

Zheng Li

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EDUCATION	University of Wisconsin-Madison <ul style="list-style-type: none">• Doctor of Philosophy (Ph.D.) Candidate in Civil and Environmental Engineering• Advisor: Dr. Xiaopeng Li, Dr. Sikai Chen	Sep. 2023 - Present
	University of Wisconsin-Madison <ul style="list-style-type: none">• Master of Science (M.S.) in Computer Science• GPA: 3.83/4.00	Jan. 2024 - Aug. 2025
	University of Wisconsin-Madison <ul style="list-style-type: none">• Master of Science (M.S.) in Civil and Environmental Engineering• GPA: 3.90/4.00• Dissertation: Behavioral Analysis and Impact Assessment of Automated Driving Systems' Interaction with Traffic Light	Sep. 2023 - Aug. 2025
	Tongji University, China <ul style="list-style-type: none">• Master of Engineering (M.Eng) in Transportation Engineering• GPA: 3.80/4.00• Advisor: Dr. Jian Sun, Dr. Ye Tian, Dr. Anthony Chen (Hong Kong Polytechnic University)• Dissertation: Simulation-Based Optimization for Highway Active Management Strategies Design• Honors: Distinctive Graduate Student of Tongji University	Sep. 2020 - Jun. 2023
	Hunan University, China <ul style="list-style-type: none">• Bachelor of Engineering (B.Eng) in Civil Engineering• GPA: 3.68/4.00• Honors: Distinctive Bachelor's Degree Graduate of Hunan Province, Distinctive Bachelor's Degree Graduate of Hunan University	Sep. 2016 - Jun. 2020
RESEARCH INTERESTS	<ul style="list-style-type: none">• Simulation-based optimization for traffic system design and management• Driving behavior modeling and simulation• Safety assessment and scenario generation for autonomous vehicles• End-to-end autonomous driving control and closed-loop simulation• LLM-based agents for simulation and decision-making	
ACADEMIA EXPERIENCES	Research Assistant in Connected & Autonomous Transportation Systems Laboratory, University of Wisconsin-Madison <ul style="list-style-type: none">• Digital Twin Framework for Intelligent Transportation Systems: Built the front-end for a highway traffic digital twin web app using Leaflet and Unity, visualizing real-time traffic flow, weather, incident detection, and streaming highway CCTV video [Paper].• Infrastructure Enablers for Reliable Cooperative Driving Automation (Sponsored by Florida Department of Transportation): Investigated state-of-the-art CDA sensing/communication technologies and roadway infrastructure features, laid the groundwork for scenario-based testing and a hardware-in-the-loop co-simulation platform at SunTrax.• Turning "Tragedy of the Commons" into "Emergent Cooperative Behavior" for Automated Vehicles at Intersections with Meta-Learning (Sponsored by National Science Foundation): Performed statistical analyses (Markov property tests, t-tests, and F-tests) on driving behavior data to compare difference between HVs and AVs, revealing significantly stronger Markov properties in AV dynamics [Paper] [2025 Transportation Research Board Best Paper Award 🏆]. Modeled longitudinal string stability using a GMM + Fourier framework and found that homogeneous AV platoons can amplify oscillations under certain control latencies [Paper].• Realistic Autonomous Vehicle Behavior Investigation for Stakeholder Empowerment (Sponsored by U.S. Department of Transportation): Curated an ADS-equipped vehicle and traffic signal/sign interaction dataset containing over 80,000 segments from the Waymo Motion Dataset	Sep. 2023 - Present

<p>[Paper] [Project]. Collected over 25 miles of ADAS-equipped vehicle and traffic signal/sign interaction trajectories [Paper] [Project]. Reconstructed human driver and traffic signal interaction trajectories from over 120min of drone footage using YOLOv8 [Project]. Modeled traffic signal interaction behaviors for ADS/ADAS-equipped vehicles, and human drivers; simulated urban networks in SUMO to evaluate ADS/ADAS impacts, finding that higher automation improves efficiency but increases collision exposure [Paper].</p> <ul style="list-style-type: none"> • Understanding Driver Cognition and Decision-Making Behaviors in High-Risk Scenarios: Formulated cognition-aware decision models (drift-diffusion framework) for high-risk maneuvers (cut-in, rear-end, lane change), linking cognitive processes to kinematic patterns [Paper] [Paper]. • LLM-Based Agents for Driving Decision-Making: Developed RESPOND, a structured risk-pattern memory + hybrid rule/LLM pipeline that improved retrieval/reflection, reduced collisions in highway-env, and lowered risk in highD dataset [Paper]. • Closed-Loop Simulation for End-to-End Autonomous Driving System Evaluation: Built a generalizable, full-scenario closed-loop evaluation framework in CARLA for end-to-end autonomous driving systems, enabling performance curves as a function of scenario rarity and moving beyond traditional fixed, pre-defined scenario benchmarks. 	
