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RSEARCH INTERESTS

AI for Transport Planning, Public Transit, Travel Behavior, Shared Mobility, Urban Analytics

EDUCATION

- Doctor of Philosophy, **Massachusetts Institute of Technology (MIT)** 2013-2018
- Master of Applied Science, **University of British Columbia (UBC)** 2011-2013
- Bachelor of Engineering, **Tongji University** 2007-2011

PROFESSIONAL EXPERIENCE

- Assistant Professor at **The University of Hong Kong (HKU)** 2020-Present
- Senior Data Scientist at **Via Transportation, Inc.** 2018-2020

OTHER ACADEMIC POSITIONS

- Editorial Board Member, *Transactions in Urban Data, Science, and Technology* 2022-Present
- Deputy Programme Director, HKU MSc in Urban Design and Transport (MScUDT) 2022-Present
- Chief Examiner, HKU MA in Transport Policy and Planning (MATPP) 2022-Present
- Chairperson of Transport Policy Committee, HKU Institute of Transport Studies 2023-Present

PROFESSIONAL AFFILIATIONS

- Fellow, Hong Kong Society for Transportation Studies 2022-Present
- Member, HKU Musketeers Foundation Institute of Data Science 2022-Present
- Fellow, HKU Urban Systems Institute 2023-Present

TEACHING EXPERIENCE

As Instructor

- URBA6002 Urban Big Data Analytics (HKU) 2021-Present
- URBA6004 Spatial Mobilities Analytics (HKU) 2021-Present
- URBP6157/GEOG7003 Transport Economics (HKU) 2022-Present
- URBA6402 Smart Planning and Design Studio (HKU) 2022-Present
- URBS2005 Research Methods in Urban Studies (HKU) 2021-2022

As Teaching Assistant

- 11.478 Behavior and Policy: Connections in Transportation (MIT) 2015
- CIVL 441 Transportation Planning and Analysis (UBC) 2013
- CIVL 587 Urban Transportation Economics and Policy (UBC) 2012

RESEARCH GRANTS

[1] PI. "Generalizable Deep Learning across Cities and Modes for Human Mobility Prediction". *National Natural Science Foundation of China (NSFC) Young Scientists Fund (NSFC 42201502)*. 01/2023-12/2025.

[2] PI. "Enhancing Multimodal Public Transit System Resilience using Network Science and AI". *HKU Seed Fund for PI Research – Basic Research*, 06/2023-06/2025.
[3] PI. "Quantifying the Impact of Street Network Structure on Urban Congestion: A Multi-City Study". *HKU Seed Fund for Basic Research*, 06/2022-06/2024.
[4] PI. "A Simulation-based Analytical Framework for the Design of an Integrated Autonomous Vehicle and Public Transit System and Evaluation of its Impact on Urban Form". *HKU Seed Funding for Strategic Interdisciplinary Research Scheme*, 06/2021-06/2024.
[5] PI. "Urban Embedding: Learning Spatial Representation from Urban Mobility Flows". *HKU Seed Fund for Basic Research for New Staff*, 03/2021-02/2023.

PUBLICATIONS

(* refers to the corresponding author)

