Smart Irrigation System Using Arduino

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Introduction

- Water conservation is crucial in agriculture and gardening.
- Traditional irrigation wastes a lot of water.
- Smart irrigation automates watering using soil moisture sensors.
- Helps in efficient water usage and reduces human effort.

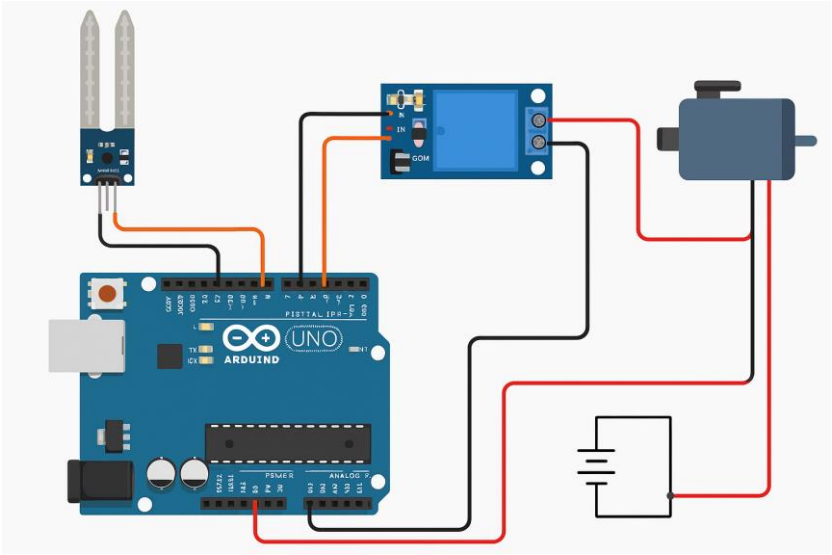
Objectives

- Automate irrigation using a soil moisture sensor.
- Reduce water wastage by only watering when necessary.
- Control the water pump based on soil conditions.
- Improve plant health with efficient irrigation.

Components Used

- **Arduino Uno/Nano** – Main controller
- **Soil Moisture Sensor** – Detects moisture level in soil
- **Relay Module (5V)** – Controls water pump
- **Water Pump (5V or 12V)** – Pumps water to plants
- **Power Supply (Battery/Adapter)** – Powers the system

Circuit Diagram



Working Principle

- The **soil moisture sensor** checks soil dryness.
- If the soil moisture is **below a threshold**, the **relay activates the pump**.
- When moisture reaches a required level, the **pump turns off**.
- The Arduino continuously monitors and controls the process

Advantages

- Saves water by preventing over-irrigation
- Reduces manual effort and labor costs
- Ensures consistent plant growth
- Can be integrated with WiFi for remote monitoring

Future Scope

- **WiFi-based remote monitoring** using ESP8266/ESP32.
- **Weather prediction integration** for better irrigation scheduling.
- **Solar-powered irrigation system** for energy efficiency.
- **AI-based soil analysis** to optimize watering schedules.

Conclusion

- Smart irrigation is an efficient and sustainable solution.
- Arduino-based automation helps optimize water usage.
- Future enhancements can make it smarter with IoT and AI.

THANK YOU