Xingmin Wang

Postdoctoral Researcher at University of Michigan, Ann Arbor

+1 734 926 6340 xingminw@umich.edu xingminw.github.io

Research Interests

I am currently working as a postdoctoral researcher at the University of Michigan, advised by Dr. Henry Liu. My research interests include traffic flow theory, traffic network modeling, traffic control, and urban computing, particularly with connected and automated transportation. My research works are founded on a variety of methodologies including applied statistics, network science, machine learning, and optimization. I have extensive experience in the processing, mining, and visualization of geospatial data such as traffic road networks and vehicle trajectories.

Education

Ph.D., Civil Engineering and Scientific Computing *University of Michigan* **Ann Arbor, MI** *2018.8 – 2023.8*

- Advided by Dr. Henry Liu
- Thesis: "Traffic Signal Optimization with Connected Vehicle Trajectories"
- GPA: 4.0/4.0, A+ in more than half of courses

B.Eng., School of Vehicle and Mobility *Tsinghua University* **Beijing, China** *2014.9 – 2018.7*

- Major in Automotive Engineering (89.0/100), Rank Top 5%

Work Experiences

Academic Experiences

Postdoctoral Researcher *Civil Engineering, University of Michigan* **Ann Arbor, MI** *2023.9 – Present*

- Advided by Dr. Henry Liu

Adjunct Lecturer *Civil Engineering, University of Michigan* **Ann Arbor, MI** *2023.9 – 2024.1*

- CEE 551 Traffic Science (for graduate student)
- Teaching evaluation: (Q1: 4.6/5.0 Q2: 4.9/5.0)

Industrial Experiences

Algorithm Intern *Didi Chuxing* **Beijing China** *2017.9 – 2018.8*

- Advided by Dr. Henry Liu and Dr. Jianfeng Zheng
- We work on developing a traffic signal retiming system with vehicle trajectory data.

Honors & Awards

- Department Fellowship, Civil Engineering, University of Michigan, 2019
- The First Prize in 35th Tsinghua University Academic Challenge Cup, 2017
- Fellowship of Siyuan Programme, Tsinghua University, 2015–2017
- Infineon Technology Scholarship, Tsinghua University, 2017
- Outstanding Project of Undergraduate Research Competition (3/250+), Tsinghua University, 2016
- The First Prize in Tsinghua Analytical Mechanics Contest (3/500+), 2015
- The First Prize in National Physics Contest for College Student, 2015

Preprints

PP1: Xingmin Wang, Zihao Wang, Zachary Jerome, Henry X Liu. "Traffic State Estimation and Uncertainty Quantification at Signalized Intersections with Low Penetration Rate Vehicle Trajectory Data". Submitted to *Transportation Science* [arxiv]

Publications

Journal Publications

J11: Xingmin Wang, Zachary Jerome, Zihao Wang, Chenhao Zhang, Shengyin Shen, Vivek Vijaya Kumar, Fan Bai, Paul Krajewski, Danielle Deneau, Ahmad Jawad, Rachel Jones, Gary Piotrowicz, Henry X Liu. "Traffic light optimization with low penetration rate vehicle trajectory data". *Nature Communications*, 15(1) 1306, 2024, [DOI] [News]

J10: Yu Han, Zhe Han, Fan Ding, Fuliang Li, Hao Wang, Xingmin Wang*. "Field-tested signal controller to mitigate spillover using trajectory data". *Computer-Aided Civil and Infrastructure Engineering*, 2023 [DOI] *: Co-correspondence

J9: Xinyu Fei, Xingmin Wang, Xian Yu, Yiheng Feng, Henry X. Liu, Siqian Shen, Yafeng Yin. "Traffic Signal Control under Stochastic Traffic Demand and Vehicle Turning via Decentralized Decomposition Approaches". *European Journal of Operational Research (EJOR)* 310 (2), 712-736, 2023 [DOI]

J8: Xingmin Wang, Yafeng Yin, Yiheng Feng, Henry X. Liu. "Learning the max pressure control for urban traffic networks considering the phase switching loss". *Transportation Research Part C: Emerging Technologies (TR part C)* 140, 103670. 2022 [DOI]

J7: Xingmin Wang, Zachary Jerome, Chenhao Zhang, Shengyin Shen, Vivek Vijaya Kumar, Henry X Liu. "Trajectory Data Processing and Mobility Performance Evaluation for Urban Traffic Networks". *Transportation Research Record (TRR)* 2677 (3), 355-370, 2022 [DOI]

