

# Capacitive-Touch-Based Soil Monitoring Device with Exchangeable Sensor Probe



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Precision farming has large potential for enhancing farming productivity and saving water consumption. Especially, irrigation activities should be optimized by capturing soil conditions using soil sensors and it contributes to water resource sustainability. While there are several commercialized soil monitoring systems, their cost tends to be forbidding to large scale implementation. To guarantee water resource sustainability and food supply through irrigation optimization, huge scale deployments of soil sensors on developing country are required. Therefore, we developed a cost-efficient soil monitoring device which using capacitive touch sensing and printed electronics leveraging sensor electrodes. The target price of the proposed system including a sensor probe and a gateway is \$1000 US dollars. It is about 3 times cheaper than conventional, but it achieved reasonable accuracy (The 95% confidence interval is less than 3%). In India, irrigation optimization is crucial to avoid severe drought and water shortage caused by climate changes. Thus, confirming the usability of the proposed probes for irrigation management in real farm field, the probes tested in a maize field in Hyderabad. The deployed probes successfully captured soil moisture changes due to precipitation and irrigation, which is informative for irrigation optimization.

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