

Full time PhD Scholarship under Royal Melbourne Institute of Technology (RMIT) - University of Peradeniya (UOP) Joint PhD Programme



Title: Development of an Integrated Behavior-Sensitive Traffic Simulation Framework for Urban Congestion Management: Comparative Case Studies from Sri Lanka and Australia

Brief Description:

Rapid urbanization and increasing travel demand have placed significant pressure on urban road networks, resulting in congestion, fuel wastage, travel-time losses, and increased environmental impacts. These challenges are particularly important in emerging cities such as those in Sri Lanka, where heterogeneous and mixed traffic conditions make conventional traffic simulation approaches less effective. The research identifies three major research gaps: limited development of generalizable multi-index congestion assessment frameworks for heterogeneous and data-scarce networks; insufficient representation of differences between commuter and non-commuter travel behavior; and limited integration of GIS and Remote Sensing with behavior-sensitive microscopic traffic simulation. Although Agent-Based Modeling and open-source platforms such as SUMO provide opportunities to address these limitations, their integrated application to Sri Lankan mixed-traffic networks remains underexplored. Hence, this study aims to develop an internationally validated, open-source, behavior-sensitive urban congestion management framework by integrating SUMO microscopic traffic simulation, Nested Logit travel-demand modeling, GIS, and Remote Sensing with three specific objectives. The framework will be developed and comparatively evaluated using Kurunegala City, Sri Lanka, and an emerging Australian city to assess its robustness, adaptability, and transferability across contrasting urban environments. The objectives are to; develop and calibrate a transferable SUMO-based microscopic simulation and multi-parameter congestion assessment model, develop Nested Logit models to characterize commuter and non-commuter travel behavior and integrate behavioral parameters into SUMO, and integrate GIS and Remote Sensing into a decision-support framework for congestion mapping, hotspot identification, monitoring, and evaluation of congestion-management strategies.

Supervisors:

- Sri Lankan supervisors: Dr Samal Dharmarathna (UoP), Dr Sajith Udayanga (WUoSL)
- RMIT Supervisor: Dr Zahra Shahhoseini, Prof. Sara Moridpour

Commencement date: May 2027

Features of the PhD:

- Duration of the PhD is 3-3.5 years on a full-time basis and the candidate will spend maximum period of one year at RMIT, Australia and the remaining time in Sri Lanka.
- The tuition fee is fully waived, and the selected applicant will be considered for the standard scholarships for living stipend during the stay in Sri Lanka and Australia.
- There will be at least one principal supervisor each from RMIT and UOP.
- Degree will be awarded from both institutions acknowledging the joint supervision. You will get two separate degree certificates, one each from RMIT and UOP.

Successful candidates should have the following:

1. BSc Engineering (Specializing in Civil Engineering) with Second Class Upper division or higher
2. IELTS overall band of 6.5 with each band above 6.0

We are looking for a dynamic candidate who meets the above qualifications.

If you are interested in this PhD research, apply via the following link on or before 25th September 2026

<https://forms.gle/M9AmbViH9343jJMe6>

Note: Only the shortlisted candidates will be called for the interview.

If you have any queries, contact Dr. Panduka Neluwala [Email: pandukaneluwala@eng.pdn.ac.lk]