Journal Papers

[1] Zhao, L., Shen, S. and **Zhao, Z.*** (2024). Planning decentralized battery-swapping recharging facilities for e-bike sharing systems. *Sustainable Cities and Society*, 101, 105118.
[2] Zhou, J.*, Zhou, M., Zhou, J. and **Zhao, Z.** (2023). Adapting node-place model to predict and monitor COVID-19 footprints and transmission risks. *Communications in Transportation Research*, 3, 100110.
[3] Huang, G., Liang, Y. and **Zhao, Z.*** (2023). Understanding market competition between transportation network companies using big data. *Transportation Research Part A: Policy and Practice*, 178, 103861.
[4] Liang, Y., Huang, G. and **Zhao, Z.*** (2023). Cross-mode knowledge adaptation for bike sharing demand prediction using adversarial graph neural networks. *IEEE Transactions on Intelligent Transportation Systems*, accepted in October 2023.
[5] Huang, G., Lian, T., Yeh, A.G.O. and **Zhao, Z.*** (2023). To share or not to share? Revealing determinants of individuals' willingness to share rides through a big data approach. *Transportation Research Part C: Emerging Technologies*, 157, 104372.
[6] Liang, Y., Ding, F., Huang, G. and **Zhao, Z.*** (2023). Deep trip generation with graph neural networks for bike sharing system expansion. *Transportation Research Part C: Emerging Technologies*, 154, 104241.
[7] Jiang, F., Ma, J.*, Webster, C.J., Chiaradia, A.J.F., Zhou, Y., **Zhao, Z.** and Zhang, X. (2023). Generative urban design: A systematic review on problem formulation, design generation, and decision-making. *Progress in Planning*, 100795.
[8] Lin, Y., Xu, Y.*, **Zhao, Z.**, Park, S., Su, S. and Ren, M. (2023). Understanding changing public transit travel patterns of urban visitors during COVID-19: A multi-stage study. *Travel Behaviour and Society*, 100587.
[9] **Zhao, Z.*** and Liang, Y. (2023). A deep inverse reinforcement learning approach to route choice modeling with context-dependent rewards. *Transportation Research Part C: Emerging Technologies*, 149, 104079.
[10] Zhou, M., Zhou, J.*, Zhou, J., Lei, S. and **Zhao, Z.** (2023). Introducing social contacts into the node-place model: A case study of Hong Kong. *Journal of Transport Geography*, 107, 103532.
[11] Liang, Y., **Zhao, Z.*** and Zhang, X. (2022). Modeling taxi cruising time based on multi-source data: A case study in Shanghai. *Transportation*, accepted in October 2022.
[12] **Zhao, Z.***, Koutsopoulos, H. N. and Zhao, J. (2022). Identifying hidden visits from sparse call detail record data. *Transactions in Urban Data, Science, and Technology*, 1(3-4), 121-141.
[13] Liang, Y., **Zhao, Z.*** and Sun, L. (2022). Memory-augmented dynamic graph convolutional networks for traffic data imputation with diverse missing patterns. *Transportation Research Part C: Emerging Technologies*, 143, 103826.

[14] Liang, Y., Huang, G. and **Zhao, Z.*** (2022). Joint demand prediction for multimodal systems: A multi-task multi-relational spatiotemporal graph neural network approach. *Transportation Research Part C: Emerging Technologies*, 140, 103731.

[15] Bi, W., Lu, W.*, **Zhao, Z.** and Webster, C. (2022). Combinatorial optimization of construction waste collection and transportation: A case study of Hong Kong. *Resources, Conservation & Recycling*, 179, 106043.

[16] Li, J. and **Zhao, Z.*** (2022). Impact of COVID-19 travel-restriction policies on road traffic accident patterns with emphasis on cyclists: A case study of New York City. *Accident Analysis & Prevention*, 167, 106586.

[17] Liang, Y. and **Zhao, Z.*** (2021). NetTraj: A network-based vehicle trajectory prediction model based on directional representation and spatiotemporal attention mechanisms. *IEEE Transactions on Intelligent Transportation Systems*, 23 (9), 14470-14481.

[18] Mo, B., **Zhao, Z.***, Koutsopoulos, H.N. and Zhao, J. (2021). Individual mobility prediction in mass transit systems using smart card data: An interpretable activity-based hidden Markov approach. *IEEE Transactions on Intelligent Transportation Systems*, 23 (8), 12014-12026.

[19] **Zhao, Z.***, Koutsopoulos, H.N. and Zhao, J. (2020). Discovering latent activity patterns from transit smart card data: A spatiotemporal topic model. *Transportation Research Part C: Emerging Technologies*, 116, 102627.

[20] **Zhao, Z.** and Zhao, J.* (2020). Car pride and its behavioral implication: An exploration in Shanghai. *Transportation*, 47(2), 793-810.

[21] **Zhao, Z.**, Koutsopoulos, H.N. and Zhao, J.* (2018). Detecting pattern changes in individual travel behavior: A Bayesian approach. *Transportation Research Part B: Methodological*, 112, 73-88.

[22] **Zhao, Z.**, Koutsopoulos, H.N. and Zhao, J.* (2018). Individual mobility prediction using transit smart card data. *Transportation Research Part C: Emerging Technologies*, 89, 19-34.

[23] Goulet-Langlois, G.**,** Koutsopoulos, H.N., **Zhao, Z.** and Zhao, J.* (2018). Measuring regularity in individual travel patterns. *IEEE Transactions on Intelligent Transportation Systems*, 19 (5), 1583-1592.

[24] Zhao, J.*, Frumin, M., Wilson, N. H. and **Zhao, Z.** (2013). Unified estimator for excess journey time under heterogeneous passenger incidence behavior using smartcard data. *Transportation Research Part C: Emerging Technologies*, 34, 70-88.

