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ROVIGA: Model-Based Capacitive Soil Moisture Sensor for IoT-Based Plant Pot

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Abstract— The soil moisture sensor is a qualitative measurement that detects changes in soil moisture with an analogue voltage output. The sensor output and changes in soil moisture will form a relationship pattern so that sensor recalibration based on statistical models can be carried out. This research aims to find a model-based capacitive sensor that can detect soil moisture for watering plants based on the Internet of Things (IoT). Analysis was carried out using linear and polynomial regression models. Modelling was carried out based on the results of primary gravimetric tests on dried soil with volumetric water content as the response variable and raw sensor data as the predictor variable. The best model coefficients, selected based on the largest adjusted R Squared, are used for sensor recalibration. Finally, set up a series of watering systems using an Arduino Uno and a model-based capacitive soil moisture sensor in an internet connected smart plant pot for watering using a mobile phone. The research results show that polynomial regression order 3 model has the largest adjusted R Squared (0.945). What's more, smart plant pot connected to the internet allow you to take controls and provides information when your plant needs water precisely and in real-time. Smart watering plants pot using model-based capacitive sensors have soil moisture prediction values in the range 0 – 1.2 for raw sensor data values of 100 – 530.

Keywords—*arduino, capacitive soil moisture sensor, gravimetric test, IoT, regression models, smart plant pot*



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