



Prize Winner

**Programming, Apps &
Robotics
Year 3-4**

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Soil Moisture Monitor – Report

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The aim of the entry, its scientific purpose, and potential applications

My aim of the project is to detect the soil's moisture level and indicate to the user if the moisture level drops below a certain level. Different plants need different moisture levels to grow properly. Therefore, it's essential to keep the moisture level healthy. (I got this idea when I saw my mum often forget to water her plants and complain about it).

I used the Arduino Resistive Soil Moisture Sensor Module to measure the soil moisture level. It measures the moisture level by using the resistance between the two probes.

Potential Applications

- Home Garden Beds
- Plantation Nurseries

Future Development

My future intentions are to

- Improve this project to an automatic irrigation system.
- Integrate temperature sensor, humidity sensor, and SD card module to collect data to learn what type of environment a specific plant needs.

The type of robot or computer/device required to run the program

- Arduino IDE 2.3.2
- Soil moisture sensor module
- Tinkercad to design the project
- Arduino Uno R3 Board

- A computer for initial setup
- 9v Battery
- 220-ohm resistor
- Jump wires
- LED bulb
- Breadboard
- A box for packaging
- Double-side adhesive tapes

Instructions to run the Soil Moisture Monitor:

I have used a laptop to display the current moisture level and to get the input of the expected ideal moisture level from the user.

1. Insert the 2 probes of the Soil Moisture Monitor in the soil.
2. Now, connect the Soil Moisture Monitor to your computer
3. Then, open the program code in Arduino IDE.
4. Open the Serial Monitor window in Arduino IDE.
5. The current moisture level will be displayed on the Serial monitor screen.
6. Next the user is asked to set the ideal moisture level.
7. Provide the expected moisture level using the laptop keyboard.
8. Now disconnect the laptop.
9. If the moisture level is below the ideal moisture level, the LED will go red. It keeps on checking every 10 seconds until water the plant.
10. If it's above the moisture level the LED will turn off.
11. The program will check the moisture level again in 6 hours.

Video Link

<https://www.youtube.com/watch?v=uXariPbM4-s>

Application Code And Explanation

```
int idealMoistureLevel; // Declare a global variable to keep ideal moisture level

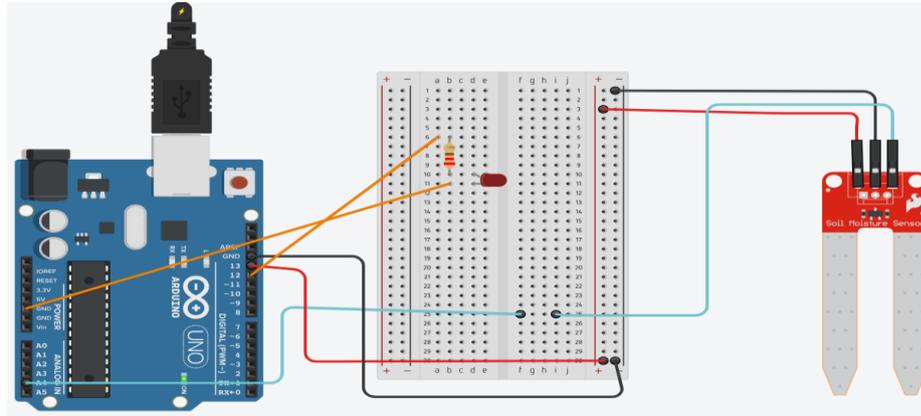
void setup(){ // Runs only one time when setting up
  Serial.begin(9600); //Start the serial communication
  pinMode(13, OUTPUT); // Declare the pins
  pinMode(12, OUTPUT);

  digitalWrite(13, HIGH); // Give power to the pin 13
  int currentMoistureLevel = analogRead(A4); // Read the current moisture level
  and save in a variable.
  delay(3000); // Waiting for 3 seconds
  Serial.println("Your current moisture level is");
  Serial.println(currentMoistureLevel); // Print the current moisture level
  digitalWrite(13, LOW); // Stop giving power to pin 13

  Serial.println("Please enter the ideal moisture level you want"); // Asking the
  user input
  while(Serial.available() == 0){ // wait unill it's received
  }

  idealMoistureLevel = Serial.parseFloat(); // save the user entered value to a
  variable
  Serial.println(idealMoistureLevel); // print the value
}

void loop() // This block runs repeatedly
{
  digitalWrite(13, HIGH); // Give power to pin 13
  int moistureValue = analogRead(A4); // Reading the moisture level and saves to
  a variable
  Serial.println(moistureValue); // Print the current reading
  if(moistureValue < idealMoistureLevel){ // check if the current moisture value
  is below the ideal value
    digitalWrite(12, HIGH); // turn the LED on
    digitalWrite(13, LOW); // turn the soilmoisture sensor off
    delay(10000); // Wait for 10 seconds
  }
  else{ // Moisture leveel the above the ideal value
    digitalWrite(12, LOW); // Turn the LED off
    delay(3600 * 6 * 1000); // Wait for 6 hours
  }
}
```



Acknowledgment of any external support provided to the entry

To build my idea into a project using Arduino, I had to learn basic concepts of programming with help from my dad, video tutorials, Scratch, and TinkerCad. I have made a few applications, and games using Visual Studio and Arduino in the past 2 years which helped me to understand basic programming concepts. I learned about while loops, variables, and functions.

For this project, my dad helped me install Arduino IDE, understand how to work with breadboards, understand the videos and articles, and TinkerCad codes I watched. TinkerCad was a good source for me to find the specific Arduino codes on how to light up an LED, get user inputs, print values, and examples of how soil moisture sensors work.

Bibliography

TinkerCad

<https://www.tinkercad.com/dashboard>

Arduino basic concepts

https://www.youtube.com/watch?v=cd04o5yqSAU&list=PLIBVuTSjOrclb0iCMSRpS_H1ISrISVeEm

Get user input in Arduino

<https://www.youtube.com/watch?v=XishaRwUlGM>

Programming

<https://www.arduino.cc/reference/en/language/structure/control-structure/while/>

<https://www.arduino.cc/reference/en/language/variables/variable-scope-qualifiers/scope/>