[25] Frumin, M., Zhao, J.*, Wilson, N. H. and **Zhao, Z.** (2013). Automatic data for applied railway management: Case study on the London Overground. *Transportation Research Record: Journal of the Transportation Research Board*, 2353, 47-56.

[26] **Zhao, Z.**, Zhao, J.* and Shen, Q. (2013). Has transportation demand of Shanghai, China, passed its peak growth? *Transportation Research Record: Journal of the Transportation Research Board*, 2394, 85-92.

Conference Papers

[1] Liang, Y., Ding, F., Tang, Y. and **Zhao, Z.*** (2023). Time-aware trip generation for bike sharing system planning. *The 12th ACM SIGKDD International Workshop on Urban Computing (UrbComp'23)*, Long Beach, CA, USA.

[2] Liang, Y., Huang, G. and **Zhao, Z.*** (2022). Bike sharing demand prediction based on knowledge sharing across modes: A graph-based deep learning approach. *2022 IEEE 25th International Conference on Intelligent Transportation Systems (ITSC)*, 857-862.

[3] **Zhao, Z.***, Koutsopoulos, H.N. and Zhao, J. (2018). Discovering latent activity patterns from human mobility. *The 7th ACM SIGKDD International Workshop on Urban Computing (UrbComp'18)*, London, UK.

[4] **Zhao, Z.**, Koutsopoulos, H. N. and Zhao, J.* (2018). Detecting changes in individual travel behavior patterns. *Transportation Research Board 97th Annual Meeting*, Washington, DC.

[5] **Zhao, Z.**, Koutsopoulos, H. N. and Zhao, J.* (2017). Mobility as a language: Predicting individual mobility in public transportation using n-gram models. *Transportation Research Board 96th Annual Meeting*, Washington, DC.

[6] **Zhao, Z.**, Zhao, J.* and Koutsopoulos, H. N. (2016). Individual-level trip detection using sparse call detail record data based on supervised statistical learning. *Transportation Research Board 95th Annual Meeting*, Washington, DC.

[7] **Zhao, Z.** and Zhao, J.* (2015). Car pride: Psychological structure and behavioral implications. *Transportation Research Board 94th Annual Meeting*, Washington, DC.

[8] **Zhao, Z.**, Chua G. and Zhao, J.* (2012). Evolution of trip chaining patterns in London from 1991 to 2010. *Innovations in Travel Modelling Conference*, Tampa, FL.

[9] Kang, L.*, Lin, B., **Zhao, Z.** and Jin, L. (2010). The traffic control system at urban intersections during the phase transitions based on VII. *2010 International Conference on Computer Application and System Modeling (ICCASM 2010)*, Taiyuan, China.

Book Chapters

[1] **Zhao, Z.**, Koutsopoulos, H. N.* and Zhao, J. (2020). Chapter 7 – Uncovering Spatiotemporal Structures from Transit Smart Card Data for Individual Mobility Modeling. *Demand for Emerging Transportation Systems*, 123-149.

Under Review

[1] Yang, H., Jiang, J.*, **Zhao, Z.** and Pan, R. (2023). STVANet: A spatio-temporal visual attention framework with large kernel attention mechanism for citywide traffic dynamics prediction. *Expert Systems With Applications*, originally submitted in December 2023.

[2] Zhang, Q., Ma, Z.*, Ling, Y., Qin, Z., Zhang, P. and **Zhao, Z.** (2023) Causal graph discovery for urban bus operation delays: A case in Stockholm. *Transportation*, originally submitted in December 2023.

[3] Liang, Y., Liu, Y., Wang, X. and **Zhao, Z.*** (2023). Exploring large language models for human mobility prediction under public events. *Computer, Environment and Urban Systems*, originally submitted in November 2023.

[4] Liang, Y., **Zhao, Z.***, Ding, F., Tang, Y. and He, Z. (2023). Time-aware trip generation for bike sharing planning: A multi-task memory-augmented graph neural network. *Information Fusion*, originally submitted in October 2023.

[5] Huang, G., **Zhao, Z.*** and Yeh, A.G.O. (2023). How shareable is your trip? A path-based analysis of ridesplitting trip shareability. *Computer, Environment and Urban Systems*, originally submitted in September 2023.

