Fully Funded PhD Research Studentship

Project Title: Digital Soil Mapping and smartphones technology for assessing soil physical and mechanical properties

PhD Studentship: This 3.5 years fully funded doctoral program is a collaboration between Abertay University and the James Hutton Institute. Abertay University is one of the fastest growing universities in the UK. In the latest Guardian University League Tables, Abertay University is ranked 8th in the UK in Civil Engineering among 60 institutes and 1st in Scotland. Abertay University has been named UK University of Year for Teaching Quality by The Times & Sunday Times Good University Guide 2021. The James Hutton Institute (based in Dundee and Aberdeen) is one of the largest environmental and agricultural research institutes in the UK, carrying out research in climate change, soil science, crop breeding, agronomy and many other topics.

Project Description: Soil properties (such as organic carbon) can be estimated using modern data mining and modelling approaches. The proposed approach correlates soil colour and image structure metrics extracted from smartphone and tablet camera images, as well as environmental factors. This principle was used as a foundation to develop a mobile phone app which measures Scottish soil organic carbon content. This project aims to improve on this concept with a model that enhances the performance and functionality, and integrates it with the system hosting the app. Furthermore, the project proposes analysing the pH, bulk density, particle size distribution and permeability of the soil utilising images. Upon the development of the model, a new SolEst app will be developed which provides an environmentally-friendly and costless platform for land managers working in the construction and agriculture sectors to analyse these and other soil properties using their mobile phone. This interdisciplinary project merges geotechnical engineering, digital technology and artificial intelligence to introduce a cutting-edge method for soil analysis using smartphone which is widely available.

The project is the combination of modelling, laboratory and experimental work which enables the PhD candidate to acquire skills of programming, working in-situ and in laboratory during the course of the program.

Candidate specification:

Essential:

- Knowledge/experience in developing Artificial Neural Networks
- Knowledge/experience in working with modelling software (e.g. Matlab, Java)
- Knowledge/experience in analysing soil physical and mechanical properties both in-situ and in the laboratory
- UK/European driving licence

Desirable:

- Knowledge/experience in mobile phone app development
- Track record of publication in related fields

Entry requirements: A related Masters level qualification is desirable but not essential. Candidates must have, or expect to obtain a first class or upper second-class honours degree in a

relevant discipline; for example, geoscience, engineering geology or geotechnical engineering (with strong mathematics).

Funding: The studentship covers full UK/EU PhD tuition fees for 3.5 years and a tax-free stipend. Interested International Students can contact Dr Ehsan Jorat (e.jorat@abertay.ac.uk) for further details.

Applicants who are non-native speakers of English, the University requires IELTS of 6.5 (with no band less than 6.5) or an equivalent qualification accepted by the Home Office.

The Studentship is available for a February 2021 start for a period up to 3.5 years.

Applicants should submit through the Abertay University jobs page https://www.abertay.ac.uk/about/working-at-abertay/jobs/ , submitting a cover letter detailing why you are interested in undertaking this project, and a CV.

Application closing date: 14/12/2020

Further details on this project can be obtained from the project principal supervisor, Dr Ehsan Jorat (e.jorat@abertay.ac.uk).