

Automatic Surface Wetness Monitor

Objective

- Design and implement a circuit to monitor surface wetness .
- Design a spraying mechanism to maintain a set value.

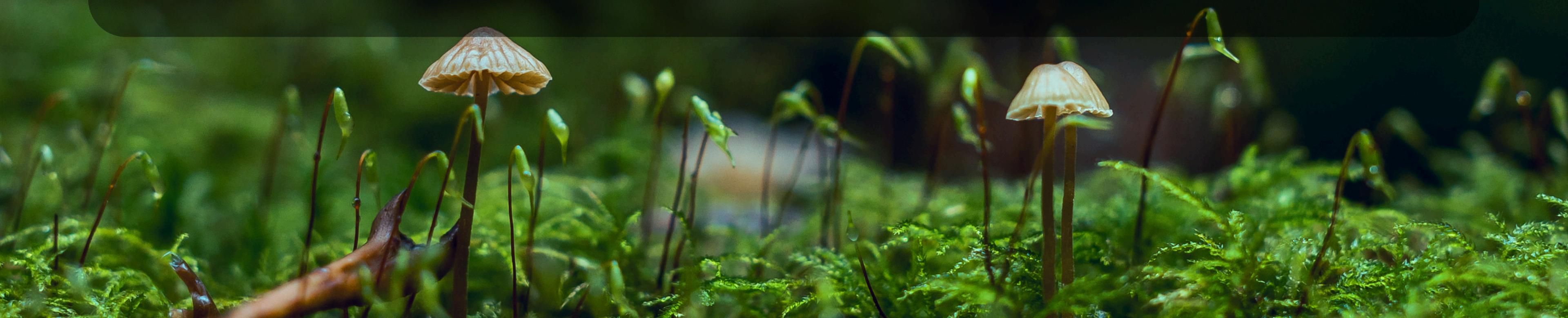
Relevance

The automated wetness monitor optimizes the water use and it addresses practical needs in agriculture, environmental monitoring and gardening. We are doing this project on Automated soil moisture monitor, which is one of the applications of Surface wetness monitor. Automated soil moisture monitor can be used in agriculture sector which helps in saving both resources and cost.

Sensors Used and Sensing Mechanism involved

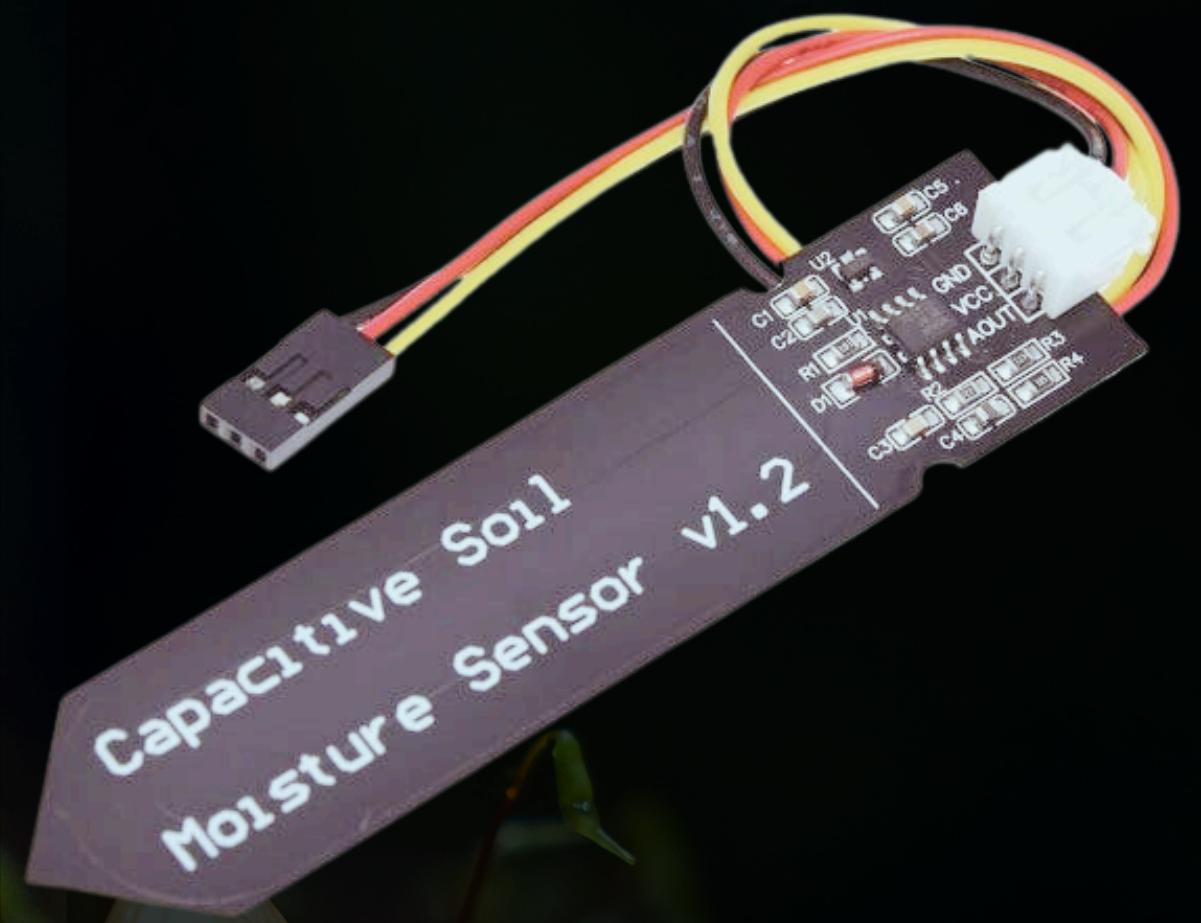
In our project , we are using a SOIL MOISTURE SENSOR to detect the amount of wetness present in the soil.

