

Qin Lei

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RESEARCH INTERESTS

- Multimodal travel behavior
- Complex transportation network analysis
- Mobility equity

EDUCATION

THE UNIVERSITY OF HONG KONG

Hong Kong, China

Master of Science in Urban Design and Transport

09/2023-06/2025

- Distinction Graduation
- **Dissertation Title:** Gen-tod: diffusion-based automated generation of building morphology and function for transit-oriented development.
- **Advisor:** Professor Zhao Zhan.

HARBIN INSTITUTE OF TECHNOLOGY

Weihai, China

Bachelor of Engineering in Traffic Engineering

09/2016-06/2020

- Awarded the 2nd prize scholarship of Harbin Institute of Technology, 2016-2017.
- Awarded the 3rd prize scholarship of Harbin Institute of Technology, 2017-2018.
- Awarded outstanding students representative by Faculty of Automotive Engineering, Harbin Institute of Technology, 2017-2018.

RESEARCH EXPERIENCE

MASTER'S DISSERTATION

Gen-tod: diffusion-based automated generation of building morphology and function for transit-oriented development

11/2024-05/2025

- Developed an RGB-based urban dataset encoding building height, building functions, and transit accessibility across three image channels.
- Designed the Gen-TOD research framework by synthesizing generative urban design methodologies with the theoretical principles of Transit-Oriented Development
- Collaborated with teammates to debug and implement a LoRA-tuned diffusion model supporting multi-prompt and multi-image input pairing, with customized loss computation functions.
- Wrote the introduction, literature review, and data and methodology sections, edited and refined the results and conclusion sections.

RESEARCH COLLABORATION

Geo-embedded graph network: Decoding urban spatiotemporal ride-hailing demand through street contextual features 06/2024-12/2024

- Developed Graph Neural Network models that leverage road network topology and integrates micro-level street perception with macro-scale built environment features to predict and interpret spatiotemporal ride-hailing demand.
- Performed interpretability analysis on the best-performing GraphSAGE model using the Integrated Gradients algorithm, implemented via the Captum library in PyTorch.

The digital economy enhances overall life satisfaction but reduces equity among vulnerable groups

12/2024-03/2025

- Applied ERNIE 3.0 and DeBERTaV3 models to classify and quantify over 10 million Weibo posts, constructing a fine-grained life satisfaction index with high validity.
- Designed a spatial econometric framework combining ridge regression, XGBoost, and GeoShapley to disentangle nonlinear and geographically heterogeneous effects of the digital economy on residents' well-being.
- Analyzed disparities across vulnerable groups (elderly, low-income, low-education) and identified digital inclusion strategies to enhance equity in urban development.

The 5D framework as a rigid theory for urban quantification: Six critical reflections based on LLM

12/2024-03/2025

- Conducted a systematic review of 208 studies on the 5D framework using a semi-automated pipeline integrating PRISMA standards with LLM-based text mining.
- Employed GPT-4-turbo and GPT-o1 for structured information extraction, categorization, and synthesis, enhancing efficiency and reproducibility in literature review.

PUBLICATIONS

Journal Articles

- Jin, R. and **Qin, L.** (2024) The 5D framework as a rigid theory for urban quantification: Six critical reflections based on LLM. *Land Use Policy*, under review.
- Jin, R., Shao, C., **Qin, L.** and Zhao, W. (2024) The digital economy enhances overall life satisfaction but reduces equity among vulnerable groups. *Applied Geography*, under review.
- Jin, R. and **Qin, L.** (2024) Inconsistencies between drivers and impacts of urban commuting: A semi-automated systematic review using LLMs. *Transport Policy*, under review.