IoT- enabled Capacitance-based Soil Moisture Sensor

An IoT-enabled capacitance-based soil moisture sensor installed at different locations

Developed by

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RELEVANCE

- Soil moisture sensors are instrumental in promoting efficient and sustainable agricultural practices, assisting in water conservation, improving crop yield and contributing to overall environmental and resource management.
- An IoT-enabled capacitance-based soil moisture sensor with requisite hardware and software was designed to monitor, collect, and send real-time crop root zone soil moisture data for judicious irrigation scheduling.

DESCRIPTION

- The sensor was calibrated and validated under varying soil moisture regimes in a cropped environment, both in laboratory and field conditions.
- The developed system includes weather-resistant electrical cabinets, a microcontroller for outdoor use, and customized enclosures to protect electronic components for field use.
- Soil moisture sensor is connected to internet via Wi-Fi networks/GSM module and also to the android-based platform.

BENEFITS

- Cost-effective, IoT-enabled soil moisture sensors with quick response time quantify irrigation water applied, coupled with app-based data visualization and decision-making for precision irrigation.
- The developed device communicates with the cloud to send and receive soil moisture data. The accuracy of the developed soil moisture sensing system was compared with the standard gravimetric method, and the Mean Absolute Percentage Error (MAPE) was found to be less than 5%.