<p>Research Assistant in Human-centered AI & Transportation Laboratory, University of Wisconsin Madison</p>	<p>Sep. 2023 - Sep. 2024</p>
<ul style="list-style-type: none"> • CIM-to-GIS Interoperability Pipeline for Infrastructure Asset Management (In collaboration with Wisconsin Department of Transportation): Developed an ArcGIS–Civil 3D data exchange pipeline to support infrastructure system management and geospatial dataset updates, including schema mapping, coordinate transformation, and QA checks to enable consistent GIS publishing and versioned updates. 	
<p>Research Assistant in Traffic Operations & Simulation Laboratory, Tongji University</p>	<p>Sep. 2020 - Jun. 2023</p>
<ul style="list-style-type: none"> • Simulation-Based Optimization for Traffic System Design and Management (Sponsored by China National Natural Science Foundation): Developed an ML-accelerated simulation-based optimization framework with jackknife uncertainty estimation to optimize dedicated bus lane allocation in large-scale networks, achieving 5.05% network performance improvement in a real-world case study [Paper]. Proposed a problem-specific discrete SBO algorithm (CTM-based metamodel + Adaptive Hyperbox Algorithm) to optimize highway ATM strategy designs under tight simulation budgets, achieving up to a 70% reduction in total delay [Paper] [Paper]. • City-Scale Mesoscopic Simulation & Dynamic Traffic Assignment Digital Twin (Sponsored by China Department of Transportation): Established city-scale mesoscopic traffic simulation and dynamic traffic assignment models for large urban networks, including network coding and calibration, OD demand estimation, time-dependent routing/assignment, and performance evaluation to traffic management strategy testing. • Mesoscopic, Dynamic, and Online Vehicle Path Recognition, OD Estimation, and Path Assignment (In collaboration with Tencent): Supported a real-time, city-scale mesoscopic simulation and path assignment platform by developing dynamic vehicle path recognition, OD demand estimation, and time-dependent path assignment modules. 	
<p>Research Internship in Decision Intelligence & Analytics Laboratory, Clemson University (Advised by Dr. Qi Luo)</p>	<p>Jul. 2022 - Oct. 2022</p>
<ul style="list-style-type: none"> • RL for Traffic Assignment & Sustainability Review and Knowledge Base: Investigated applications of RL in traffic assignment and sustainable transportation systems by reviewing 40+ papers. Synthesized findings into an internal Wiki knowledge base, organizing methods by problem type (routing/assignment, signal control, pricing), summarizing key assumptions. 	
