

The University of Queensland - IIT Delhi Academy of Research Joint PhD Project

PROJECT TITLE	DEVELOPING EFFECTIVE TRAFFIC CONGESTION MANAGEMENT STRATEGIES FOR ROAD TRANSPORT SYSTEMS WITH TRADITIONAL, CONNECTED AND AUTOMATED VEHICLES
PROJECT CODE	UQIDAR 00140
PROJECT DESCRIPTION	<p>Aims</p> <p>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—as one of the first in the world—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.</p> <p>Methodology</p> <p>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.</p>
PROJECT OUTCOMES	<ul style="list-style-type: none"> • 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	<p>Associate Professor Zuduo Zheng School of Civil Engineering http://www.connectedandautonomoustransport.com/zuduo.zheng@uq.edu.au</p> <p>Professor K. Ramachandra Rao Department of Civil Engineering http://web.iitd.ac.in/~rrkalaga_rkkalaga@civil.iitd.ac.in</p>

<p>TYPE OF STUDENT DISCIPLINE BACKGROUND OF STUDENT</p>	<p>Applications are open to i/a students who meet eligibility criteria.</p> <p>Transport Engineering; Control Engineering; Mathematics and Statistics; Computer Science</p>
<p>IDEAL CANDIDATE</p>	<p>Essential capabilities:</p> <ul style="list-style-type: none"> • 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. <p>Desirable capabilities:</p> <ul style="list-style-type: none"> • 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 <p>Expected qualifications (courses, degrees, etc):</p> <ul style="list-style-type: none"> • Master degree in Mathematics or Statistics, Transport Engineering, Control Engineering, Computer Science and Electrical Engineering related fields; <p>OR</p> <ul style="list-style-type: none"> • BE (honour) in the area of in Civil Engineering, Control Engineering, Computer Science and Electrical Engineering.
<p>APPLICATION PROCESS</p>	<p>Apply online by the due date: https://www.uqidar.org/students/how-to-apply/</p>