POSITION DESCRIPTION

Position Title: Postdoctoral Research Fellow
Organisation Unit: School of Civil Engineering
Position Number: TBA
Type of Employment: Full-Time, Fixed-Term
Classification: Academic Level A

THE UNIVERSITY OF QUEENSLAND

The University of Queensland (UQ) contributes positively to society by engaging in the creation, preservation, transfer and application of knowledge. UQ helps shape the future by bringing together and developing leaders in their fields to inspire the next generation and to advance ideas that benefit the world. UQ strives for the personal and professional success of its students, staff and alumni. For more than a century, we have educated and worked with outstanding people to deliver knowledge leadership for a better world.

UQ ranks in the world’s top universities, as measured by several key independent ranking, including the Performance Ranking of Scientific Papers for World Universities (43), the US News Best Global Universities Rankings (52), QS World University Rankings (47), Academic Ranking of World Universities (55), and the Times Higher Education World University Rankings (60). UQ again topped the nation in the prestigious Nature Index and our Life Sciences subject field ranking in the Academic Ranking of World Universities was the highest in Australia at 20.

UQ has an outstanding reputation for the quality of its teachers, its educational programs and employment outcomes for its students. Our students remain at the heart of what we do. The UQ experience – the UQ Advantage – is distinguished by a research-enriched curriculum, international collaborations, industry engagement and opportunities that nurture and develop future leaders. UQ has a strong focus on teaching excellence, winning more national teaching excellence awards than any other university in the country and attracting the majority of Queensland’s highest academic achievers, as well as top interstate and overseas students.

UQ is one of Australia’s Group of Eight universities, a charter member of edX and a founding member of Universitas 21, an international consortium of leading research-intensive universities.

Our 50,000-plus strong student community includes more than 13,000 postgraduate scholars and more than 12,000 international students from 144 countries, adding to its proud 240,000-plus alumni. The University has about 7,000 academic and professional staff and a $1.8 billion annual operating budget. Its major campuses are at St Lucia, Gatton and Herston, in addition to teaching and research sites around Queensland and Brisbane city. The University has six Faculties and four University-level Institutes. The Institutes, funded by government and industry grants, philanthropy and commercialisation activities, have built scale and focus in research areas in neuroscience, biomolecular and biomedical sciences, sustainable minerals, bioengineering and nanotechnology, as well as social science research.
UQ has an outstanding track-record in commercialisation of our innovation with major technologies employed across the globe and integral to gross product sales of $11 billion+ (see http://uniquest.com.au/our-track-record).

UQ has a rapidly growing record of attracting philanthropic support for its activities and this will be a strategic focus going forward.

Organisational Environment

The School of Civil Engineering is one of the largest schools of its kind in Australia. Located in the state-of-the-art, $135 million Advanced Engineering Building, the School passionately delivers world-leading teaching, research, and service. We aspire to be the Civil Engineering school of choice for students, staff, industry, and the wider community in the fields of environmental, fire safety, geotechnical, structural, transportation and water engineering.

Our goal is to foster graduates with the technical and professional skills required to lead the civil engineering profession and we aim to re-engineer civil and infrastructure research to improve the way communities operate and function.

Our over 40 academic staff hail from over 24 countries, are widely published and cited, and have extensive research backgrounds in diverse engineering disciplines including coastal, environmental, fire safety, geotechnical, hydraulics, structural, transport, and water resources. These research strengths attract expert academics and students from around the world and provide industry with consulting expertise, research collaboration and testing facilities.

The School recognises and values equity and diversity, and encourages applications from any individual who meets the requirements of this position irrespective of gender, sexuality, race, ethnicity, religion, disability, age or other protected attributes. The School strives to provide an inclusive working environment, and along with the University is committed to supporting staff with family and caring responsibilities by providing policies, programs and initiatives to help balance work and family responsibilities. The School has an agreed set of values that include:

1. Respecting each other.
2. Embracing equity and diversity.
3. Making decisions transparently whenever possible.
4. Collaborating across disciplines and universities.
5. Supporting each other.
6. Being accountable and responsible.
7. Seeking first to understand then be understood.
8. Making positive and meaningful societal contributions.
9. Celebrating achievement.