<p>Project Assistant in Connected & Autonomous Transportation Systems Laboratory, University of Wisconsin-Madison</p>	<p>Sep. 2023 - Present</p>
<p>Proposal Writing</p> <ul style="list-style-type: none"> • U.S. Department of Transportation: Tribal & Rural Autonomous Vehicles for Equity, Liveability and Safety • Wisconsin Department of Transportation: Wildlife Crossings Pilot Program • Federal Highway Administration: Generalized Object-Oriented Data Structure for Real-Time Edge-Computing Transportation Data • Federal Highway Administration: Maximize the Use of Pavement QA Data and Develop Data Schema for Digital Construction and Infrastructure BIM <p>Report Writing</p>	

	<ul style="list-style-type: none"> Federal Highway Administration: Realistic Autonomous Vehicle Behavior Investigation for Stakeholder Empowerment Florida Department of Transportation: Infrastructure Enablers for Reliable Cooperative Driving Automation National Science Foundation: Cyber-Physical Phases of Mixed Traffic with Modular & Autonomous Vehicles: Dynamics, Impacts and Management National Science Foundation: Turning “Tragedy of the Commons” into “Emergent Cooperative Behavior” for Automated Vehicles at Intersections with Meta-Learning
	<p>Project Assistant in Human-centered AI & Transportation Laboratory, University of Wisconsin Madison Sep. 2023 - Sep. 2024</p> <p>Proposal Writing</p> <ul style="list-style-type: none"> Center for Connected and Automated Transportation: Security Defense of Transportation Network against Cyber Attacks Using Game-Theoretic Approaches Center for Connected and Automated Transportation: Using Connected Intelligent Transportation to Enhance Vulnerable Road User Safety
INDUSTRY EXPERIENCES	<p>Autonomous Vehicle Test Engineer Intern in NIO Feb. 2023 - Apr. 2023</p> <ul style="list-style-type: none"> Autonomous Vehicle Simulation & Evaluation Pipeline: Built an Apollo-simulator-aligned testing workflow by parameterizing simulation task configurations into tunable hyperparameters, developed Python scripts to batch-run simulations and collect results via RESTful endpoints, and analyzed performance metrics using Pandas/NumPy with metric dashboards visualized in Excel for reporting and comparison.
JOURNAL PUBLICATIONS	<ol style="list-style-type: none"> Li, Z., Sun, J., Meng, H., & Tian, Y.* (2026). Simulation-Based Optimization of Highway Active Traffic Management Strategies Design. <i>IEEE Transactions on Intelligent Transportation Systems</i>. (SCI, IF=8.4, 10.1109/TITS.2026.3662347) Li, Z., Meng, H., Ma, C.*, Ma, K., & Li, X.* (2026). Assessing Markov Property in Driving Behaviors: Insights from Statistical Tests. <i>Transportation Research Part E: Logistics and Transportation Review</i>. (SCI, IF=8.8, 10.1016/j.tre.2026.104740) Huang, H., Li, Z.*, Cheng, H., Wang, H., Jiang, J., Li, X., & Zgonnikov, A. (2025). Understanding driver cognition and decision-making behaviors in high-risk scenarios: A drift diffusion perspective. <i>Accident Analysis & Prevention</i>, 220, 108123. (SCI, IF=6.2, doi: 10.1016/j.aap.2025.108123) Long, K., Ma, C.*, Li, H., Li, Z., Huang, H., Shi, H., Huang, Z., Sheng, Z., Shi, L., Li, P., Chen, S., & Li, X. (2025). AI-Enabled Digital Twin Framework for Safe and Sustainable Intelligent Transportation. <i>Sustainability</i>, 17(10), 4391. (SCI, IF=3.3, doi: 10.3390/su17104391) Li, Z., Bao, Z., Meng, H., Shi, H.*, Li, Q.*, Yao, H., & Li, X. (2025). Interaction Dataset of Autonomous Vehicles with Traffic Lights and Signs. <i>Communications in Transportation Research</i>. (SCI, IF=14.5, doi: 10.1016/j.commtr.2025.100201) Sun, J., Wu, J., Li, Z., & Tian, Y.(2023). Optimization of Incentive-Based Carpooling Scheme (in Chinese). <i>Journal of South China University of Technology</i> (EI, doi: 10.12141/j.issn.1000-565X.230210) Li, Z., Tian, Y.*, Sun, J., Lu, X., & Kan, Y. (2022). Simulation-Based Optimization of Large-Scale Dedicated Bus Lanes Allocation: Using Efficient Machine Learning Models as Surrogates. <i>Transportation Research Part C: Emerging Technology</i>, 143, 103827. (SCI, IF=7.9, doi: 10.1016/j.trc.2022.103827)
CONFERENCE PAPERS	<ol style="list-style-type: none"> Li, Z., Zhang, P., Zhou, H., Liang, S., Li, Q., Yao, H., & Li, X.* (2026, June). A Multi-Modal Synchronized Dataset for Benchmarking ADAS Responses to Traffic Control Devices. In <i>37th Intelligent Vehicles Symposium (IV)</i>, Detroit, United States. Li, Z., Li, Y., Li, Q., Yao, H., Li, X.*, Hourdos, J., & McHale, G. (2026, January). Behavioral Analysis and Impact Evaluation of Automated Driving Systems’ Interaction with Traffic Lights. In <i>105th Annual Meeting of Transportation Research Board (TRB)</i>, Washington DC, United States. Ma, C., Liang, S., Cao, B., Li, Z., Long, K., & Li, X.* (2026, January). Agentic AI for Cooperative Perception in Connected Driving Scenarios. In <i>105th Annual Meeting of Transportation Research Board (TRB)</i>, Washington DC, United States. Li, Z., Zhang, P., Zhou, H., Liang, S., Li, Q., Yao, H., & Li, X.* (2026, January). Benchmarking Tesla’s Traffic Light and Stop Sign Control: Field Dataset and Behavior Insights. In <i>105th Annual Meeting of Transportation Research Board (TRB)</i>, Washington DC, United States.

