

Dingyi Zhuang

Research Interests

Urban Computing

- Spatiotemporal data mining
- Trustworthy AI
- Probabilistic models and uncertainty quantification
- Time series analysis

Intelligent transportation system

- Reinforcement learning based traffic control
- Travel behavior analysis

Education

2021 – Now Massachusetts Institute of Technology

- Ph.D. in Transportation
- Advisors: Jinhua Zhao
- Thesis proposal: Quantifying Uncertainty: Advancing Robustness, Reliability, and Fairness in AI-Driven Transportation Demand Modeling
- Committee Members: Jinhua Zhao, Haris N. Koutsopoulos, Shenhao Wang, Cathy Wu, Michael Batty
- GPA: **5.0/5.0**

2019 – 2021 McGill University

- Master (Thesis) in Civil Engineering
- Advisor: Lijun Sun
- GPA: **3.8/4.0**
- Thesis: Spatial Aggregation and Temporal Convolution Graph Neural Network for Kriging

2015 – 2019 Shanghai Jiao Tong University

- Bachelor of Science in Engineering (Tsien Hsue-Shen Class)
- Advisor: Jiangang Jin
- GPA: **3.6/4.0**; Ranking: **3/8**
- Graduate with Outstanding Honor (Top 5%)


Journal Publications

[J6] 2024 Uncertainty Quantification of Spatiotemporal Travel Demand with Probabilistic Graph Neural Networks.

Qingyi Wang, Shenhao Wang*, [Dingyi Zhuang](#), Haris Koutsopoulos, Jinhua Zhao
IEEE Transactions on Intelligent Transportation Systems

[J5] 2023 Fairness-enhancing deep learning for ride-hailing demand prediction .

Yunhan Zheng, Qingyi Wang, [Dingyi Zhuang](#), Shenhao Wang*, Jinhua Zhao
IEEE Open Journal of Intelligent Transportation Systems

- [J4] 2022 **A Universal Framework of Spatiotemporal Bias Block for Long-Term Traffic Forecasting**  .
Fuqiang Liu, Jiawei Wang, Jingbo Tian, Dingyi Zhuang, Luis Miranda-Moreno, Lijun Sun*
IEEE Transactions on Intelligent Transportation Systems
- [J3] 2021 **Low-Rank Hankel Tensor Completion for Traffic Speed Estimation**  .
Xudong Wang, Yuankai Wu, Dingyi Zhuang, Lijun Sun*
IEEE Transactions on Intelligent Transportation Systems
- [J2] 2020 **From compound word to metropolitan station: Semantic similarity analysis using smart card data**  .
Dingyi Zhuang, Siyu Hao, Lee Der-Horng*, Jiangang Jin
Transportation Research Part C: Emerging Technologies, Volume 114, May 2020, Pages 322-337
- [J1] 2019 **Understanding the bike sharing travel demand and cycle lane network: the case of Shanghai**  .
Dingyi Zhuang, Jiangang Jin*, Yifan Shen, Wei Jiang
International Journal of Sustainable Transportation, 2019: 1-13

