

## International Pre-Conference (HKSTS) Workshop 2024

### Frontiers in Transport Studies

**Date:** 7 December 2024 (Saturday)

**Time:** 13:15 – 16:50

**Venue:** FJ304, The Hong Kong Polytechnic University

Time	Event
13:15 – 13:25	<b>Registration</b>
13:25 – 13:30	<b>Welcome Address</b>
13:30 – 14:00	<b>Prof. Maria Attard</b> Experiencing walking through citizen science and action research
14:00 – 14:30	<b>Prof. Lili Du</b> Title (to be added)
14:30 – 15:00	<b>Prof. Zhi-Chun Li</b> Autonomous vehicles, parking, and urban spatial structure
15:00 – 15:15	<b>Break</b>
15:15 – 15:45	<b>Prof. Jiangbo (Gabe) Yu</b> Eliciting Travel Preferences and Infrastructure Perceptions Using Conversational Agents
15:45 – 16:15	<b>Prof. Songyot Kitthamkesorn</b> Integrating route choice models in mixed integer linear optimization
16:15 – 16:45	<b>Prof. Hangjun Yang</b> Comparative Analysis of Carbon Emission Reduction Policies in China's Manufacturing and Transportation Sectors
16:45 – 16:50	<b>Closing Remark</b>

#### Jointly organized by

Department of Industrial and Systems Engineering, The Hong Kong Polytechnic University  
 Department of Civil and Environmental Engineering, The Hong Kong Polytechnic University  
 The Hong Kong Society for Transportation Studies (HKSTS)

#### Co-organizers

Prof. Xiaowen Fu ([xiaowen.fu@polyu.edu.hk](mailto:xiaowen.fu@polyu.edu.hk)), Department of Industrial and Systems Engineering, The Hong Kong Polytechnic University  
 Prof. Anthony Chen ([anthony.chen@polyu.edu.hk](mailto:anthony.chen@polyu.edu.hk)), Department of Industrial and Systems Engineering, The Hong Kong Polytechnic University  
 Dr. Wei Ma ([wei.w.ma@polyu.edu.hk](mailto:wei.w.ma@polyu.edu.hk)), Department of Civil and Environmental Engineering, The Hong Kong Polytechnic University  
 Dr. Kun Wang ([allen-kunwang@polyu.edu.hk](mailto:allen-kunwang@polyu.edu.hk)), Department of Industrial and Systems Engineering, The Hong Kong Polytechnic University

**Registration:** free admission and no registration is required. All are welcome.

## Keynote Speech Details

**Prof. Maria Attard**



Speech title: **Experiencing walking through citizen science and action research**

**Abstract:** Past efforts to improve walkability have mainly focused on identifying the determinants that dis/encourage people to walk and propose interventions that encourage walking activity. As walkability gradually became a relevant research topic, the most common method to assess walkability was through indices that combined objective observations and measurements of urban density, land use diversity and street network design. This approach however overlooked aspects such as the provision for comfort, safety and visual interest. The walkable environment cannot be abstracted from its social setting and should be assessed through the citizens who experience it. The premise is that pedestrian needs, perceptions and feelings towards the walkable environment should play an integral part in studying, planning and designing public space. This presentation will focus on pedestrian-centred walkability assessments based on subjective experiences using innovative pedestrian-centred walkability assessments where participants simultaneously collect georeferenced *subjective experiences* and *objective observations* on the walkable environment as part of their daily routine.

**Short bio:** Professor Maria Attard is Head of Geography and Director of the Institute for Climate Change and Sustainable Development at the University of Malta. She is co-editor in chief of Research in Transportation Business and Management, Associate Editor of Case Studies on Transport Policy and sits on the editorial board of the Journal of Transport Geography among others. Between 2002 and 2008 she was a consultant to Malta's government and helped develop the first white paper on transport policy (2004) and implement the 2006 Valletta Strategy including park-and-ride, pedestrianisation and road pricing (2007). She also supported the planning for the 2011 public transport reform. She sits on the Steering Committee of the WCTR and is current President of NECTAR.

