SYMBIOSIS INSTITUTE OF TECHNOLOGY, PUNE

Department of Computer Science Engineering

Project Report for Tinkerlab

Tilte - To determine the moisture level of given soil sample.

Submitted by –

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CERTIFICATE

This is to certify that the Project work entitled "**Soil moisture based irrigation system**" is carried out by the students **Tanvi Nanoty, Vinamra Jain, Vinayak Bansal , Yash Samtani, Varini Ranjan** in partial fulfilment for the award of the degree of **Bachelor of Technology** in **Computer Science & Engineering**, Symbiosis International (Deemed University), Pune during the academic year 2024-2025.

Name and Signature of the Guide	Name and Signature of the Co-Guide	Dr. Deepali R. Vora Head, Department of CSE

DECLARATION

I hereby declare that the project titled "**Soil moisture based irrigation system**" submitted to Symbiosis Institute of Technology, Constituent of Symbiosis International (Deemed University) Pune for the award of the degree of Bachelor of Technology in Computer Science & Engineering is a result of original research carried out by me. I understand that my report may be made electronically available to the public. It is further declared that the project report or any part thereof has not been previously submitted to any University or Institute for the award of any degree or diploma.

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Degree: Bachelor of Technology in CSE

Department: Computer Science & Engineering

Title of the project : soil moisture based irrigation system

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(Signatures of the Students)

Date:

ACKNOWLEDGEMENT

I want to express my sincere gratitude to everyone who supported me throughout this project. First and foremost, I would like to thank my project guide, **Dr. Mahesh Arse**, for his valuable guidance, encouragement, and feedback. He has been a constant source of inspiration and motivation for me.

I would also like to thank the head of the department, **Dr. Deepali R. Vora**, for providing me with the necessary facilities and resources for conducting this project. I am grateful to him for his constant support and advice.

I want to acknowledge the contribution of my project team members,**Tanvi Nanoty, Vinamra Jain,Vinayak Bansal, Yash Samtani,Varini Ranjan**,who have worked hard and cooperated with me in every project stage. They have been accommodating and supportive throughout this journey.

I would also like to thank my family and friends for their love, care, and support. They have always been there for me in times of need and stress. They have encouraged me to pursue my passion and achieve my goals.

Lastly, I thank **Symbiosis Institute of Technology Pune** for allowing me to work on this project and enhance my skills and knowledge. I am proud to be a part of this prestigious institution.

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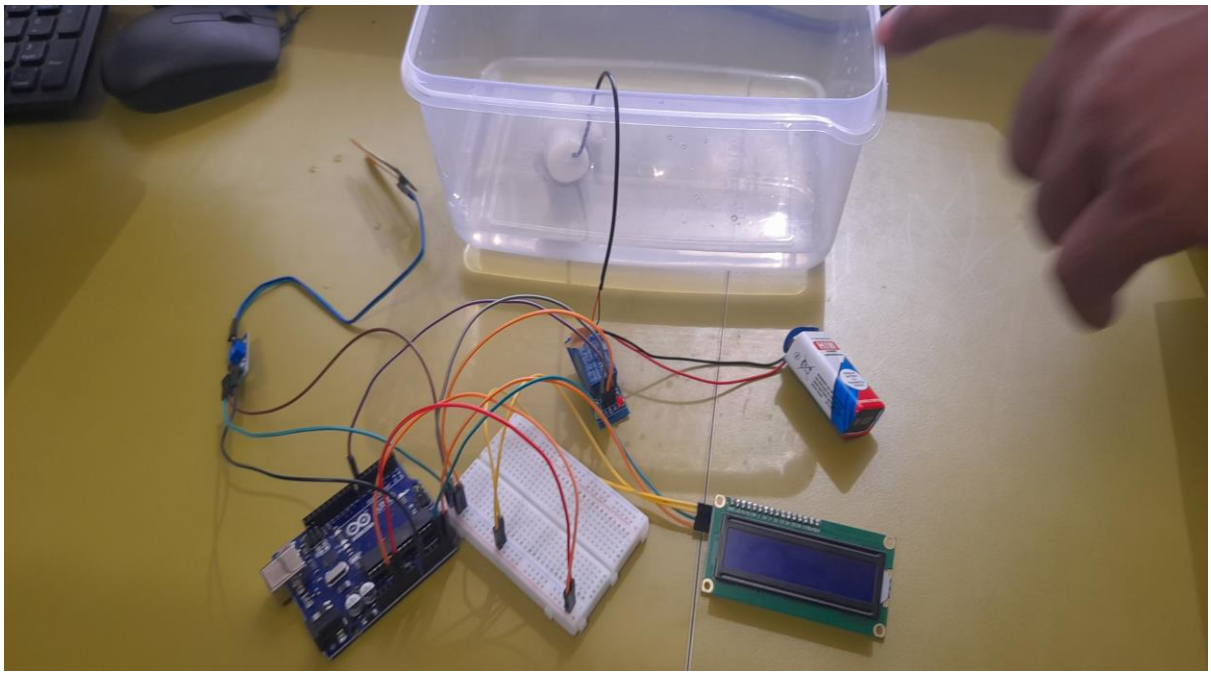