Conference Proceedings

- [C10] 2023 **SAUC: Sparsity-Aware Uncertainty Calibration for Spatiotemporal Prediction with Graph Neural Networks.**
Dingyi Zhuang, Yuheng Bu, Guang Wang, Shenhao Wang, Jinhua Zhao
NeurIPS 2024 TGL Workshop
- [C9] 2023 **Performance benchmarking and scalability of LPSim: a multi-GPU traffic simulation approach.**
Xuan Jiang, Dingyi Zhuang, Shangqing Cao, Junzhe Cao, Yuhan Tang, Vishwanath Bulusu, Raja Sengupta, Jinhua Zhao
IEEE Transactions on Intelligent Vehicles, Digital Twin and Parallel Intelligence, 2023
- [C8] 2023 **Uncertainty Quantification via Spatial-Temporal Tweedie Model for Zero-inflated and Long-tail Travel Demand Prediction**  .
Xinke Jiang*, Dingyi Zhuang*, Xianghui Zhang, Hao Chen, Jiayuan Luo, Xiaowei Gao
32nd ACM International Conference on Information and Knowledge Management (CIKM-2023)
- [C7] 2023 **ST-GIN: An Uncertainty Quantification Approach in Traffic Data Imputation with Spatio-temporal Graph Attention and Bidirectional Recurrent United Neural Networks**  .
Zepu Wang, Dingyi Zhuang*, Yankai Li, Jinhua Zhao, Peng Sun
IEEE International Conference on Intelligent Transportation Systems (ITSC-2023)
- [C6] 2023 **Uncertainty Quantification in Road-level Traffic Risk Prediction by Spatial-Temporal Zero-Inflated Negative Binomial Graph Neural Network(STZINB-GNN)**  .
Xiaowei Gao, James Haworth, Dingyi Zhuang, Huanfa Chen, Xinke Jiang
12th International Conference on Geographic Information Science (GIScience-2023)
- [C5] 2022 **Uncertainty Quantification of Sparse Trip Demand Prediction with Spatial-Temporal Graph Neural Networks**  .
Dingyi Zhuang, Shenhao Wang*, Haris N. Koutsopoulos, Jinhua Zhao
28th ACM SIGKDD Conference on Knowledge Discovery & Data Mining (KDD-2022, oral pre.)
- [C4] 2022 **The Braess Paradox in Dynamic Traffic**  .
Dingyi Zhuang, Yuzhu Huang, Vindula Jayawardana, Jinhua Zhao, Dajiang Suo, Cathy Wu*
25th IEEE International Conference on Intelligent Transportation Systems
- [C3] 2020 **Inductive graph neural networks for spatiotemporal kriging**  .
Yuankai Wu, Dingyi Zhuang, Lijun Sun*
The Thirty-Fifth AAAI Conference on Artificial Intelligence (AAAI-21, oral pre.)
- [C2] 2020 **A Pseudo-3D Convolutional Neural Network based Framework for Short-term Mixed Passenger Flow Prediction in Large-scale Public Transit.**
Siyu Hao, Dingyi Zhuang, De Zhao, Lee Der-Horng*
Transportation Research Board 2020

- [C1] 2018 **An empirical study on cycle lane network using bike sharing data: the case of Shanghai.**
Dingyi Zhuang, Jiangang Jin*, Yifan Shen, Wei Jiang
2018 International Conference on Transportation and Space-time Economics (oral pre.)

Invited Talks & Guest Lectures

- Jun 2024 **Uncertainty Quantification on Sparse Spatiotemporal Data Prediction**
Machine Learning Seminar, Morgan Stanley
- Oct 2023 **Modeling Multi-perspective Nature of Urban Dynamics (Ph.D. thesis framework)**
Allen Turing Insitute
- Oct 2023 **Modeling Multi-perspective Nature of Urban Dynamics (Ph.D. thesis framework)**
The Space Time Lab, University College London
- Oct 2023 **Sparsity-Aware Uncertainty Calibration for Spatiotemporal Prediction with Graph Neural Networks**
The Bartlett Centre for Advanced Spatial Analysis, University College London
- July 2023 **Uncertainty Quantification of Sparse Trip Demand Prediction**
Lyft
- July 2023 **Deep Hybrid Model with Urban Road Network for Travel Demand Analysis**
Transit Data Section at World Conference on Transportation Research 2023
- May 2023 **Deep Hybrid Model with Urban Road Network**
MIT Mobility Initiative Forum
- Apr 2023 **Uncertainty Quantification of Sparse Trip Demand Prediction**
Urban Artificial Intelligence Laboratory, University of Florida
- Feb 2023 **Deep Hybrid Model with Urban Road Network for Travel Demand Analysis**
CEE Research Days, MIT Media Lab
- Oct 2022 **Uncertainty Quantification of Sparse Trip Demand Prediction**
College of Computer Science, Sichuan University