[6] Tang, Y., Deng, W., Lei, S., Liang, Y., Ma, Z. and **Zhao, Z.*** (2023). RouteKG: A knowledge graph-based framework for route prediction on road networks. *Transportation Research Part C: Emerging Technologies*, originally submitted in September 2023.

[7] Ding, F., Chen, S., and **Zhao, Z.*** (2023). Incorporating walking into ride-hailing: The potential benefits of flexible pick-up and drop-off. *Transportation Research Part D: Transport and Environment*, originally submitted in September 2023.

[8] Zhou, M., Zhou, J.*, Zhou, J. and **Zhao, Z.** (2023). Node, place and resilience: A perspective for classifying metro stations considering urban crises. *Journal of Transport Geography*, originally submitted in September 2023.

[9] Tang, Y., He, J. and **Zhao, Z.*** (2023). Activity-aware human mobility prediction with hierarchical graph attention recurrent network. *IEEE Transactions on Intelligent Transportation Systems*, originally submitted in August 2023.

[10] Lin, Y., Xu, Y.*, **Zhao, Z.**, Tu, W., Park, S. and Li, Q. (2023). Assessing effects of pandemic-related policies on individual public transit travel patterns: A Bayesian online changepoint detection based framework. *Transportation Research Part A: Policy and Practice*, originally submitted in July 2023.

[11] Wang, X., **Zhao, Z.***, Zhang, H., Guo, X. and Zhao, J. (2023). Quantifying the uneven benefits of ridesharing market integration. *IEEE Transactions on Intelligent Transportation Systems*, originally submitted in February 2023.

INVITED TALKS

[1] AI-driven travel demand modeling for smart transport planning. *Massachusetts Institute of Technology*, November 2023.
[2] AI and machine learning for urban planning and design. *Executive Course in Urban Analytics for Lands Department, HKSAR Government*, August 2023.
[3] AI for transport planning. *HKU-PKU Joint Summer School in Urban Science*, July 2023.
[4] AI-driven travel demand modeling for smart transport planning. *KTH Royal Institute of Technology*, March 2023.
[5] Urban transport networks and trajectory data mining. *Peking University-HKU Sustainable Development and Smart Cities in the Greater Bay Area*, November 2021.
[6] Trajectory data mining for smart urban mobility. *University of Michigan-Shanghai Jiaotong University Joint Institute*, June 2021.
[7] Transportation big data and data mining for cities. *Seminar-Workshop Series in Urban Analytics for Lands Department, HKSAR Government*, December 2020.
[8] Uncovering behavior dynamics in human mobility using transit smart card data. *Hong Kong Polytechnic University*, September 2020.

HONORS & AWARDS

- HKU Overseas Fellowship Award, 2023
- HKU Foundation Publication Award for Research Postgraduate Students (as supervisor), 2023
- Second Prize, The 6th Chengyuan Cup - Planning Decision Support Model Design Contest (as supervisor), 2022
- Fellow, Meeting of Minds@HKU Forum for Outstanding Young Scholars, 2019
- Mitacs-Accelerate Internship Award, 2012
- Tongji University Outstanding Graduate Award, 2011
- Second Prize, Competition of Transport Science and Technology of Tongji University, 2010
- Scholarships for Excellent Academic Performance, 2008-2010

SELECTED SERVICES

- Organizing committee member for International Symposium for Transport Network Resilience, 2023 (INSTR2023)
- Organizer for University of Glasgow-HKU Symposium on Urban Analytics, 2021
- Reviewer for leading academic journals in transportation, urban planning and geography, including
    - *Transportation Research Part A/B/C/D*
    - *IEEE Transactions on Intelligent Transportation Systems*
    - *Sustainable Cities and Society*
    - *Computer, Environment and Urban Systems*
    - *Journal of Transport Geography*
    - *Travel Behaviour and Society*
    - *IEEE Transactions on Mobile Computing*
    - *GIScience & Remote Sensing*
    - *Transport Policy*
    - *Journal of Transport and Health*
    - *PLOS ONE*

RESEARCH POSTGRADUATE STUDENTS

As Primary Supervisor

- Yuebing Liang, PhD Student 2020-Present
- Yijia Hu, PhD Student 2021-Present
- Fangyi Ding, PhD Student 2022-Present
- Luyun Zhao, PhD Student 2023-Present
- Xiaohan Wang, PhD Student 2023-Present
- Yihong Tang, MPhil Student 2022-Present

As Co-supervisor

- Yunting Miao, PhD Student 2023-Present