

## Thesis Internship

### RF soil moisture sensors

**Background:** Soil moisture is one of the key parameters of interest in horti- and agriculture. By accurately measuring soil moisture content, the grower can optimize production with a minimal use of water and dissolved nutrients. Current soil moisture measurements typically rely on either a frequency response measurement or time-domain reflectometry at bandwidths up to a few tens of MHz. By measuring at higher frequencies however, effects of soil texture are reduced. This enables more accurate measurements and reduced calibration efforts.

**Assignment:** The assignment is to develop a soil moisture sensor based on a RF impedance measurement. You will start with a structured (ISI - Web of Science) literature review on probing the dielectric properties of soil at RF (1-1.5GHz) frequencies. In the next step, you will design and fabricate probe geometries, such as ring resonators and micro striplines and test their functionality using a network analyzer. You will develop an equivalent circuit model and evaluate the sensor through experiments in real-life conditions, that include controlled soil consistency and water supply.

**What we are looking for:** We are looking for an enthusiastic student with experience in RF electronics and modelling, and an interest in sensors and IoT. Affinity with horti- or agriculture is welcome but not necessary. We are a small and motivated team that thrives on innovative technological challenges, and we enjoy collaboration with universities and growers.

**What we offer:** As a small company we offer a multi-disciplinary environment that crosses the boundaries between electronics, (embedded) software and business development. We have long standing experience in supervision of students up to PhD level. Are you a techie with green fingers? Join us for a (live or virtual) coffee at PLNT and we'll show you around. Or drop us a mail ([info@quantified.eu](mailto:info@quantified.eu)) or call Warner on 0651775925.

**About Quantified:** Quantified B.V. develops innovative technology for the Horti- and Agricultural sector. The company is based on 30 years of accumulated experience in scientific research and entrepreneurship. We aim to contribute to an efficient and sustainable food chain. We are based in the PLNT building, a convenient space in the historic city centre of Leiden within a 10-minute walk from the railway station. PLNT is a lively environment that hosts around twenty tech start-ups, an indoor garden, a bar, a roof terrace and a chicken coop.