Work & Research Experience

- Jun 2024– **Morgan Stanley Services Group, Inc.**
Aug 2024 Machine Learning Research Associate Intern
Manager: Majid Behbahani
- Oct 2023– **Singapore-MIT Alliance for Research and Technology (SMART)** 
Feb 2024 Research Assistant
Advisor: Jinhua Zhao; Shenhao Wang; Alex 'Sandy' Pentland
Working project: The Mens, Manus and Machina - How AI Empowers People, Institutions and the City in Singapore (M3S)
- Sep 2021– **MIT Transit Lab** 
Now Research Assistant
Advisor: Jinhua Zhao; Shenhao Wang
Working agencies:
 - Chicago Transit Authority (CTA), rail incident data analysis
 - Department of Energy (DoE), travel demand prediction
- Aug 2020– **Mitacs Accelerate with ExPretio** 
Jun 2021 Winter Intern
 - Combination of multi-horizon models for demand forecasting

2019-2021 **Interuniversity Research Centre on Enterprise Networks, Logistics and Transportation (CIRRELT)** [↗](#)
 Master's Student
 Advisor: Lijun Sun

Jul 2018– **Civil and Environmental Engineering, National University of Singapore**
 Sep 2018 Research Assistant
 Advisor: Lee Der-Horng

Oct 2017– **Institute of Refrigeration and Cryogenic Engineering, Shanghai Jiao Tong Univ.**
 Nov 2017 Research Assistant

Mar 2017– **Chuntsung Program, Shanghai Jiao Tong Univ.** [↗](#)
 Jun 2018 Research Assistant

Aug 2016– **Robotics Institute, Shanghai Jiao Tong Univ.**
 Sep 2015 Research Assistant

Honors & Awards

2020 **CIRRELT Excellence Scholarships (Master's), CIRRELT**

2019 & 2021 **Graduate Excellence Fellowship, McGill University**

2019 **Hsue-shen Tsien Class, Shanghai Jiao Tong University**
 Top 5%, Honor Program in School of Mechanical Engineering

2017 **Chungtsung Scholarship, Hui-Chun Chin and Tsung-Dao Lee Chinese Undergraduate Research Endowment**
 Top 10% in selected excellent research students in Shanghai Jiao Tong University

2017 **Chinese Big Data Innovation Application and Modeling Contest** [↗](#)
 First Prize (1/135)

2016 & 2017 **Eleme Scholarship, Shanghai Jiao Tong University**

2017 **2017 Mathematical Contest in Modeling**
 Honorable Mention

2016 **Excellent Student, Shanghai Jiao Tong University**
 Top 5%

2015 **Freshmen Scholarship, Shanghai Jiao Tong University**

Academic Service

Journal Referees IEEE Transactions on Neural Networks and Learning Systems • IEEE Transactions on Intelligent Transportation Systems • Transportation Research Part C

Conference Referees Transportation Research Board Annual Meeting (TRB) • IEEE Conference on Intelligent Transportation (IEEE ITSC)

Position of Responsibility

Jun 2024 **2nd International Workshop on Socially Interactive Autonomous Mobility (SIAM)** [↗](#)
 Program Committee

Jan 2024 **Mens, Manus and Machina (M3S) MIT-Singapore AI symposium** [↗](#)
 Organizer

Mar 2023– **MIT Film Makers Association**
 Now President of publicity

Oct 2015– **Center of Quality Development, Shanghai Jiao Tong University**
 Sep 2017 Vice president

Teaching

Spring 2024 Teaching Assistant of 1.041/1.200 Transportation Foundation and Methodology [↗](#)

Spring 2023 Teaching Assistant of 1.041/1.200 Transportation Foundation and Methodology [↗](#)