This amount is then compared to a desired threshold , based on which a water spray is implemented using a feedback loop mechanism.



Capacitive soil moisture sensor

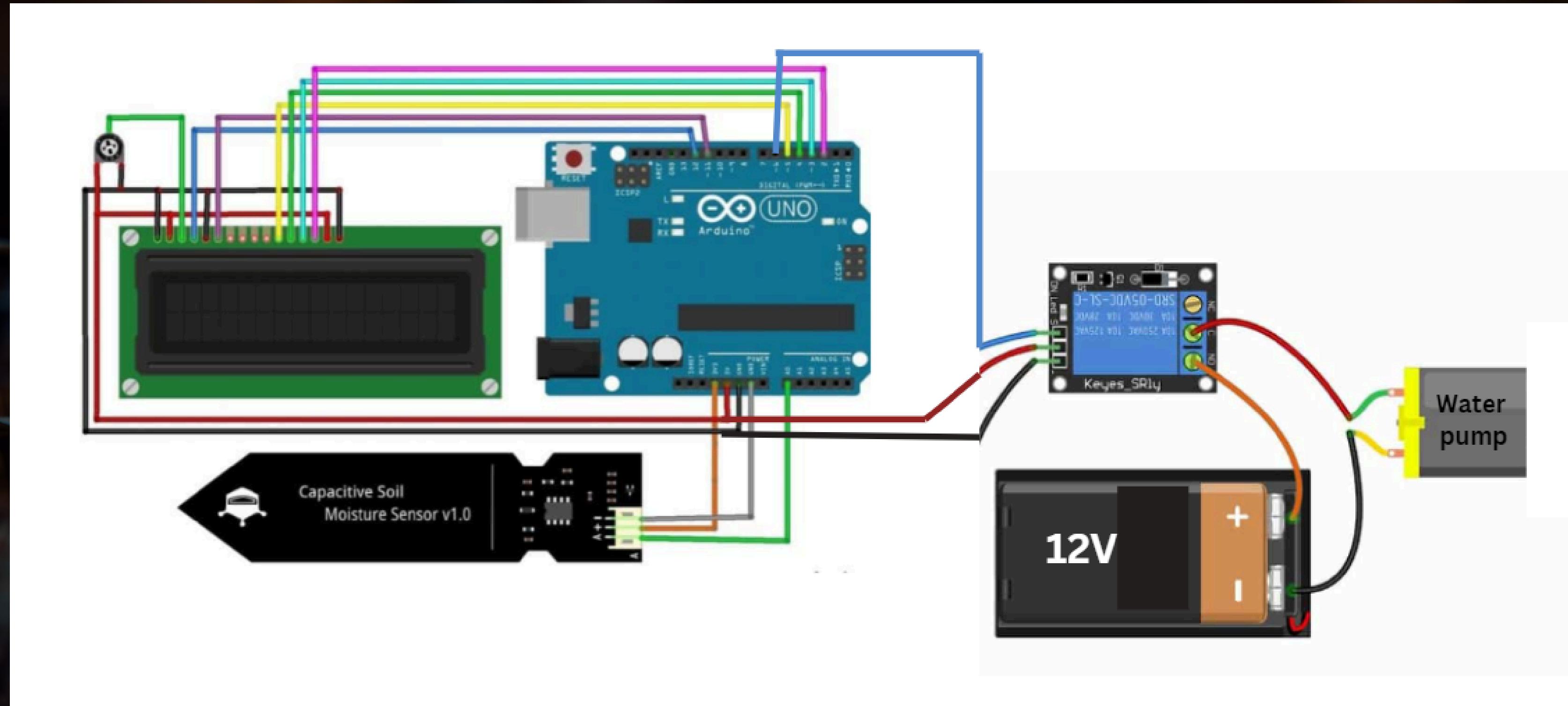
- Capacitive soil moisture sensors work on the basis of changing dielectric permittivity to determine soil moisture.
- These sensors act as capacitors, with the soil as the dielectric medium between two parallel plate electrodes.
- Water has a significantly higher dielectric permittivity compared to air. As the soil moisture content increases, the overall capacitance between the electrodes increases due to the greater permittivity of the water filling the pore spaces.
- By measuring this change in capacitance, the sensor can estimate the soil's moisture level.



