

Modelling and Optimisation of Ride-Sourcing/Sharing Systems

Research Centre for Integrated Transport Innovation

DESCRIPTION OF YOUR TECHNOLOGIES

Effective **pricing**, **operation**, and **resource allocation** for ride-sourcing/sharing systems.

- Forecasting the passenger demand for on-demand systems
- Forecasting real-time shareability for the ride-sourcing/sharing services
- Optimizing matching between drivers and riders
- Optimizing pricing mechanisms for the ride-sourcing/sharing systems to incentivise drivers and riders.
- Optimizing pricing and penalties schemes for order cancellations in ride-sourcing/sharing systems.
- Integrating electrified and automated transport in ride-sourcing/sharing systems.
- Integrating ride-sourcing/sharing services with other sharing services including parking sharing, car sharing, Airbnb (house sharing)

SELECTED RECENT PROJECTS and SUCCESSFUL APPLICATIONS

- Smart cities grant with City of Randwick: *modelling and optimisation of on- and off-street parking as well as shared parking with dynamic pricing*
- Swiss Commission for Technology and Innovation project with Sion (Switzerland): *fleet management for shared and autonomous vehicles systems*
- Competitive research grant from Research Grants Council of Hong Kong: *parking sharing problem for urban cities*

COMPETITIVE ADVANTAGES

Existing modelling and optimisation frameworks for ride-sourcing/sharing systems often consider the ride-sourcing/sharing systems as an isolated system, and many studies are based on steady-state analysis. **Our methods** for demand forecasting, resource allocation and pricing have the following key features:

- “System of systems” approach
- Integrating multimodality and intermodality (considering interactions between the ride-sourcing/sharing services and other transport modes)
- Capturing spatiotemporal heterogeneity and uncertainty
- Incorporating order cancelation behaviours
- Integrating different sharing services (to provide integrated sharing services in a chain)

Our methods could help achieve

- Better accuracy (e.g., better predicting the demand)
- Lower operating cost (e.g., more efficient dispatching of vehicles or matching of drivers and riders)
- More profitability (e.g., from incentivising drivers and riders, from monitoring order cancelation, from integrating other sharing services)

FACILITIES AND INFRASTRUCTURE

TRACSLab: The TRAVel Choice Simulation LABoratory is a world-first in transportation visualisation. This laboratory allows researchers to study travel choice and inter-dependent behavioural characteristics by incorporating group interactions.