UNIVERSITY OF LEEDS

CANDIDATE BRIEF

Research Fellow in Cognitive/Machine-Learned Models of Interactive Behaviour, Faculty of Environment

Salary: Grade 7 (£33,797 - £40,322 p.a.) Due to funding limitations an appointment is unlikely to be made above £36,914 p.a.

Reference: ENVTR1109

Closing date: 29 November 2019

Fixed-term for 42 months due to external funding

We will consider job share / flexible working arrangements

Research Fellow in Cognitive/Machine-Learned Models of Interactive Behaviour

Institute for Transport Studies, Faculty of Environment

Do you have a strong skillset in mathematics, programming, and machine learning, ideally combined with experience in cognitive science, psychology, or human factors? Are you interested in combining machine-learned, data-driven models of human behaviour with models from cognitive neuroscience, to help make automated vehicles safe and acceptable for humans?

When humans move in road traffic as pedestrians, cyclists, drivers, etc., they constantly interact with each other to share the road space, showcasing a fascinating subset of the human abilities of perception, communication, and joint action. Useful mathematical models exist that can describe these human abilities in simplified cognitive science experiments, but these models are rarely integrated to study more complex real-world tasks. Meanwhile, the currently limited scientific understanding and models of how humans interact in traffic is proving a significant hurdle to progress in industry efforts towards self-driving vehicles. Machine-learned models of human road user behaviour constitute an increasingly important applied tool, but their behaviour needs to be better understood and benchmarked.

As Research Fellow in Cognitive/Machine-Learned Models of Human Interaction with Automated Vehicles, you will work in this exciting intersection between basic and applied sciences, leveraging large datasets of naturalistic data, state of the art machine learning methods, as well as models from cognitive science, to understand and model road user interactions. The models you develop will constitute scientific contributions of high importance both from the fundamental perspective of modelling human cognition, and in terms of their industrial and societal relevance.

You will work in the EPSRC-funded project COMMOTIONS, supported by industrial partners FiveAI and Aimsun, and led by Dr. Gustav Markkula. At the Institute for Transport Studies, you will be joining the Human Factors & Safety Group, a cross-disciplinary, collegial research group with world-leading facilities for the experimental study of road user behaviour. Co-Investigators for the project are Dr. Jac Billington of the School of Psychology and Dr. Matteo Leonetti of the School of Computing.

What does the role entail?

As a Research Fellow, your main duties will include:

- Collaborating with Dr. Markkula, the Co-Investigators and the project team to define and iteratively revise your individual research objectives and plans within the project, reporting back to the team on your progress;
- Acquiring and analysing naturalistic datasets of road user interaction, from project partners, open datasets or by own data collection as appropriate;
- Drawing on existing literature to implement and parameterise machine-learned models of interactive road user behaviour;
- Compare machine-learned and cognitive models of road user interactions and investigate methods for combining the two;
- Evaluating methods and techniques used and results obtained by other researchers, relating them appropriately to your own work;
- Preparing papers for publication in leading international journals and disseminating research results through other recognised forms of output;
- Collaborating with the project partners and other relevant stakeholders to promote uptake and use of the project's results;
- Working both independently and also as part of a larger team of researchers in the project, research group, and institute, engaging in knowledge-transfer activities where appropriate and feasible;
- Maintaining your own continuing professional development and acting as a mentor to less experienced colleagues as appropriate;
- Contributing to the training of both undergraduate and postgraduate students, including assisting with the supervision of projects in areas relevant to the project.

These duties provide a framework for the role and should not be regarded as a definitive list. Other reasonable duties may be required consistent with the grade of the post.

What will you bring to the role?

As a Research Fellow you will have:

- A PhD (or near completion - i.e., the initial thesis needs to have been handed in at the point of application) in Computer Science, Engineering, Cognitive Science, Psychology, Human Factors or a closely allied discipline;



- A strong quantitative skillset, including both mathematics and scientific programming;
- Extensive experience of machine learning methods;
- A keen interest in the topic of interactions between humans and between humans and automated vehicles;
- A drive for your research to have a positive impact on society;
- Good time management and planning skills, with the ability to meet tight deadlines, manage competing demands and work effectively under pressure without close support;
- A proven track record of peer-reviewed publications in leading journals and conferences;
- Excellent written and verbal communication skills including presentation skills;
- A proven ability to work well both individually and in a team;
- A strong commitment to your own continuous professional development.

You may also have:

- A grasp of contemporary models of human perception, cognition, and action;
- Experience of imitation learning methods;
- Experience of collecting or analysing large and complex datasets, especially naturalistic human behaviour data;
- Experience of mathematical modelling and/or computational simulation of dynamical systems, especially in the areas of human perception, cognition or action;
- Other relevant training or experience in computer science (e.g., robotics, computer vision, 3D visualisation), engineering science (e.g., control theory, signal processing), social science (e.g. human factors, sociology) or application-specific areas (e.g., vehicle dynamics, vehicle automation, traffic safety).

How to apply

You can apply for this role online; more guidance can be found on our How to Apply information page. Applications should be submitted by **23.59** (UK time) on the advertised closing date.

Contact information

To explore the post further or for any queries you may have, please contact:

Dr. Gustav Markkula, Associate Professor
Tel: +44 (0)113 343 9832
Email: g.markkula@leeds.ac.uk

Additional information

Find out more about the Faculty

Find out more about our Institute

Find out more about our Research and associated facilities

Find out more about Equality and Inclusion and Athena Swan in the Faculty and the University

A diverse workforce
The Faculty of Environment has received a prestigious Athena SWAN silver award from Advance HE, the national body that promotes equality in the higher education sector. This award represents the combined efforts of all schools in the Faculty and shows the positive actions we have taken to ensure that our policies, processes and ethos all promote an equal and inclusive environment for work and study.

Working at Leeds
Find out more about the benefits of working at the University and what it is like to live and work in the Leeds area on our Working at Leeds information page.

Candidates with disabilities
Information for candidates with disabilities, impairments or health conditions, including requesting alternative formats, can be found on our Accessibility information page or by getting in touch with us at disclosure@leeds.ac.uk.

Criminal record information

Rehabilitation of Offenders Act 1974



A criminal record check is not required for this position. However, all applicants will be required to declare if they have any ‘unspent’ criminal offences, including those pending.

Any offer of appointment will be in accordance with our Criminal Records policy. You can find out more about required checks and declarations in our Criminal Records information page.