J6: Zachary Jerome, Xingmin Wang, Shengyin Shen, Henry X Liu. "Determining Yellow Change and Clearance Intervals for Left-Turning Phases: Evaluation of the Current Guidelines with Connected Vehicle Data". *Transportation Research Record (TRR)*, 2676 (11), 1-14, 2022 [DOI]

J5: Xingmin Wang, Shengyin Shen, Debra Bezzina, James R Sayer, Henry X Liu, Yiheng Feng. "Data Infrastructure for Connected Vehicle Applications". *Transportation Research Record (TRR)*, 2674 (5), 85-96, 2020 [DOI]

J4: Yan Zhao, Jianfeng Zheng, Wai Wong, Xingmin Wang, Yuan Meng, Henry X Liu. "Estimation of queue lengths, probe vehicle penetration rates, and traffic volumes at signalized intersections using probe vehicle trajectories". *Transportation Research Record (TRR)*, 2673 (11), 660-670, 2019 [DOI]

J3: Yan Zhao, Jianfeng Zheng, Wai Wong, Xingmin Wang, Yuan Meng, Henry X Liu. "Various methods for queue length and traffic volume estimation using probe vehicle trajectories". *Transportation Research Part C: Emerging Technologies (TR part C)*. 107, 70-91, 2019 [DOI]

J2: Shuo Feng, Xingmin Wang, Haowei Sun, Yi Zhang, Li Li. "A better understanding of long-range temporal dependence of traffic flow time series". *Physica A: Statistical Mechanics and its Applications*. 492, 639-650, 2018 [DOI]

J1: Shuo Feng, Ruimin Ke, Xingmin Wang, Yi Zhang, Li Li. "Traffic flow data compression considering burst components". *IET Intelligent Transport Systems*. 11 (9), 572-580, 2017 [DOI]

Patents

P1: Henry Liu, Xingmin Wang, Zachary Jerome, Shengyin Shen, and Zihao Wang. "Optimizing Traffic Signals Using Partially Observed Vehicle Trajectory Data". *US provisional patent application 18/308,996*. Filed on April 28, 2023.

Professional Services

I currently serve as the reviewer of:

- Transportation Research Part C: Emerging Technologies (reviewed 25 papers by 2024.4)
- Transportation Research Part B: Methodological
- Transportation Science
- IEEE Transactions on Intelligent Transportation Systems
- Automotive Innovation
- Intelligent Transportation Infrastructure

Young Editorial Board Member — **Intelligent Transportation Infrastructure** *2024 – Present*

Young Member *of Technical Committee* — **3rd World Transport Convention** *2023 – 2026*
Intelligent and Connected Traffic Control with V2X

Conference Secretariat and Assistant Editor — **ISTTT 25** *2022 – 2024*

- I worked with Dr. Henry Liu and handled 1/3 of the papers submitted to ISTTT 25

– I designed and scheduled the program for ISTTT

Editorial Assistant **Journal of Intelligent Transportation System** *2022 – 2024*
I performed the initial review (desk reject, editor assignment, etc.) for more than 150 papers of JITS

Vice President **Michigan Transportation Student Organization (MiTSO)** *2022 – 2024*

Presentations and Posters

- "Traffic light optimization with low penetration rate vehicle trajectories", Presented in the CCAT Mobility & Infrastructure Working Group Meeting, 2024.3
- "Traffic light optimization with low penetration rate vehicle trajectories", Presented in the meeting of Traffic Signal System Committee (ACP25)'s research subcommittee, *TRB Annual Meeting, Washington, D.C.* 2024.1
- "Learning the max pressure control for urban traffic networks", Presented at *2022 INFORMS Annual Meeting, Indianapolis* 2022.10
- "Max-Weight Control for Urban Traffic Networks Considering Phase Switching Loss", Poster at *100th TRB Annual Meeting, Washington, D.C.* 2021.1
- "Data Infrastructure for Connected Vehicle Applications", Presented at *99th TRB Annual Meeting, Washington, D.C.* 2021.1

Teaching

2023 Fall: Co-Instructor for CEE 551 (graduate) at UofM: Traffic Science (Q1: 4.6/5.0 Q2: 4.9/5.0)

2022 Fall: Co-Instructor for CEE 551 (graduate) at UofM: Traffic Science

2020 Winter: Graduate Student Instructor for CEE 450 (undergraduate) at UofM: Introduction to Transportation Engineering

Student Mentorship

- Chenhao Zhang (master student, UofM, Computer Science), now at CMU, 2021-2023
- Saiyu Zhang (master student, UofM, Civil Engineering), 2021-2022
- Kechen Zhu (master student, UofM, Civil Engineering), 2021-2022