Plan of Implementation



Complete circuit design for detecting moisture and implementing the spraying mechanism to reach the desired setpoint.



Plan of Implementation

Surface Wetness Monitoring Circuit:

- We utilize the capacitive moisture sensor as they are non-corrosive and have a long lifespan.
- Connect the moisture sensor to the analog input of the Arduino.
- Calibrate the sensor to detect the wetness level you want to maintain. This involves measuring the sensor output at different wetness levels and mapping these readings to corresponding wetness levels.

Spraying Mechanism:

- Use the DC Water pump we can control the flow of water
- Connect the pump to a digital output of the microcontroller through motor driver.
- Use the water reservoir connected to the pump to supply water for spraying.

Power Supply:

- Ensure that the circuit is powered adequately. This might involve using batteries or a power adapter, depending on the application's requirements.

Plan of Implementation

Microcontroller Programming:

- Writing a program for the Arduino to read the moisture sensor data at regular intervals.
- Compare the sensor readings to the desired wetness level setpoint.
- If the actual wetness level is below the setpoint, activate the spraying mechanism to moisten the surface.
- If the actual wetness level is above the setpoint, deactivate the spraying mechanism and wait for it to decrease naturally by evaporation.

Feedback Control Loop:

- Implement a feedback control loop to continuously adjust the spraying based on the actual wetness level compared to the setpoint.
- Use proportional, integral, and derivative (PID) control algorithms to fine-tune the spraying mechanism's operation and maintain the desired wetness level.

Components Required:

- Soil moisture sensor
- Arduino UNO
- Power source (for motors, sensing circuit and Arduino)
- DC Water pump
- LM293D
- Resistors
- Relay
- Male/female jumper wires
- Water containers
- Breadboard
- LCD display

Timeline of the project

- Selection of appropriate electrical component values.
- Simulation of the control circuit mechanism in TinkerCad.
- Building the soil moisture level sensing circuit in the breadboard.
- Integration of sensing circuit with the control circuit.
- Final integration of the circuits with container, motors etc. to simulate a real world scenario.

WORK DIVISION

1. Video Presentation : All four
2. Control circuit : Rittika Ghosh & Jonnalagadda Nikhila
3. Sensing circuit : Nakul C and Jitendra Shirwa
4. Integration of the circuits and final design : All four



THANK
YOU