

An Indian-Australian research partnership

Project Title:	Modelling heterogeneous non-lane based traffic flow: microscopic vs macroscopic approach	
Project Number	IMURA1001	
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Research Clusters:

Research Themes:

Highlight which of the Academy's CLUSTERS this project will address? <i>(Please nominate JUST one. For more information, see www.iitbmonash.org)</i>		Highlight which of the Academy's Theme(s) this project will address? <i>(Feel free to nominate more than one. For more information, see www.iitbmonash.org)</i>	
1	Material Science/Engineering (including Nano, Metallurgy)	1	Artificial Intelligence and Advanced Computational Modelling
2	Energy, Green Chem, Chemistry, Catalysis, Reaction Eng	2	Circular Economy
3	Math, CFD, Modelling, Manufacturing	3	Clean Energy
4	CSE, IT, Optimisation, Data, Sensors, Systems, Signal Processing, Control	4	Health Sciences
5	Earth Sciences and Civil Engineering (Geo, Water, Climate)	5	Smart Materials
6	Bio, Stem Cells, Bio Chem, Pharma, Food	6	Sustainable Societies
7	Semi-Conductors, Optics, Photonics, Networks, Telecomm, Power Eng		
8	HSS, Design, Management		

The research problem

The proposed research aims at modelling non-lane based mixed traffic flow using micro and macro approaches. In the microscopic modelling, we propose a novel 2-D multi-class car following theory for non-lane based traffic operations. In contrast to the traditional car-following theory (i.e. 1-D car-following models), in our proposed model the acceleration is affected by not only the front vehicles but also the side vehicles including motor-bikes. In the macroscopic approach, a new stochastic continuum model will be developed for mixed class traffic. In this model, the Brownian motion is considered to describe the non-lane based traffic operations and the effect of motor-bikes on the mixed traffic flow. Performance comparison of each modelling approach is carried out against traffic data collected from field.

Project aims

1. Data collection and analysis
2. Microscopic model development,
3. Macroscopic model development
4. Model applications to various scenarios
5. Performance comparison

Expected outcomes

Highlight the expected outcomes of the project

Microscopic traffic flow model for non-lane based mixed traffic conditions
Macroscopic flow modelling using stochastic continuum models
Performance comparison of both approaches: model calibration and validation

How will the project address the Goals of the above Themes?

Describe how the project will address the goals of one or more of the 6 Themes listed above.

This project is expected to made contribution to the challenging problem of modelling complex traffic dynamics

Potential RPCs from IITB and Monash

Provide names of the potential research progress committee members (RPCs) and describe why they are most suited for the proposed project

- Prof. Nagendra Velaga – expertise on driver behavioural studies
- Prof. Avijith Majhi – expertise to optimization and signal control
- Prof. Avijit Chatterjee – expertise in continuum modelling
- Prof. Hai Vu – expertise in traffic control and optimization

Capabilities and Degrees Required

List the ideal set of capabilities that a student should have for this project. Feel free to be as specific or as general as you like. These capabilities will be input into the online application form and students who opt for this project will be required to show that they can demonstrate these capabilities.

Students from M. Tech in Transportation Systems Engineering, Computer Science, Electrical/Electronics, Maths, with good background on computer programming, operation research, traffic control, and statistics.

Necessary Courses

Name three tentative courses relevant to the project that the student should complete during his/her coursework at IITB (the student will require to secure 8 point in these courses)

Traffic Engineering

Advanced Probability and Statistics

Select up to **(4)** keywords from the Academy's approved keyword list (**available at <http://www.iitbmonash.org/becoming-a-research-supervisor/>**) relating to this project to make it easier for the students to apply.

Transportation and Traffic Engineering and Logistics

Computational Fluid Dynamics and Mechanics (application of CFD in traffic flow modelling)

Computer Simulation (of traffic using micro models)

Modelling and Simulation (Modelling of vehicular traffic)