



Cristina Olaverri Monreal, Editor

## Future Urban Mobility Group

Smart Cities Research Institute Swinburne University of Technology, Melbourne Australia

### EDITOR'S NOTE

Please send your proposal on profiling research activities of your or other ITS research groups & labs in the ITS Research Lab Column to Cristina Olaverri Monreal via [olaverri@technikum-wien.at](mailto:olaverri@technikum-wien.at)

**S**winburne's Future Urban Mobility [<http://www.swinburne.edu.au/research/our-research/institutes/smart-cities/>] Group undertakes research into the development and evaluation of new solutions and policy pathways with the likelihood of greatest impact in achieving sustainable urban mobility.

Our work focuses on making cities accessible to their resident populations through connecting the social, physical, economic, and information infrastructures. Our research is primarily industry-focused and recognises the role of digital innovations and disruptive technologies in addressing the modern-day demands of urban living in the world's large and fast growing cities.

The Group comprises a multi-disciplinary research team that

specialises in intelligent transport systems, disruptive mobility, smart infrastructure and network optimisation and control. It also includes experts from Swinburne's Data Science Research Institute who specialise in data analytics, machine learning and artificial intelligence. The Group also includes researchers from Swinburne's Internet-of-Things Lab in addition to specialists in logistics and urban freight, electric vehicles, software innovations, and active transport and health. The Group works on a range of topics covering integrated land-use and transport policies; transit and pedestrian-oriented developments; dense and human scale cities; optimised road network use; transport safety and public health; pricing policy instruments; supply chain management; public transport and active travel solutions.

### Aspiration

To create safe and resilient urban mobility solutions that enhance access to services, places and economic opportunities, and improve the quality of life for citizens.

### Research Areas

The Future Urban Mobility Group leads major research projects in transport including:

- Emerging and future modes of urban mobility and disruptive forms of transport, including autonomous vehicles, on-demand shared mobility, mobility-as-a-service and digital

### QUICK FACTS

Lab Name: Future Urban Mobility Group

Affiliation: Smart Cities Research Institute Swinburne University of Technology

Website: <http://www.swinburne.edu.au/research/our-research/institutes/smart-cities/>

Established: 2017

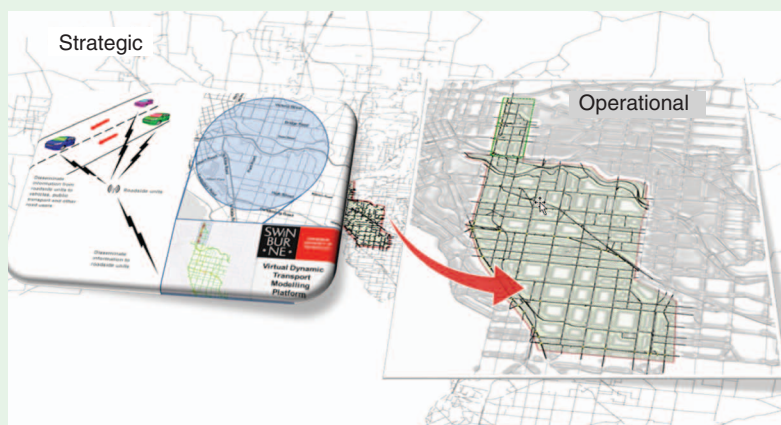
Research Focus: Making cities accessible to their populations

Program Leader: Associate Professor Hussein Dia



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## Smart Mobility Research Facility



**FIG 1** Smart Mobility Research Facility enables researchers and industry practitioners to demonstrate the readiness of advanced systems and accelerate deployment of multi-modal transport technologies through simulation testing.

innovations in personal and mass transit urban mobility

- Intelligent Transport Systems including data-driven network management; enhanced personal mobility and urban freight solutions; and development and evaluation of AI-based predictive intelligence and machine learning solutions
- Development and evaluation of advanced modelling environments for the assessment of economic, social and environmental attractiveness of emerging and new urban mobility solutions. This includes transport demand/supply modelling for scenarios of potential shifts in demand and supply, and modelling of land-use and transport interactions
- Identifying and evaluating alternative pathways for shaping future mobility behaviours using social surveys, econometric and choice modelling
- Low carbon mobility solutions and policies that promote land-use transport integration and active transport solutions for healthy citizens
- Smart mobile citizenry including management of movement in dif-

ferent types and scales of urban location and built environment

## Key Capabilities

### *Transport Modelling and Traffic Simulation*

This includes a hierarchy of modelling capabilities ranging from strategic through to operational mesoscopic and microscopic traffic simulation, and agent-based modelling. Key facilities include Swinburne's Virtual Smart Mobility Research Facility (Figure 1), which includes state-of-the-art traffic simulation and modelling platforms.

### *Intelligent Transport Systems and Infrastructure*

The capability in this area includes development of algorithms for network operations, management and control of transport systems. It also includes smart infrastructure and asset management; disruptive mobility; and data-driven low carbon mobility solutions for large and fast-growing cities.

### *Data Science and Analytics*

This capability [<http://www.swinburne.edu.au/research/our-research/>]

comprises a team specialising in big data analytics, machine learning and artificial intelligence. Areas of core capabilities include development and evaluation of algorithms to process large and interconnected data sets, and extracting insights from data by trend identification. Capabilities also include efficient data processing from high-speed sensors; and building novel approaches to unify data from multiple sources and with different formats or levels of detail.