2. INTRODUCTION

Soil moisture is basically the amount of water content present in the soil. Soil moisture (SM) content is an important component and plays a critical role in agricultural, hydrological, and water resources management, especially in the determination of crop water requirement.

Why determination of soil moisture is important for irrigation?

- Knowing the soil moisture status enables highly efficient irrigation, providing the water as and when required, and eliminating the wasteful use of water when irrigation is not needed.
- The soil moisture regime means the way in which the moisture content varies within and between years. When there is too little water, i.e when soil moisture falls below the wilting point, plants struggle to survive. Similarly, too much water can be equally fatal. The availability of water is one of the major factors controlling the biogeography of plant species.
- So the more we understand about soil moisture the better able we are to recognise the plants that are suited to particular conditions, the availability of water to maintain surface waters, and the impacts soil moisture can have on our weather. This understanding becomes more

interesting and useful when we want to understand the impacts of modifying and exploiting our environment.

Soil moisture-based irrigation therefore is a means to reduce the demand for irrigation water. Because the water gift can be better adjusted to the actual water requirements of the crop, there is also a reduced discharge or run-off of insecticides and nutrients into ground and surface water.

Thus our project is based on irrigating the plant as per its soil moisture level.

3. THEORY

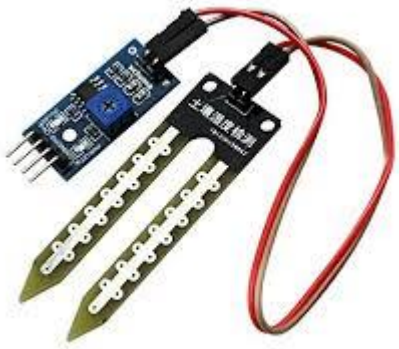
- In this project, a **Moisture sensor** will be used to maintain the optimum level of moisture for your plants. This system can be implemented, both for your garden and for your Indoor plants thus taking care of your leafy pets when you are away.
- In this system, the moisture sensor senses the moisture level of the soil and when the sensor senses a low moisture level it automatically switches the water pump with the help of a microcontroller and irrigates the plant. After supplying sufficient water, the soil gets retains the moisture hence automatically stopping the pump.
- We need a small pump to irrigate the plant, but in the case of a garden, we need to drive a larger pump that can provide a higher volume of water depending on the size of your garden which can't be directly powered by an Arduino. So in case you need to operate a larger pump, a driver is necessary to provide enough current for the pump, to show that I am using a 5v relay. You can also use an AC-powered pump and use a suitable relay. The working will remain the same as shown in this project, you just have to replace the DC power input connected to the relay with an AC power input and have to power your Arduino with a separate DC power source.