	5. Li, Z. , Sun, J., Meng, H., & Tian, Y.* (2025, June). Leveraging Microscopic Simulation to Enhance the Design of Highway Active Traffic Management Strategies. In <i>2025 IEEE Intelligent Vehicles Symposium (IV)</i> , Cluj-Napoca, Romania. (doi: 10.1109/IV64158.2025.11097416)	
	6. Li, H., Long, K., Liang, Z., Ma, C., Cao, B., Li, Z. , & Li, X.* (2025, April). Leveraging Vehicle Sensors to Digital Twin for Work Zone Safety and Optimization. In <i>2025 Safety and Mobility Conference (SMC)</i> , Madison, United States.	
	7. Li, Z. , Meng, H., Ma, C.*, Ma, K., & Li, X. (2025, January). Assessing Markov Property in Driving Behaviors: Insights from Statistical Tests. In <i>104th Annual Meeting of Transportation Research Board (TRB)</i> , Washington DC, United States.	
	8. Li, Z. , Huang, H.*, Cheng, H., Jiang, J., Li, X., & Zgonnikov, A. (2025, January). Understanding Driver Risk Responses and Proactive Decision-Making Behaviors in High-Risk Scenarios. In <i>104th Annual Meeting of Transportation Research Board (TRB)</i> , Washington DC, United States.	
	9. Li, Z.* , Bao, Z., Meng, H., Shi, H., Li, Q., Yao, H., & Li, X. (2025, January). Interaction Dataset of Autonomous Vehicles with Traffic Lights and Signs. In <i>104th Annual Meeting of Transportation Research Board (TRB)</i> , Washington DC, United States.	
	10. Ma, K., Zhou, H., Zhang, Y., Shi, H., Ma, C., Li, Z. , Zhang, P., Liang, Z., & Li, X.* (2025, January). Automated Vehicle Longitudinal Stability Analysis: Controller Design and Field Test. In <i>104th Annual Meeting of Transportation Research Board (TRB)</i> , Washington DC, United States.	
	11. Li, Z. , Huang, H.*, Cheng, H., Jiang, J., Li, X., & Zgonnikov, A. (2024, October). Human decision-making in high-risk driving scenarios: A cognitive modeling perspective. In <i>2024 IEEE International Automated Vehicle Validation Conference (IAVVC)</i> , Pittsburgh, United States. (doi: 10.1109/IAVVC63304.2024.10786483)	
	12. Mei, Y., Li, Z. , Tian, Y., Sun, J., Tang, J.*, & Fu, Q. (2022, January). Simulation-Based Optimization of Variable Speed Limit Control Strategy at Freeway Recurrent Bottlenecks. In <i>102nd Annual Meeting of Transportation Research Board</i> , Washington DC, United States.	
	13. Li, J., Li, R., Yue, Y., & Li, Z.* (2021, June). Real-Time Traffic Signal Control of Logistic Park Based on Web Crawler Technology. In <i>World Transport Conference (WTC)</i> . Xi'an, China.	
