

# Zhaoxiang Li

School of Urban Planning and Design, Peking University

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## Education

### Peking University

Beijing, China

Master of Science, Urban and Regional Planning

Sep.2022-Jul.2025(Expected)

- GPA:3.67/4.00, Supervised by Prof. Pengjun Zhao  
National Scholarship for Graduate Students of China, 2024, Rank 1/51

### Tongji University

Shanghai, China

BEng, Traffic Engineering

Sep.2018-Jun.2022

- GPA:4.76/5.00, which is equivalent to 92.61 on 100 basis  
National Scholarship for Undergraduate Students of China, 2020, Rank 1/225

## Research Interests

My research interests lie at the intersection of **Urban Mobility & Travel Behavior**, **Emerging Mobility System**, **Sustainable Transportation**, and **Transportation Equity**:

- Urban Mobility and Travel Behavior:** Leveraging transit data to understand the mobility patterns and behavioral dynamics of people and goods; exploring incentive mechanisms and intervention measures to promote more sustainable mobility.
- Emerging Mobility Systems:** Assessing the environmental, economic, and social impacts of the application of CASE (Connected, Autonomous, Shared, Electric) mobility technologies using causal inference and machine learning methods.
- Green Transformations in Transportation:** Focused on technological innovation, governance, and strategic planning techniques to achieve green transformations in transportation systems.
- Social and Spatial Justice:** In relation to accessibility to essential services, transportation infrastructure, climate and environmental impacts of transportation systems among different communities and groups.

## Publications

(\* indicates the corresponding author; † indicates co-first authors.)

### Referred publications

- Li, Z.**, Ma, X., Pan, R., Yang, C., & Yuan, Q\*. (2025). Explaining the Spatial Dynamics and Identifying Potential Risks of Hazardous Materials Truck Movements. *Journal of Transport Geography*, 123, 104125.
- Li, Z.**, Zhao, P.\*, He, Z., & Xiao, Z. (2024). Non-linear Effects of CO<sub>2</sub> Emissions from Road Transport in Port Landside Area. *Transportation Research Part D: Transport and Environment*, 132, 104264.
- Zhao, P.\*, **Li, Z.**†, Xiao, Z., Jiang, S., He, Z., & Zhang, M. (2023). Spatiotemporal Characteristics and Driving Factors of CO<sub>2</sub> Emissions from Road Freight Transportation. *Transportation Research Part D: Transport and Environment*, 125, 103983.
- He, Z., Zhao, P.\*, Xiao, Z., Huang, X., **Li, Z.**, & Kang, T. (2024). Exploring the Distance Decay in Port Hinterlands under Port Regionalization Using Truck GPS Data. *Transportation Research Part E: Logistics and Transportation Review*, 181, 103390.
- He, Z., Zhao, P.\*, Zhang, S., **Li, Z.**, Huang, G., Zhang, C., & Niu, Y. (2024). Analyzing Foreland Dynamics in China's Port Clusters under Global Major Events (2019–2022) by AIS Trajectory Data. *Ocean & Coastal Management*, 255, 107269.

### Forthcoming publications

1. Zhao, P.\*, Li, Z.\*, He, Z., Chen, Y., & Xiao, Z. (2025). Reducing the Road Freight's Emissions through Integrated Strategy in Port Cities. *Nature Communications*. **(Accepted)**
2. Li, Z., Zhao, P.\*, Liu, Q.\*, & Jiang, S. (2025). Just Transition to Sustainable Road Freight Transport in China. *Nature Sustainability*. (Under review)
3. He, Z., Zhao, P.\*, Li, Z., Huang, G., Niu, Y., Zhang, C., & Huang, Z. (2025). Assessing the Adaptivity of Global Container Shipping Network during the Russia-Ukraine Conflict by AIS Trajectory Data. *Journal of Transport Geography*. (Under revision)

## Academic Conferences

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- The 24<sup>th</sup> COTA International Conference of Transportation Professionals (Summer 2024) **Shenzhen, China**
- The 15<sup>th</sup> International Conference on Applied Energy (Fall 2023) **Matsue & Tokyo, Japan**
- The 14<sup>th</sup> Workshop on Computational Transportation Science (Fall 2023) **Shanghai, China**
- The 28<sup>th</sup> Conference on Atmospheric Environment Science and Technology of China (Winter 2022) **Beijing, China**

## Research Experience

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**Key Laboratory of Earth Surface System and Human-Earth Relations** **Shenzhen, China**  
**Ministry of Natural Resources of China, Peking University**

***Project 1: Carbon Footprint and Environmental Impacts of Urban Transportation Systems*** (*Shenzhen Science and Technology Program, Grant No. JCYJ20220818100810024, \$2,074,430*), Participant *Sep.2022-Present*

- Constructed high resolution CO<sub>2</sub> and air pollutants (NO<sub>x</sub>, PM) emission inventories of road transportation in China based on 51 billion GPS trajectory signals of heavy-duty trucks, utilizing COPERT model.
- Identified spatiotemporal patterns and drivers of CO<sub>2</sub> emission from road transportation using geospatial (MGWR) and machine learning (XGBoost + ALE) approaches.
- Established a mesoscale road traffic simulation model to simulate the impact of road network changes on traffic flow, and its subsequent effects on road transportation emissions reduction.
- Developed a scenario-based approach to assess the integrated effects of truck fleet electrification and road network development on deep decarbonization and air pollution emissions reduction in the Greater Bay Area (GBA) of China by 2035, under both the BAU scenario and the net-zero emission electricity grids scenario.