For more information about the School, please visit: www.civil.uq.edu.au

Information for Prospective Staff

Information about life at UQ including staff benefits, relocation and UQ campuses is available at - http://www.uq.edu.au/current-staff/working-at-uq

The University of Queensland Enterprise Agreement outlines the position classification standards for Levels A to E.
DUTY STATEMENT

Primary Purpose of Position

The primary role of this Research Fellow is to carry out original research for an Australian Research Council (ARC) Linkage project titled “Real-time Analytics on Urban Trajectory Data for Road Traffic Management”. This project aims to develop real-time analytics and data management capabilities that leverage large-scale urban trajectory data to provide road operators with real-time insights into population movements and enable data-driven, customer-centric network operations. Current traffic management practices rely heavily on aggregate vehicle count data from fixed road sensors, which have limitations in accurately measuring traffic demand and network congestion propagation. This project seeks to develop innovative technologies to use a wide variety of data sources, especially massive trajectories of vehicles moving across the network, to better understand people’s travel demands and road usage patterns and thus better manage the transport system.

Specific objectives of the project are (1) to develop methods to reconstruct complete, semantically rich trajectories of road users by combining raw trajectories from multiple data sources, (ii) to develop methods to estimate and predict dynamic movements of road users in real-time using multi-source trajectory data, and (iii) to develop network-wide traffic management strategies that leverage real-time population movement insights.

Duties

Duties and responsibilities include, but are not limited to:

Research

• Prepare, manage, and analyse large-scale urban mobility and transport data.
• Manipulate and analyse data using existing software packages or developing own software systems.
• Review machine learning and AI techniques applied to traffic networks and spatiotemporal data.
• Develop algorithms and models for real-time predictive analytics for the project.
• Prepare project reports and presentation materials for project meetings.
• Prepare and publish scholarly papers in high-quality refereed international journals and conference proceedings.
• Work collaboratively with researchers from the UQ Transport Engineering Group and the UQ Data Science Research Group.
• Liaise with industry partners from Queensland Department of Transport and Main Roads (TMR) and Transmax Pty Ltd.
• Assist in the supervision of research students engaged on the project.

Teaching and Learning

• As a ‘research-focused’ position, there is no formal requirement for teaching. However, it is encouraged that you actively seek teaching opportunities.

Service and Engagement

• Assist to foster the School’s relationships with industry, government departments, professional bodies and the wider community.
• Any other duties as reasonably directed by your supervisor.
Other

Ensure you are aware of and comply with legislation and University policy relevant to the duties undertaken, including but not exclusive to:

- The [University's Code of Conduct](#)
- Requirements of the Queensland occupational health and safety (OH&S) legislation and related [OH&S responsibilities and procedures](#) developed by the University or Institute/School.
- The adoption of sustainable practices in all work activities and compliance with associated legislation and related University [sustainability responsibilities and procedures](#)
- Requirements of the Education Services for Overseas Students Act 2000, the National Code 2007 and associated legislation, and related [responsibilities and procedures](#) developed by the University.

Organisational Relationships

The position reports to Dr Jiwon Kim in the School of Civil Engineering.

**SELECTION CRITERIA**

**Essential**

- PhD in the area of transport engineering, computer science, data science, mathematics, statistics, or a related field.
- Demonstrated expert knowledge in one or several areas of traffic network modelling, database management and integration, machine learning, data mining, or real-time analytics.
- Strong programming skills (Python/C++/C#/Java).
- Strong publication record in high-quality refereed international journals and conferences.
- Demonstrated excellent written and verbal communication skills.
- Ability to work independently with minimal supervision and as part of a team.

**Desirable**

- Experience in large-scale management and analysis of spatiotemporal data (e.g. vehicle trajectory data).
- Familiarity with technologies and tools for deep learning and neural network modelling (e.g., TensorFlow, Keras, PyTorch).
- Experience in liaising and collaborating with external agencies to develop co-operative research initiatives.

**Qualification Verification**

An appointment to this position is subject to the verification of the highest academic qualification from the conferring institution.

The University of Queensland values diversity and inclusion and actively encourages applications from those who bring diversity to the University. Please refer to the
University’s Diversity and Inclusion webpage (http://www.uq.edu.au/equity) for further information and points of contact if you require additional support.

This role is a full-time position; however flexible working arrangements may be negotiated.