AWARDS	1. 104th Annual Meeting of Transportation Research Board (TRB) AED60 Committee on Statistical and Econometric Methods Best Paper Award. <i>Paper:</i> Assessing markov property in driving behaviors: insights from statistical tests.	2025
	2. The first prize of Huawei Cup 18th Chinese Graduate Mathematical Modeling Competition (Rank 32nd of 8425 participants). <i>Paper:</i> Modelling and optimization for anti-cancer drug candidates.	2021
	3. The second prize of Hunan Province in the Chinese Undergraduate Mathematical Modeling Competition. <i>Paper:</i> Four-layer dynamic heat transfer model based on partial differential equations.	2018
	4. Honorable Mention in American Undergraduate Mathematical Contest in Modeling. <i>Paper:</i> An improved model to evaluate the fragility of a country.	2018
NON-US PATENT	1. A simulation-based optimization method of dedicated bus lanes allocation using the surrogate-assisted evolutionary algorithm.	2021110985103
	2. A simulation-based optimization method of large-scale en-route diversion system using the Partial Least Squares Kriging model.	2022104052512
PEER REVIEW	<ul style="list-style-type: none"> • Transportation Science • Computer-Aided Civil and Infrastructure Engineering • Transportation Research Part B • Transportmetrica A: Transport Science • Computers & Industrial Engineering • Transportation Research Board Annual Meeting • Cleaner Logistics and Supply Chain • Journal of Urban Planning and Development • IEEE Transactions on Intelligent Transportation Systems • IEEE Intelligent Transportation System Magazine • Scientific Report • The Journal of Supercomputing 	

	<ul style="list-style-type: none"> • IEEE Intelligent Vehicles Symposium • Discover Computing • Human-Centric Intelligent Systems 										
HONORS	<table border="1"> <tr> <td>1. Distinguished Masters' Scholarship at Tongji University</td> <td>2022</td> </tr> <tr> <td>2. Distinguished Undergraduates in Hunan Province</td> <td>2020</td> </tr> <tr> <td>3. Distinguished Undergraduates at Hunan University</td> <td>2020</td> </tr> <tr> <td>4. Outstanding Students in Hunan University (10 students in undergraduate cohort)</td> <td>2019</td> </tr> <tr> <td>5. China National Inspirational Scholarship</td> <td>2017, 2018, 2019</td> </tr> </table>	1. Distinguished Masters' Scholarship at Tongji University	2022	2. Distinguished Undergraduates in Hunan Province	2020	3. Distinguished Undergraduates at Hunan University	2020	4. Outstanding Students in Hunan University (10 students in undergraduate cohort)	2019	5. China National Inspirational Scholarship	2017, 2018, 2019
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SKILLS	<ul style="list-style-type: none"> • Programming languages: Python, MATLAB, Fortran, HTML, JavaScript • Software: CARLA, Vissim, SUMO, Auto CAD, Civil 3D, ArcGIS, GitHub • Machine learning: pandas, numpy, tensorflow, keras, scikit-learn, xgboost, gurobi 										
REFERENCE	<table border="1"> <tr> <td>1. Dr. Xiaopeng Li Professor in the Department of Civil and Environmental Engineering, and Department of Electrical and Computer Engineering, University of Wisconsin, Madison, USA. E-mail: xli2485@wisc.edu</td> </tr> <tr> <td>2. Dr. Jian Sun Professor in the Department of Transportation Engineering, Tongji University, China, Winner of China National Science Fund for Distinguished Young Scholars. E-mail: sunjian@tongji.edu.cn Personal website: https://www.researchgate.net/profile/Jian-Sun-56</td> </tr> <tr> <td>3. Dr. Ye Tian Associate professor in the Department of Transportation Engineering, Tongji University, China. E-mail: tianye@tongji.edu.cn</td> </tr> </table>	1. Dr. Xiaopeng Li Professor in the Department of Civil and Environmental Engineering, and Department of Electrical and Computer Engineering, University of Wisconsin, Madison, USA. E-mail: xli2485@wisc.edu	2. Dr. Jian Sun Professor in the Department of Transportation Engineering, Tongji University, China, Winner of China National Science Fund for Distinguished Young Scholars. E-mail: sunjian@tongji.edu.cn Personal website: https://www.researchgate.net/profile/Jian-Sun-56	3. Dr. Ye Tian Associate professor in the Department of Transportation Engineering, Tongji University, China. E-mail: tianye@tongji.edu.cn							
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