Title: Machine Learning in Tunnel Boring Excavation

Type of award: PhD Research Studentship

Schools: Civil, Aerospace and Design Engineering (CADE) and Engineering Mathematics and Technology (EMT)
Earthquake and Geotechnical Engineering Research Group / Intelligent Systems Lab

Scholarship Details: Minimum £18,662 p.a. in 2023/24 subject to confirmation of eligibility and award

Duration: 3.5 years

Eligibility: Home (UK) and EU citizens who have confirmation of UK settlement or pre-settlement status under the EU Settlement Scheme

Start Date: November 2023

PhD Topic Background/Description

J. Murphy and Sons have been investigating using machine learning in tunnelling by applying supervised learning techniques to predict construction duration and are interested in exploring new and continued applications of machine learning in tunnel boring. The primary aim of the project is to develop a process to enable the full use of machine learning in Tunnel Boring such that it can become an effective decision tool at all stages of the project from bidding and planning to execution.

The project would entail the following stages:

1. Literature Review including increasing competencies in Machine learning and Geotechnical Engineering as required.

2. Collect and analyse data from real case studies and ongoing projects.

3. Develop machine learning algorithms to predict speed of tunnelling, incorporating all the necessary variables and the expected uncertainties in ground conditions.

4. Test the developed algorithms for a range of different scenarios and independent case studies to demonstrate their reliability while determining the boundaries of applicability.

The project will be co-supervised by academics in Geotechnical engineering and Data Science/Machine Learning as well as being supported by civil, mechanical and geotechnical experts from J Murphy and Sons.

Candidate Requirements

Applicants must hold/achieve a minimum of a master’s degree (or international equivalent) in a science, mathematics or engineering discipline. Applicants without a master's qualification may be considered on an
exceptional basis, provided they hold a first-class undergraduate degree. Please note, acceptance will also depend on evidence of readiness to pursue a research degree.

This project would be best suited to students with expertise in Civil Engineering or Data Science/Machine Learning.

If English is not your first language, you need to meet this profile level:  
**Profile E**

Further information about [English language requirements and profile levels](#).

**Basic skills and knowledge required**

Applicants should have knowledge of linear algebra, regression techniques, and some knowledge of optimisation methods. Applicants should know how to program in at least one high level or scripting language (e.g. Python, R, MATLAB).

**Scholarship Details**

The scholarship covers tuition fees at home rate, tax free stipend of £18,662 p.a. and a travel/consumables budget for 3.5 years.

For eligibility and residence requirements please check the [UKRI UK Research and Innovation](#) website.

**Enquiries**

General enquiries, please email [admissions-engpgr@bristol.ac.uk](mailto:admissions-engpgr@bristol.ac.uk)

Informal enquiries, please email Dr Dimitris Karamitros ([d.karamitros@bristol.ac.uk](mailto:d.karamitros@bristol.ac.uk))

**Application Details**

Applicants are encouraged to contact the supervision team (noted above) prior to application.

To apply for this studentship, submit a PhD application using our [online application system](#) ([www.bristol.ac.uk/pg-howtoapply](http://www.bristol.ac.uk/pg-howtoapply)]

Please ensure that in the Funding section you tick “I would like to be considered for a funding award from the Civil Engineering or Engineering Mathematics Department” and specify the title of the scholarship in the “other” box below with the names of the supervisors.

Interested candidates should apply as soon as possible.

**Closing date for applications 30th September 2023**