Curriculum Vitae

Yuan-Zheng Lei, Ph.D. Candidate

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Research Interests

- Trustworthy Machine Learning for Smart Mobility
- Connected Automated Vehicles
- Optimization
- Reinforcement Learning for On-demand Services
- Quantum Machine Learning

Education

Ph.D. Civil Engineering (Transportation) — August 2022 - August 2026 (Expected)
Department of Civil and Environmental Engineering — University of Maryland, College Park

M.S. Transportation Planning and Management — August 2019 - June 2022
School of Transportation and Logistics — Southwest Jiaotong University, Chengdu

B.S. Railway Engineering — August 2015- June 2019
School of Transportation and Logistics — Southwest Jiaotong University, Chengdu

Journal Publications

5. **Yuan-Zheng Lei**, Yaobang Gong, Dianwei Chen, Yao Cheng & Xianfeng Terry Yang (2025), "Reconstructing Physics-Informed Machine Learning for Traffic Flow Modeling: a Multi-Gradient Descent and Pareto Learning Approach", Transportation Research Part C: Emerging Technologies, Transportation Research Part C: Emerging Technologies, vol 180, 105344.

4. **Yuan-Zheng Lei**, Yao Cheng & Xianfeng Terry Yang (2025), "An optimization-free approximation Framework for Connected and Automated Vehicles Eco-Trajectory Planning Under limited computing capacity", Transportation Research Part C: Emerging Technologies, vol 171, 104949.

3. **Yuan-Zheng Lei**, Yaobang Gong & Xianfeng Terry Yang (2024), "Unraveling stochastic fundamental diagrams with empirical knowledge: Modeling, limitations, and future directions", Transportation Research Part C: Emerging Technologies, vol 169, 104851.

2. Hongxiang Zhang, Gongyuan Lu, **Yuan-Zheng Lei**, Guangyuan Zhang & Irene Niyitanga (2022), "A hybrid framework for synchronized passenger and train traffic simulation in an urban rail transit network", International Journal of Rail Transportation, vol 11(6), 912-941.

1. **Yuan-Zheng Lei**, Gongyuan Lu, Hongxiang Zhang, Bisheng He & Jiaxin Fang (2022), "Optimizing total passenger waiting time in an urban rail network: A passenger flow guidance strategy based on a multi-agent simulation approach", Simulation Modeling Practice and Theory, vol 117, 102510.

Under-reviewed Journal Papers

3. **Yuan-Zheng Lei**, Yaobang Gong, & Xianfeng Terry Yang (2025), "A two-stage programming for multi-objective optimization and its application in transportation", Transportation Science, **Under review**.

2. **Yuan-Zheng Lei**, Yaobang Gong, Dianwei Chen, Yao Cheng & Xianfeng Terry Yang (2025), "Potential failures of physics-informed machine learning in traffic flow modeling: theoretical and experimental analysis", Transportation Research Part B: Methodological, **Under major revision**.

1. Kaitai Yang, **Yuan-Zheng Lei**, Yi Zhang & Xianfeng Terry Yang (2025), "A Conservative Car Following Model Based on Adverse Weather Conditions", Journal of Intelligent Transportation Systems, **Under major revision**.

Refereed Conference Papers

5. **Yuan-Zheng Lei**, Yaobang Gong, Dianwei Chen & Xianfeng Yang, (2025), "Potential failures of physics-informed machine learning in traffic flow modeling: theoretical and experimental analysis". 105th Transportation Research Board Annual Meeting, Washington, D.C.

4. Dianwei Chen, Zifan Zhang, **Yuan-Zheng Lei**, & Yuchen Liu, (2025), "Customized Generative AI Agent for Transportation Engineering Practice: A Development and Continued Pre-Training Guideline". 105th Transportation Research Board Annual Meeting, Washington, D.C.

3. Kaitai Yang, **Yuan-Zheng Lei**, & Xianfeng Terry Yang, (2024), "Analyzing Car-Following Behavior Using an Empirical Prior Statistical Learning Framework". 104th Transportation Research Board Annual Meeting, Washington, D.C.

2. Kaitai Yang, **Yuan-Zheng Lei**, & Xianfeng Terry Yang, (2024), "Analyzing Car-Following Behavior Using an Empirical Prior Statistical Learning Framework". 104th Transportation Research Board Annual Meeting, Washington, D.C.

1. **Yuan-Zheng Lei**, Yao Cheng, Yi Zhang & Xianfeng Terry Yang, (2023), "Eco-trajectory planning for connected and autonomous vehicles with the heuristic explicit model predictive control". 103rd Transportation Research Board Annual Meeting, Washington, D.C.

Teaching Experiences at U of Maryland

2. **Spring 2025, ENCE673: Urban Transportation. (Teaching assistant)**

1. **Spring 2024, ENCE370: Introduction to Transportation Engineering and Planning. (Teaching assistant)**

Project Participation

7. **NSF CAREER: Physics Regularized Machine Learning Theory: Modeling Stochastic Traffic Flow Patterns for Smart Mobility Systems (Research assistant)**

6. **NSF OAC Core: Stochastic Simulation Platform for Assessing Safety Performance of Autonomous Vehicles in Winter Seasons. (Research assistant)**

5. **NSF EIR: Towards Data and Machine Learning Fairness in Smart Mobility. (Research assistant)**

4. **Maryland Transportation Institute (Center for MultiModal Mobility in Urban, Rural, and Tribal Areas): Unraveling stochastic fundamental diagrams considering empirical knowledge: modeling, limitation and further discussion. (Research assistant)**

3. **Maryland Transportation Institute (Center for MultiModal Mobility in Urban, Rural, and Tribal Areas): Ecological Driving System for Connected Automated Vehicles: A New Model Predictive Control Framework. (Research assistant)**

2. **Maryland Department of Transportation: Improving Internal Communications with SHA Employees. (Research assistant)**

1. **Maryland Department of Transportation: Evaluating MDOT SHA's Facility Maintenance Technician's (FMT) Training Program. (Research assistant)**

Grant writing

2. **NSF CSSI: Physics-Informed Machine Learning Cyberinfrastructure to Transform Engineering Research. (Methodology)**

1. **NSF CIS: Reassessing Physics-Informed Machine Learning for Traffic Flow Modeling: Potential Failures, Tailored Solutions, and Implementation Guidance. (Methodology)**

Referee Services

Journals:

- IEEE Transactions on Intelligent Transportation Systems
- Journal of Intelligent Transportation Systems: Technology, Planning, and Operations
- Journal of the Transportation Research Board

- ASCE Journal of Urban Planning and Development
- The Journal of Supercomputing

Conferences:

- 103rd-105th Transportation Research Board Annual Meeting, 2023-2025

Awards and Honors

2025 UMD Graduate Student Summer Research Fellowship

2024 UMD Dean's Fellowship