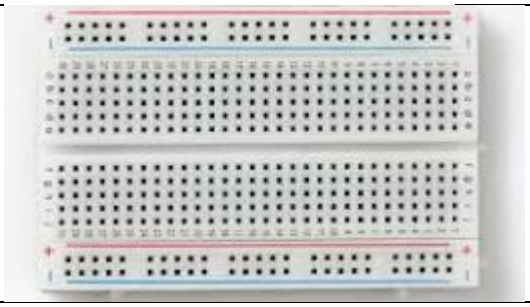
- The **Arduino UNO** is the brain of this whole project. It controls the motor pump according to the moisture in the soil which is given by the moisture sensor.

- 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.

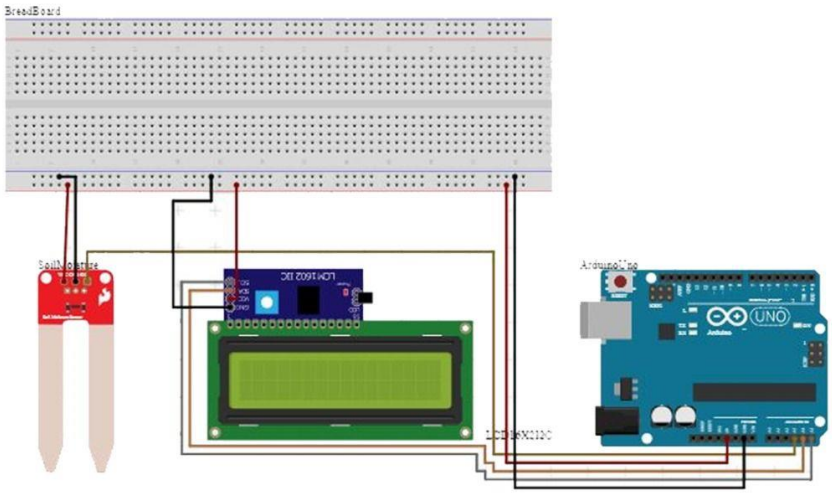
4. LIST OF COMPONENTS

1.	**Arduino uno**	
2.	**Jumper wires**	

3.	**Soil moisture sensor**	
4.	**Relay module**	
5.	**LCD(liquid crystal display)**	
6.	**9v battery**	

7.	**Water pump**	
8.	**breadboard**	
9.	**pipe**	

5. CIRCUIT DIAGRAM



Soil Moisture Sensor Arduino Circuit

6.CODE

```
#include <Wire.h>
#include <LiquidCrystal_I2C.h>

LiquidCrystal_I2C lcd(0x27, 16, 2); // Update the address if necessary

int sensor_pin = A0;
int relay_pin = 7;

void setup() {
  Serial.begin(9600);
  lcd.init();         // Initialize the LCD
  lcd.backlight();    // Turn on the backlight
  pinMode(sensor_pin, INPUT);
  pinMode(relay_pin, OUTPUT);
```

```
}

void loop() {
 int sensor_data = analogRead(sensor_pin);
 Serial.println(sensor_data);

 lcd.clear(); // Clear the display before updating

 if (sensor_data > 950) {
  Serial.println("Moisture level: LOW");
  digitalWrite(relay_pin, LOW);
  lcd.setCursor(0, 0);
  lcd.print("Soil is dry");
  lcd.setCursor(0, 1);
  lcd.print("Water pump is ON");
 } else if (sensor_data >= 400 && sensor_data <= 700) {
  Serial.println("Moisture level: MEDIUM");
  digitalWrite(relay_pin, HIGH);
  lcd.setCursor(0, 0);
  lcd.print("Soil is medium");
  lcd.setCursor(0, 1);
  lcd.print("Pump is OFF");
 } else if (sensor_data < 400) {
  Serial.println("Moisture level: HIGH");
  digitalWrite(relay_pin, HIGH);
  lcd.setCursor(0, 0);
  lcd.print("Soil is wet");
  lcd.setCursor(0, 1);
  lcd.print("Pump is OFF");
 }

 delay(1000); // Allow time to see the updates
}
```

7 .CONCLUSION

In conclusion,the arduino based soil moisture sensor efficiently monitored soil moisture sensor helping maintain optimal plant health by indicating when water is needed. This project highlights practical and cost effective solution for smart irrigation