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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 ( $\theta$ ), and the bulk electrical conductivity ( $\sigma$ ). Although there are multiple software that allow monitoring  $\theta$  and  $\sigma$  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  $\theta$  and the  $\sigma$  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  $\theta$  and the  $\sigma$  measurement is also allowed. Since the objective of the portable system is to ease and makes  $\theta$  and  $\sigma$  samplings faster, a complementary web page for subsequent and more accurate estimates of  $\theta$  and  $\sigma$  was also developed.