



UNIVERSITY
OF MANITOBA
Faculty of Engineering

TSRLab

Transportation Systems Research Lab



Manitoba Learning and Artificial Intelligence Research

Ph.D. in Artificial Intelligence / Deep Learning / Reinforcement Learning for Transportation Systems

Transportation Systems Research Lab, Department of Civil Engineering, University of Manitoba, Winnipeg, Canada

Manitoba Learning and Artificial Intelligence Research (MLAIR), Department of Electrical and Computer Engineering, University of Manitoba, Winnipeg, Canada

POSITION OVERVIEW:

This is an interdisciplinary position at the intersection of artificial intelligence, deep learning, and transportation systems. The Ph.D. student will work on research projects focused on developing innovative **machine learning** solutions for **optimizing** the operations of an electric autonomous vehicle-based **transit** system such as inferring trip characteristics, modeling trip choices, placement of charging stations along with **reinforcement learning** for optimizing the choice of system parameters.

The student will primarily be admitted to the Department of Electrical and Computer Engineering. The project will be conducted jointly between the Manitoba Learning and Artificial Intelligence Research (MLAIR) lab in the Department of Electrical and Computer Engineering and the Transportation Systems Research Lab in the Department of Civil Engineering at The University of Manitoba in Winnipeg (MB), Canada.

SUMMARY OF JOB FUNCTIONS:

- Algorithm design and development for machine learning, and statistical modeling solutions.
- Design and Development of Artificial Intelligence and Deep Reinforcement Learning-driven Solutions for Transportation Systems.
- Perform necessary quality control procedures to ensure accuracy and completeness of the research data.
- Preparing scientific manuscripts and reports.

QUALIFICATIONS AND EDUCATION REQUIREMENTS

- Masters in Computer Science, Computer Engineering, Electrical Engineering or related fields.
- Strong background in **machine (deep) learning** and **statistical analysis**.
- Strong background in **classical and deep reinforcement learning**.
- Strong scientific programming skills with **Python**; Matlab and Fortran are an asset.
- Facility with **deep learning frameworks** such as PyTorch, Keras, and Tensorflow.
- Hands-on in virtual environments.
- Proven research-based publications in deep learning.
- Excellent technical writing for scientific publications.
- A **minimum G.P.A. of 3.5/4.5** or equivalent in your last 60 credit hours of study is required.
- A **minimum IELTS score of 7.0** is required.
- Excellent problem-solving skills.
- Ability to work well with a team and to use initiative in achieving goals.
- *Experience with reinforcement learning for transportation systems, simulation of traffic flow is a plus. Candidates with excellent experiences in reinforcement learning for other domains are encouraged to apply.*

DEPARTMENT DESCRIPTION

At the **Manitoba Learning and Artificial Intelligence Research (MLAIR) lab**, we conduct high impact research in developing novel artificial intelligence and deep learning architectures for multimodality data such as imaging, computer vision, robotics, machine learning and data driven discovery of radiogenomic markers of disease progression, hybrid neural architectures for multi-format, multi-source spatiotemporal imaging data.

Research at the **Transportation Systems Research Lab** focuses on establishing interdisciplinary and collaborative research related to traffic flow modeling and simulation, adaptive traffic control, modeling and analysis of public transportation systems and transportation network analysis.

HOW TO APPLY?

Interested applicants should send their applications to **Dr. Babak Mehran** (Babak.Mehran@umanitoba.ca), Transportation Systems Research, and **Dr. Ahmed Ashraf** (Ahmed.Ashraf@umanitoba.ca), Manitoba Learning and AI Research (MLAIR),

A complete application should include:

- A cover letter including a brief description of research interests relative to the above topics and a motivation of why the applicant's expertise and background is appropriate for the position.
- Curriculum Vitae (CV) including a complete list of scientific publications.
- Copies of transcripts (BSc & MSc).
- Contact information for two references.

The successful applicant should have the ability to relocate to Winnipeg, Manitoba beginning **September 1, 2020**. Remuneration (salary plus benefits) will be negotiated based on the candidate's experience and aligned with similar positions held in the Faculty of Engineering at The University of Manitoba.

The University of Manitoba is committed to creating a diverse and inclusive workplace. Applications are encouraged from qualified applicants including members of visible minorities, Aboriginal peoples, persons with disabilities and people of all sexual orientations and genders. All qualified candidates are encouraged to apply; however, Canadian citizens and permanent residents will be given priority.