLUSION AND FUTURE WORK

Thus, a system is required, to handle this task automatically. Automated plant watering system estimate and measure the existing plant and then supplies desired amount of water needed by that plant. It is **minimizing the excess water use as well as keeping plants healthy**. Automatic system using a microcontroller, moisture sensor and other electronic tools were been developed. It was observed that the proposed methodology controls the moisture content of the soil of cultivated land. The motor automatically start pumping water if the soil is dry and need water and stops when the moisture content of the soil is maintained as required.

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