

# ABSTRACT

The effective management of water resources in agricultural and horticultural practices is crucial for optimizing plant growth while conserving water. This paper presents a novel moisture sensor-based watering system designed to enhance irrigation efficiency. The system integrates soil moisture sensors with a microcontroller-based control unit to automate the irrigation process. Soil moisture levels are continuously monitored by the sensors, which transmit real-time data to the control unit. Based on predefined moisture thresholds, the control unit activates or deactivates the watering mechanism, ensuring that plants receive adequate hydration without overwatering. This approach not only improves water usage efficiency but also reduces labour and operational costs associated with manual irrigation practices. The paper includes a detailed description of the system's design, implementation, and testing, demonstrating its effectiveness in maintaining optimal soil moisture levels and contributing to sustainable water management practices in agriculture.

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