



GROUNDED



Soil Acoustics (Graduation assignment)

Listening to sounds from the soil is an innovative and promising method for measuring subsurface biodiversity. Insects (such as earthworms) and even growing plant roots produce unique acoustic emissions. This assignment explores how these sounds can be recorded, analyzed, and converted into a "fingerprint" that reveals insights about soil biodiversity. As part of the GROUNDED project, you'll have access to multiple field labs, allowing you to investigate whether individual field labs can be distinguished based on their acoustic emissions.

Hardware

Use existing development kits (most likely the ESP32) to record synchronous acoustic emissions from both soil and from surrounding. The idea is that sounds of the surrounding can be used to remove unwanted interferences from the soil sounds. Sound samples need to be stored on an SD card. Also selecting the best sensor to capture these acoustic emissions will be part of this project.

Software

The wireless uplink of sensor nodes are limited due to regulations and battery life. Therefore, we need to use machine learning on the edge to condense information into a unique fingerprint. For instance, TinyML can be used to do this. The best machine learning approach of doing this needs to be investigated offline, and if time allows can even be implemented on the actual edge device.

Contact and location

The research will be facilitated by the Ambient Intelligence research group at Saxion in Enschede. This will also be your working location. If you are interested, or if you want some more information please contact Bram Ton (b.t.ton@saxion.nl).

