

Efficacy of Arduino based low-cost Resistive Sensor in evaluating Soil Moisture from different Soil types collected in the Kelantan-Terengganu plain of Malaysia

Abstract

This paper presents an experimental study on the effectiveness of using Arduino based low-cost resistive sensors to measure soil moisture content from five different soil types. In this experiment, the soil samples were filled in the vases and arranged in a completely randomized design with three replications. The soil samples from the vases were taken for soil moisture evaluation for 28 days. The experiment began with soil samples at fully saturation condition followed by field capacity condition and finished at the dry condition. The sensors used in this study were calibrated with a gravimetric method by using an oven. The results reveal that the Arduino based low-cost resistive sensor is highly capable of measuring suitable soil moisture content of fine sand, loamy soil, and sandy clay loam soil types. However, this type of sensor has poor performance for sandy loam and clay loam soil types due to the high content of organic matter and low bulk density. The performance of this sensor on peat and wetland soil can be further enhanced by using a distinctively developed empirical formula. The system developed in this work allows employing large-scale soil moisture measurement network for irrigation monitoring and controlling in future research due to its low-cost and great simplicity.