## Prof Li Zhi-Chun



Speech title: **Autonomous vehicles, parking, and urban spatial structure**

**Abstract:** This paper provides a theoretical analysis of the effects of autonomous vehicles (AVs) on the spatial structures of future cities. We consider two types of AVs, private AVs (PAVs) and shared AVs (SAVs). We assume that AVs have a lower marginal travel cost than human-driven traditional vehicles (TVs) due to additional utility caused by free activities in AVs, and PAVs have a lower marginal travel cost than SAVs due to better privacy and comfort. The land that SAVs release due to exemption of parking land is used for firm production and household residential uses. We also assume that the type of housing is regulated and designed by the government, and households rent houses from the government. Two urban spatial models, one for TVs and the other for PAVs / SAVs, accounting for the competition for land among firm production, household residence, and parking, are presented and compared. The government aims to determine the optimal housing sizes to maximize the social welfare of the city system. The finding shows that after introducing AVs, the city size may expand or shrink, depending on the marginal travel costs of AVs and the SAV market share in the AV market. The firm production rises for a full SAV city. Household utility and social welfare may increase or decrease, depending on the maturity level of AV technologies.

**Short bio:** Dr. Li is a Chair professor of Transportation and Urban Economics at the Huazhong University of Science & Technology, China. He was awarded as Cheung Kong (Changjiang) Scholar from Ministry of Education China (2016) and Distinguished Young Researcher from NSFC (2015), respectively. He obtained his PhD in Transport Operations from Beijing University of Aeronautics & Astronautics in 2006. Between 2006 and 2011, he worked as a Research Associate and a post-doctoral Research Fellow at the Hong Kong Polytechnic University. His research interests include transport modeling, transportation and urban economics, and public transportation. He is a recipient of the 2008 National Excellent Doctoral Dissertation Award of China, and of the 2009 New Century Excellent Talents in University of China, Ministry of Education of China. He is also a recipient of the 2009 HKSTS (Hong Kong Society for Transportation Studies) Outstanding Dissertation Paper Award and Gordon Newell Memorial Prize. He has published about 90 SCI/SSCI journal papers in such journals as Journal of Urban Economics, Regional Science and Urban Economics, Transportation Research A-E, European Journal of Operational Research. 22

papers have been published in top journal Transportation Research Part B (TR-B). He is currently editorial advisory board members of Transportation Research Part E (SCI journal) and International Journal of Sustainable Transportation (SSCI journal), and an Associate Editor of Transportmetrica B (SCI journal), and Transport Policy (SSCI journal).

### **Prof. Jiangbo (Gabe) Yu**



Speech title: **Eliciting Travel Preferences and Infrastructure Perceptions Using Conversational Agents**

**Abstract:** Surveys and interviews—whether structured, semi-structured, or unstructured—are essential tools for travel demand analysis, infrastructure investment, and policymaking, especially when addressing hypothetical scenarios where empirical data is lacking. However, traditional human-led methods, while effective, often face significant challenges such as high costs, inefficiencies, scalability issues, and inconsistent results. Distributed questionnaires, though convenient, fall short in providing real-time clarifications or adapting dynamically to participants' responses.

To overcome these limitations, our research lab has developed conversational agents (chatbots) powered by large language models (LLMs) to conduct surveys and interviews with enhanced efficiency and adaptability. This talk introduces a modular framework for designing these agents, enabling rapid, cost-effective deployment across diverse survey contexts. Our approach integrates engineered prompts, specialized knowledge bases, and customizable, goal-oriented conversational logic, offering flexibility to meet the demands of various scenarios. Alongside the technical architecture, I will address key considerations such as ethics, privacy, security, and computational resource management. Drawing from three field studies, I will demonstrate the versatility of our multilingual, multimodal conversational agents in eliciting expert opinions, conducting household travel surveys, and capturing public perceptions of infrastructure projects. Additionally, I will discuss challenges such as managing erratic user inputs and handling large conversational transcript files.

**Short Bio:** Prof. Jiangbo (Gabe) Yu is an assistant professor of civil engineering at McGill University in Montreal, Quebec, Canada. His research centers on Human-Machine Transportation Systems (HMTS), a framework he proposed in his award-winning dissertation. HMTS envisions transportation systems co-designed, co-developed, and co-operated by human intelligence and machine capabilities. This framework provides a novel perspective on integrating human-machine collaboration in the conception, implementation, and management of future transportation systems. Prior to joining McGill, Prof. Yu was a research affiliate at the Massachusetts Institute of Technology and a senior engineer at AECOM, an infrastructure consulting firm. He holds a BS from Beijing Institute of

Technology, an MS from the University of Southern California, and a PhD and postdoctoral fellowship from the University of California, Irvine. Prof. Yu is a registered Professional Engineer (PE) and a certified Professional Transportation Planner (PTP).

