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A wireless system for volumetric water content measurement by TDR

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Time Domain Reflectometry (TDR) is an accurate and widely used technique for real time estimation of soil volumetric water content (θ), and the bulk electrical conductivity (σ). Although there are multiple software that allow monitoring θ and σ by connecting the TDR device to a PC, this system used under field conditions can be in many cases awkward. This paper presents a wireless, portable, unexpansive, simple, and versatile system to measure θ and the σ by connecting the TDR device to a smart phone. The system consists on a M5Stack processing unit that integrates a Wifi connectivity. The UART port of the M5Stack is connected to the TDR device through RS232-ttl adapter. The hardware is programmed in micropython language that allows the M5Stack acts as a server between the user and the TDR device through a web page read with a smart phone. The software, which is compatible with Campbell TDR100 and 1502C Tektronix devices, allows creating different project where the TDR waveforms are stored. A simple θ and the σ measurement is also allowed. Since the objective of the portable system is to ease and makes θ and σ samplings faster, a complementary web page for subsequent and more accurate estimates of θ and σ was also developed.