Newcastle University PhD Studentship award

Title
PhD Studentship in Digital Twins for Resilient Geo-Infrastructure

Value of award
Full UK/EU fees (eligibility criteria applies to EU students) and annual living allowance of £14,777 (at the 2018/19 UKRI rate.)

Number of awards
1

Start date and duration
September 2019 for 3.5 years

Application closing date
22nd February 2019

Overview
This PhD studentship in Computer Science will combine modelling and simulation techniques with machine learning to develop a novel Digital Twin approach for predicting failures in key infrastructure assets. It is located in the School of Computing, host of the National Innovation Centre for Data, in collaboration with the School of Engineering, which coordinates the ACHILLES programme on infrastructure resilience.

There are thousands of kilometres of roads, railways and flood defences in Great Britain; Network Rail alone manages almost 200,000 earthworks. Failures in these assets are common (twice per week) and costly (failure costs dwarf maintenance costs), but the timing of failures is currently unpredictable. Increasingly extreme weather patterns will cause ever more failures in aging infrastructure and new methods of prediction are required for management of assets.

Existing computer models are used to produce weather projections, predict water flows, and simulate the effects of water pressure on individual assets, however these models are disconnected from each other and real-time data. A promising area of research is in Digital Twins—digital counterparts of real systems—that combine computer models with real-time data and machine learning to produce calibrated simulations for reliable, real-time predictions about maintenance needs and possible failures. In this project you will develop a novel Digital Twin for resilient geo-infrastructure and demonstrate the approach on test assets owned and monitored by the University.

You will develop the knowledge and expertise necessary to succeed in an interdisciplinary research environment. In partnership with your supervisory team, you will develop a Personal Development Plan, identifying areas for development and training. You will have the opportunity to attend international summer schools, workshops and courses, and to participate in Masters-level training, including MSc modules from Geotechnical Engineering and Computing. These will cover slope stability theory, modelling techniques, machine learning and data science.

Sponsor
Engineering and Physical Sciences Research Council

Name of supervisor(s)
Dr Ken Pierce
Eligibility Criteria
UK/EU citizens with a first-class or 2.1 degree, or equivalent qualifications and/or experience. Ideally, students should have a BSc or MSc degree in computing or a related discipline.

The studentships are open to applicants satisfying EPSRC home/UK or EU fee criteria, and are eligible for home fees. EU candidates may only be available for a partial award.

How to apply

“You must apply through the University’s online postgraduate application system by creating an account. To do this please select ‘How to Apply’ and choose the ‘Apply now’ button.

All relevant fields should be completed, but fields marked with a red asterisk must to be completed. The following information will help us to process your application. You will need to:

- insert the programme code 8050F in the programme of study section
- select PhD Computer Science - (Computing Science) as the programme of study
- insert the studentship code COMP010 in the studentship/partnership reference field
- attach a covering letter and CV. The covering letter must state the title of the studentship, quote reference code COMP010 and state how your interests and experience relate to the project
- attach degree transcripts and certificates and, if English is not your first language, a copy of your English language qualifications.

Please also send a copy of your CV and covering letter to computing.phd@ncl.ac.uk

Contact
kenneth.pierce@ncl.ac.uk; ross.stirling@ncl.ac.uk; matthew.forshaw@ncl.ac.uk