### *Electric Vehicle Systems*

Specific expertise includes vehicle use analysis and human centred design; battery pack design solutions including battery management; and design and development of vehicle platform architectures (e.g. Figure 2 featuring Swinburne's Electric Bus). Our work focuses on achieving modular design solutions that enable subsystems to evolve iteratively and progressively on a common learning platform.

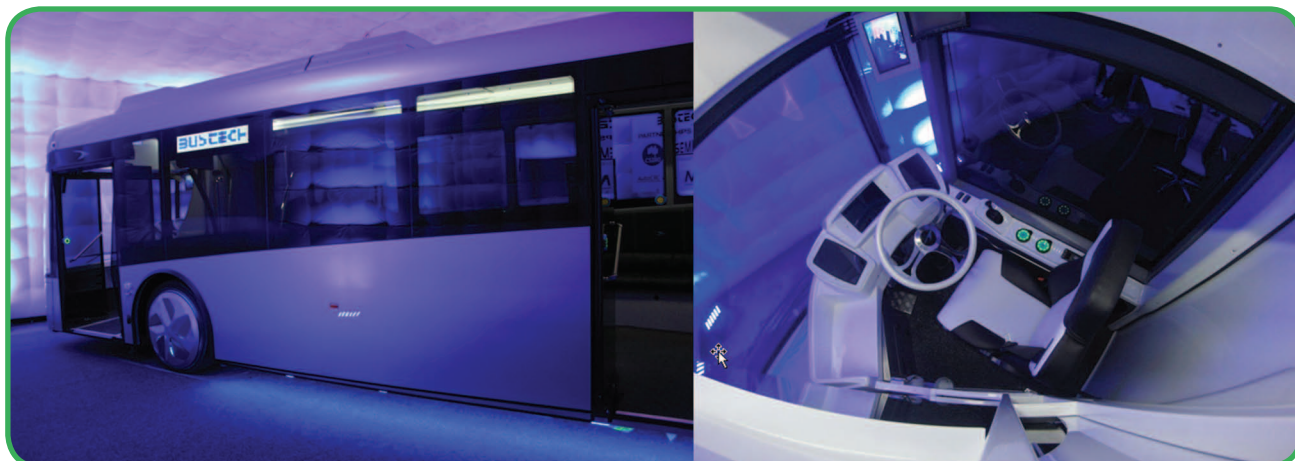
Key facilities related to this capability include Swinburne's Electric Vehicle Research Laboratory

### *Enhanced Personal Mobility*

This capability includes development and evaluation of systems to identify and capture travellers' journey preference metrics, and create intelligent systems to interpret traveller needs and preferences. It also includes context and situation-aware personalisation, integration, provisioning and delivery of personalised mobility services.

### *End-to-End Freight Solutions*

This capability includes intermodal transport; rail freight transport; collaborative supply chain management; port management and economics; and operations research. It also includes development and evaluation of intelligent systems to enable collective sensing and responding to changes across the end-to-end supply chain environment.



**FIG 2** Swinburne University of Technology has helped develop the first electric bus designed, engineered and manufactured in Australia in partnership with BusTech and AutoCRC.

### Thought Leadership Articles

- **Driverless cars will change the way we think of car ownership**

Automated vehicles are set to shake up the business model of the automotive industry, resulting in less people owning cars and many more sharing instead.

*Read the original article on The Conversation [https://theconversation.com/driverless-cars-will-change-the-way-we-think-of-car-ownership-50125]*

- **Who (or what) is behind the wheel? The regulatory challenges of driverless cars**

Can software be considered the “driver” of an autonomous vehicle? This is one question that needs to be resolved before driverless cars can hit the roads.

*Read the original article on The Conversation [https://theconversation.com/who-or-what-is-behind-the-wheel-the-regulatory-challenges-of-driverless-cars-55434]*

- **How blockchain will transform our cities**

If you think the internet has changed your life, brace yourself for the next digital innovation that's set to transform our world.

*Read the original article on The Conversation [https://theconversation.com/how-blockchain-will-transform-our-cities-69561]*

- **Jobs, tax and politics: three ways electric vehicles will change our world**

Governments racing to grab a lead in the global quest to position their countries for the car industry of the future.

*Read the original article on The Conversation [https://theconversation.com/jobs-tax-and-politics-three-ways-electric-vehicles-will-change-our-world-84910]*

- **Tech diplomacy: cities drive a new era of digital policy and innovation**

Welcome to the era of TechPlomacy where a new world order is emerging around cities and their economies, rather than nations and their borders.

*Read the original article on The Conversation [https://theconversation.com/tech-diplomacy-cities-drive-a-new-era-of-digital-policy-and-innovation-89959]*

### Recent Books



Published by IET: The Institution of Engineers, U.K.

- **Low Carbon Mobility for Future Cities: Principles and Applications**

This book [http://digital-library.theiet.org/content/books/tr/pbtr006e] presents a cohesive body of work on the policy principles and practical applications to drive sustainable mobility services in tomorrow's smart cities. Topics covered include policy principles for low carbon mobility; reducing automobile dependence; integrated land-use and transport planning for future cities; mobility and the sharing economy; autonomous shared mobility; gamification and sustainable mobility; and digital innovations and disruptive mobility.

*Read the Preface [https://www.linkedin.com/pulse/low-carbon-mobility-future-cities-hussein-dia/]*

### Transport and Public Health

This capability includes research into the development and evaluation of wearable technologies, smart equipment engineering, sensors and advanced data processing for proac-

tive monitoring and management of driver health and wellbeing. It also includes expertise in the measurement of alertness during driving, and provision of immediate intervention in case of fatigue.