

Title : Improvement of the determination of the physical profile of a soil, resulting from a measurement with a radiofrequency probe, by an optimized inverse calculation and machine learning

Keywords: Machine learning, Databases, electromagnetism, material characterization, physical models

Location :

IMEP-LaHC

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Our lab is a joint research unit (CNRS/Grenoble INP/UGA/USMB) of 180 people whose research topics concern micro and nanoelectronics, photonics and microwaves. The team will be composed of P. Xavier, Professor of the UGA, D. Raully and E. Chamberod, Assitant Professors of the UGA.

Supervisor :

XAVIER Pascal, pascal.xavier@univ-grenoble-alpes.fr, 04.56.52.95.69 or 06.45.36.22.65

Candidate profile : five years of higher education in computer science or applied mathematics.

1. Context and objectives

The innovative project DAMP (Device for the Analysis of Materials Profile) carried out by our laboratory is in the process of maturing with the Linksiium Technology Transfer Acceleration Company (SATT). The aim is to develop an invasive and local hardware and software solution (radiofrequency probe equipped with commercial sensors), capable of physically characterizing liquid or solid media in depth with a resolution of the order of 1 cm. This probe is robust, easy to use and suitable for all environments. The technique used is fast, simple and inexpensive: it combines the advantages of two competing current technologies.

Our team has three applications in mind: the characterization of snow cover (height, density...) to anticipate the filling of EDF dams or prevent avalanches, smart irrigation of agricultural plots or input monitoring, monitoring the humidity level of buildings and structures. In the long term, a licence transfer is planned in the partner companies.

2. Purpose of the internship

The work will focus on processing the signals recorded by the probe and improving the physical modelling of environments. In this context, we offer a 4 to 5 month internship at Bac+5 level.

Based on an existing prototype and measurements made on site, the trainee will:

- program the software tool allowing, by a reverse calculation and optimization method, to go back to the physical parameters of the sections detected for each medium.
- develop a database containing data from measurements made on model and real environments (depending on the applications).
- test an automatic learning procedure to improve the accuracy of identifying the type of medium and measuring physical parameters.

As the DAMP project aims to enter the incubation phase in 2020, it will be appreciated if the candidate has a taste for adventure and is motivated by the opportunity to get involved in a marketing project.

Please send your applications (CV + cover letter) by email to pascal.xavier@univ-grenoble-alpes.fr