## Project Title

Developing Effective Traffic Congestion Management Strategies for Road Transport Systems with Traditional, Connected and Automated Vehicles

## Project Code

UQIDAR 00140

## Project Description

**Aims**

Entering the promise of connected and automated vehicles (CAVs), which are widely heralded to revolutionize mobility, experts predict that the transport networks in Australia, India and elsewhere will continue to grow with more CAVs mixed with traditional vehicles. While the valuable information collected and communicated by CAV provides unprecedented opportunities for operating traffic flow at the optimal level, the lack of a robust, theory-based operational plan for mixed traffic flow will only lead to more chaotic roads. While vehicle manufacturers compete feverishly to design better CAVs, and focus their research on the development of connectivity and automation technologies, researchers have yet to solve two critical issues: (1) the impact of connectivity on driving behaviour and its implication on road transport systems’ capacity and efficiency. (2) strategies to optimally include CAVs in transport systems. Motivated by the great need for such models this project aims to: (1) develop an analytical tool that accurately describes and reproduces features of the mixed traffic flow of traditional, connected, and automated vehicles, and (2) develop effective traffic congestion management strategies for road transport systems with CAVs.

**Methodology**

To achieve its aim, data collected from a high-fidelity driving simulator by Dr Zheng will be used to develop microscopic traffic models for CAVs. Based on the developed models, connectivity and automation’s impact on traffic flow stability will be quantitatively measured. Then various traffic control strategies (e.g., speed harmonisation, cooperative lane changing and ramp metering, etc.) will be developed to effectively avoid traffic congestion before its occurrence or quickly diminish it if it has already formed. The performance of these control strategies will be rigorously tested using the comprehensive simulation platform for traditional, connected, and automated vehicles developed by Dr Zheng’s group at UQ.

- Knowledge on interactions between connectivity, automation, and human drivers.
- Microscopic traffic models that accurately describes and reproduces features of the mixed traffic flow of traditional, connected, and automated vehicles.
- Effective traffic congestion management strategies for road transport systems with traditional, connected, and automated vehicles.

## Project Outcomes

- Knowledge on interactions between connectivity, automation, and human drivers.
- Microscopic traffic models that accurately describes and reproduces features of the mixed traffic flow of traditional, connected, and automated vehicles.
- Effective traffic congestion management strategies for road transport systems with traditional, connected, and automated vehicles.

## Advisory Team

**Associate Professor Zuduo Zheng**

Civil Engineering, UQ


**Professor K. Ramachandra Rao**

Civil Engineering, IITD

[http://web.iitd.ac.in/~rrkalaga](http://web.iitd.ac.in/~rrkalaga)

## Type of Student

Applications are open to Indian students who meet eligibility criteria.

## Discipline Background of Student

Ideally, this project requires students with a background in: Transport Engineering, Control Engineering, Mathematics and Statistics, Computer Science.
IDEAL CANDIDATE

**Essential capabilities:** Demonstrated good knowledge in at least one of the following topics: traffic flow modelling, control theory, mathematical and statistical modelling, optimisation, or related topics. Good academic writing skills.

**Desirable capabilities:** Demonstrated ability of conducting quality research and publishing research findings in international journals. A reliable team player with excellent communication skills (academic writing in particular). Self-driven.

**Expected qualifications (courses, degrees, etc):** A Master degree or BE (honour) in the area of in Transport Engineering, Control Engineering, Computer Science, Mathematics, Statistics, Electrical Engineering, or related disciplines.

APPLICATION PROCESS

Apply online by the due date: [https://www.uqidar.org/students/how-to-apply/](https://www.uqidar.org/students/how-to-apply/)