**Prof. Songyot Kitthamkesorn**



Speech title: **Integrating route choice models in mixed integer linear optimization**

**Abstract:** Route choice models provide a disaggregated representation of demand that can capture the impact of planning decisions on travel behavior. The demand expressions derived from the majority of these models are non-linear, presenting challenges for their integration into optimization problems. We introduce a method to incorporate a route choice model into a mixed integer linear programming (MILP) problem utilizing two approaches: 1) applying the independence of irrelevant alternatives (IIA) property and 2) employing the Charnes-Cooper transformation.

The IIA property is utilized to linearize the paired combinatorial weibit (PCW) model (Kitthamkesorn et al., 2024). The PCW model's two-level tree structure is decomposed into pairwise marginal and conditional probabilities, which are subsequently combined with the decision variable to address both route overlapping and heterogeneity in the context of optimal park-and-ride facility location.

The Charnes-Cooper transformation is employed to linearize the eUnit route choice model (Kitthamkesorn and Chen, 2024). A linear relationship between route utility and eUnit lower and upper bounds presents the eUnit probability as a linear-fractional programming problem. A double Charnes-Cooper transformation is incorporated with the eUnit bounds and the decision variable to address a profit maximization problem for an urban air mobility network design with endogenously determined route utility.

**Short bio:** Songyot Kitthamkesorn received his Ph.D. degree from the Department of Civil and Environmental Engineering, Utah State University, Logan, USA. He is currently an Associate Professor with the Department of Civil Engineering at Chiang Mai University, Thailand. His research interests include the transportation network equilibrium model, route choice model, and stochastic programming.

**Prof. Yang Hangjun**



**Speech title: Comparative Analysis of Carbon Emission Reduction Policies in China's Manufacturing and Transportation Sectors**

**Abstract:** This study evaluates China's environmental policies, specifically the increase of carbon emission tax rates and the reduction of carbon emission intensity, by developing a New Keynesian Dynamic Stochastic General Equilibrium (NK-DSGE) model that incorporates energy consumption and carbon emissions. The production sector is segmented into manufacturing, non-manufacturing, and transportation, with transportation services acting as inputs for both manufacturing and non-manufacturing firms. We construct four cases within two scenarios, each characterized by distinct targets and policies. After calibrating and estimating the relevant parameters, we compare carbon reduction outcomes and economic fluctuations across the two scenarios. Our findings indicate that when targeting the same carbon emission tax rate or carbon emission intensity ratio reduction, policies implemented in the manufacturing sector achieve greater carbon emission reductions compared to those in the transportation sector. However, this is accompanied by more significant declines in output and increased inflationary pressures. Conversely, when the quantities of carbon emission reductions are held constant in the first quarter, policies enacted in the transportation sector demonstrate superior performance relative to those in the manufacturing sector, resulting in smaller output reductions and milder inflation increases. In summary, for equivalent levels of carbon emission reductions, policies directed at the transportation sector yield more favorable economic outcomes than those applied in the manufacturing sector.

**Short bio:** Dr. Hangjun Yang is a Professor and an Associate Dean of the School of International Trade and Economics at the University of International Business and Economics (UIBE) in Beijing, China. He obtained his PhD degree from the Sauder School of Business, University of British Columbia (UBC) in Vancouver, Canada. His main research interests are transport economics and supply chain management. He has published more than 50 papers in leading transportation journals including *Transportation Research Part A/B/D/E* and *Journal of Transport Economics and Policy*. He serves as an Associate Editor of *Transport Policy* and the President of Air Transport Research Society China Chapter.

## Location Map of the Workshop Venue.



# Campus access code is needed to enter PolyU campus. Please contact Ms Kay Ma to apply for the access QR code through email: [qianhua.ma@polyu.edu.hk](mailto:qianhua.ma@polyu.edu.hk) .