***Project 2: Building Capacity for the Future City in Developing Countries (PEAK)*** (*UKRI's Global Challenge Research Fund, Grant No.ES/P011055/1, \$9,146,875*), Participant *Sep.2022-Present*

- Extracted human travel origin-destination (OD) data from 35 billion mobile signalling records during the 2019-2023 period and analysed the mobility patterns in China before and after the COVID-19 epidemic.
- Proposed the Pollution-Benefit Matching Index (PBMI) to quantify the social inequalities of economic benefits and pollution burdens (NO<sub>x</sub>, PM) from road freight transport activities in China at a 1 km grid scale.
- Evaluated the impacts of traffic restriction policies on pollutant emissions from road transportation and analyzed the resulting inequalities using DID analysis.
- Assessed the potential of policy interventions (e.g., pollution taxes, electrification, land use mix) to promote environmental justice, using a simulation-based approach.

***Project 3: Mechanism and Simulation of Sea-land Resources Flow via Big Data*** (*National Natural Science Foundation of China, Grant No.42130402, \$401,056*), Participant *Sep.2022-Jul.2023*

- Devised a data-driven algorithm to extract liner shipping networks and voyage information via 4.5 billion AIS (Automatic Identification System) data.

- Employed the complex network approach to demarcate the foreland structures of China's port clusters.
- Estimated the distance decay effect of freight flows in port-hinterland relationship (between the Shenzhen Port and primary freight facilities) by adopting the gravity model.
- Investigated the allocation of freight facilities related to the Shenzhen Port using the DBSCAN algorithm.

**Key Laboratory of Road and Traffic Engineering**  
**Ministry of Education of China, Tongji University**

**Shanghai, China**

***Project 1: Federated Learning-based Personalized Vehicle Operation Risk Identification Algorithms*** (National Innovation Training Project, Grant No.202010247139, \$2,800), **Principal Investigator** Jan.2020-May.2021

- Constructed a CNN-LSTM model to identify risk driving events from vehicle forward video data.
- Developed a federated learning (FL) framework to collect data from multiple vehicles and transmit model training parameters with privacy preservation.
- Adopted a Domain Adaptation method within the FL framework to adjust the feature distribution of input data from different users, removing the differences in sample distribution.

***Project 2: Travel Decision-making Mechanism and Control Method for Urban Heavy-duty Trucks*** (National Natural Science Foundation of China, Grant No.52302394, \$41,488), **Participant** Apr.2021-Jun.2022

- Proposed a data-driven approach (a dual-constraint PELT algorithm) for extracting stops and trips from GPS data, determined dwell time thresholds of HazMat truck stops.
- Developed a spatial clustering algorithm to identify stopping hotspots for HazMat transportation.
- Analysed the mobility patterns of HazMat trucks based on the truncated power-law distribution.
- Modified the risk assessment method of the US DOT to calculate the potential risks of HazMat transportation.

## Selected Honors and Awards

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| <b>Membership:</b> American Society Civil Engineering (ASCE)   | 2021-Present |
| Merit Student Pacesetter Award, Peking University ( <b>Rank 1/51</b> )   | 2024         |
| National Scholarship (Awarded by Ministry of Education of China, <b>Rank 1/225</b> )   | 2024         |
| Outstanding Graduate of Shanghai (Awarded by Shanghai Education Commission, <b>Rank 1/225</b> )  | 2022         |
| Xiangcheng High-Tech Talent Scholarship, Tongji University ( <b>Rank 2/225</b> )   | 2021         |
| <b>First Prize</b> of the 16 <sup>th</sup> National Competition of Transport Science and Technology (Awarded by Ministry of Transport of China, <b>Rank 1/1130</b> ) | 2021         |
| <b>5<sup>th</sup></b> in 2021 American Society Civil Engineering Mid-Pacific Student Conference Transportation Contest   | 2021         |
| National Scholarship (Awarded by Ministry of Education of China, <b>Rank 1/225</b> )   | 2020         |
| Outstanding Student Award, Tongji University ( <b>Top 1%</b> of all undergraduate students at TJU)   | 2019-2022    |

## Research Skills

- **Programming:** Python, C++, SQL, MATLAB, STATA, ArcGIS, QGIS, TransCAD, PTV Visum/Vissim, EPA MOVES, COPERT.
- **Deep Learning Framework:** Pytorch, TensorFlow, Scikit-learn.
- **Analytical Skills:** Machine Learning, Computer Vision, Reinforcement Learning, GIS & Spatial Data Analysis, Traffic Simulation, Transportation Energy & Emission Modeling, Econometrics, Causal Inference, Discrete Choice Modeling, Web Scrapping.
- **Language:** English (IELTS: 7.0), Chinese Mandarin (Native).