

# Soil Moisture Detection

**Mst. Adit Sanjay Mokashi<sup>1</sup>, Ms. Bhakti Sanjay Patil<sup>2</sup>,  
Mst. Atharv Mohan Mhatre<sup>3</sup>, Prof. Shobhana Gaikwad<sup>4</sup>**

Students, Department of Computer Technology<sup>1,2,3</sup>

Lecturer, Department of Computer Technology<sup>4</sup>

Bharati Vidyapeeth Institute of Technology, Navi Mumbai, Maharashtra, India

**Abstract:** *Efficient water management is a very important ingredient in optimization of irrigation practices and sustainable water utilization in this smart farming age. "Smart Soil Moisture Monitoring and Control System Using an ESP32" is a very new concept towards the automation of irrigation based on real-time soil moisture detection. The system reads data from a soil moisture sensor with the help of an ESP32 microcontroller, analyses moisture levels and drives a water pump to switch on or off. This irrigation system is monitored and controlled remotely via a web-based user interface designed with the help of Platform IO and Wi-Fi Access Point mode. The platform provides real time soil moisture data; allows the users to toggle between manual irrigation mode or automatic irrigation mode; and logs moisture data for further analysis. Primary features of the system include data logging and visualization, where the logs can be downloaded and provide trends of water consumption over time. With SPIFFS (SPI Flash File System), data will be stored adequately; using either ThingSpeak or a custom-made dashboard, interaction will provide developers with a general view of moisture trends and pump activity easily observed in real time. The water conservation technique incorporated by the proposed system minimizes manual intervention and provides optimal irrigation services based on soil condition. Future improvements may include cloud integration, AI predictive analytics, expansion into IoT to enhance decision-making for smart farming applications.*

**Keywords:** Smart Irrigation System, Soil Moisture Sensor, IoT-Based Agriculture, Remote Pump Control