

XI XIONG

CONTACT INFORMATION

Tongji University
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EDUCATION

New York University <i>Doctor of Philosophy in Transportation Engineering</i> Dissertation: "Operations of Vehicle Platooning: Prediction, Optimization, and Cooperation."	New York, NY May 2021
Tsinghua University <i>Master of Science in Mechanical Engineering</i>	Beijing July 2015
Jilin University <i>Bachelor of Science in Automotive Engineering</i>	Changchun July 2012

ACADEMIC POSITIONS

Tongji University <i>School of Transportation Engineering</i> Research Professor (Principle Investigator)	Shanghai April 2023 - Present
The Chinese University of Hong Kong, Shenzhen <i>Shenzhen Research Institute of Big Data</i> Research Scientist	Shenzhen September 2021 - March 2023
Harvard University <i>Harvard Kennedy School</i> Postdoctoral Visiting Fellow	Cambridge, MA July 2021 - April 2022

FIELDS OF INTEREST

- Connected and autonomous systems
- Traffic flow modeling in mixed-autonomy
- Multi-agent interaction in dynamical networks
- Stochastic optimization and optimal control
- Dynamic programming and reinforcement learning
- Large language models and generative AI

GRANTS

- Fundamental Research Funds for the Central Universities, 22120230286, *Reinforcement Learning from Human Feedback for Lane Changing of Autonomous Vehicles in Mixed Traffic*, CNY 50,000, Role: PI, April 2024 - December 2024.
- Fundamental Research Funds for the Central Universities, 22120240249, *Vehicle Platooning Coordination over A Cascade of Junctions*, CNY 50,000, Role: PI, July 2023 - December 2023.

- National Natural Science Foundation of China (NSFC), 72371172, *Statistical and Optimization Study of Efficient Machine Learning for High-Dimensional and Streaming Data*, CNY 410,000, Role: Co-PI (with a share of 29%), January 2024 - December 2027.

RESEARCH EXPERIENCE

Harvard University

Postdoctoral Visiting Fellow

Supervisor: Soroush Saghaian

Cambridge, MA

July 2021 - April 2022

- Designed a hierarchical reinforcement learning framework for decision-making in societal problems.
- Developed analytical tools to improve operations efficiency in the healthcare sector.

Civil and Urban Engineering, New York University

Research Assistant

Supervisor: Li Jin

New York, NY

August 2018 - May 2021

- Developed a multi-agent reinforcement learning framework to coordinate vehicle platooning in transportation networks.
- Proposed the threshold-based policy to coordinate vehicle platooning by an analytical approach.
- Derived theoretical properties of coordinated platooning with a stochastic model.
- Evaluated the platooning coordination strategy with a traffic simulation testbed.

Center for Urban Science And Progress, New York University

Research Assistant

Supervisor: Kaan Ozbay

New York, NY

August 2017 - July 2018

- Developed a framework combining neural networks with Kalman filter to forecast traffic demands.
- Proposed the line graph neural networks to incorporate traffic topology.
- Evaluated the demand forecasting approach with actual traffic data.

Tsinghua University

Research Assistant

Beijing

August 2015 - December 2016

- Developed a framework combining reinforcement learning with control for autonomous driving.
- Studied deep deterministic policy gradient for autonomous vehicle to improve safety.

SERVICE AND TEACHING

Editorial Board

Communications in Transportation Research

Professional Committees

Session Chair at the 2021 International Workshop on Mathematical Issues in Information Sciences

Member of Institute for Operations Research and the Management Sciences

Member of Chinese Association of Automation

Member of China Intelligent Transportation Systems Association

Member of China Communications and Transportation Association

Referee Service

Nature Communications

IEEE Transactions on Intelligent Transportation Systems
IEEE Transactions on Intelligent Vehicles
IEEE Intelligent Transportation Systems Magazine
IEEE International Conference on Intelligent Transportation Systems
IEEE Conference on Decision and Control
ACM Journal on Autonomous Transportation Systems
Transportation Research Record
Transportation Research Board Annual Meeting
Transportation
Journal of Advanced Transportation
Frontiers of Engineering Management

Teaching

“UY-15033204: Operations Research II” at Tongji University, Undergraduate, Spring 2024
“ECE4530J: Decision making in smart cities” at Shanghai Jiao Tong University, Undergraduate, Summer 2021
“CE-UY 4393: Analytics and Learning Methods for Smart Cities ” at New York University, Undergraduate, Fall 2020
“TR-GY 8023: Stochastic Models and Methods for Engineering Systems” at New York University, Graduate, Spring 2020

FELLOWSHIPS AND AWARDS

Shanghai Overseas Outstanding Talents Scheme (2023)
Shenzhen Pengcheng Peacock Scheme (2022)
School of Engineering Fellowship, New York University (2017, 2018)
Kwang-Hua Scholarship, Tsinghua University (2013)
National Encouragement Scholarship, Jilin University (2009)
First-class Fast Auto Drive Scholarship, Jilin University (2009)

PUBLICATIONS

Journal papers

- **Xiong, X.**, Sun, D. and Jin, L., “An approximate dynamic programming approach to vehicle platooning coordination in networks.” *IEEE Transactions on Intelligent Transportation Systems*, Accepted for publication, June 2024.
- **Xiong, X.**, Sha, J. and Jin, L., “Optimizing coordinated vehicle platooning: An analytical approach based on stochastic dynamic programming.” *Transportation Research Part B: Methodological*, 2021,150,pp.482-502.
- **Xiong, X.**, Ozbay, K., Jin, L. and Feng, C., “Dynamic origin-destination matrix prediction with line graph neural networks and Kalman filter.” *Transportation Research Record: Journal of Transportation Research Board*, 2020,2674(8),pp.491-503.

- Čičić, M., **Xiong, X.**, Jin, L. and Johansson, K.H., “Coordinating vehicle platoons for highway bottleneck decongestion and throughput improvement.” *IEEE Transactions on Intelligent Transportation Systems*, 2021,23(7),pp.8959-8971.
- Wang, M., **Xiong, X.**, Kan, Y., Xu, C. and Pun, M., “UniTSA: A universal reinforcement learning framework for V2X traffic signal control.” *IEEE Transactions on Vehicular Technology*, Early Access, May 2024.
- Yang, S., Yin, H.H., Yeung, R.W., **Xiong, X.**, Huang, Y., Ma, L., Li, M., and Tang, C, “On scalable network communication for infrastructure-vehicular collaborative autonomous driving.” *IEEE Open Journal of Vehicular Technology*, 2022,4,pp.310 - 324.
- Wang, M., Chen, Y., Kan, Y., Xu C., Lepech M., Pun, M., and **Xiong, X.**, “Traffic Signal Cycle Control with Centralized Critic and Decentralized Actors under Varying Intervention Frequencies.” *IEEE Transactions on Intelligent Transportation Systems*, under review.

Conference papers

- **Xiong, X.** and Liu, L., “Combining Policy Gradient and Safety-based Control for Autonomous Driving.” In *24th COTA International Conference of Transportation Professional, CICTP 2024*.
- Wang, M., Xu, Y., **Xiong, X.**, Kan, Y., Xu, C., and Pun, M., “ADLight: A universal approach of traffic signal control with augmented data using reinforcement learning.” In *ITransportation Research Board 102nd Annual Meeting, 2022*.
- **Xiong, X.**, Xiao, E., and Jin, L., “Analysis of a stochastic model for coordinated platooning of heavy-duty vehicles.” In *58th IEEE Conference on Decision and Control, 2019*.
- **Xiong, X.**, Wang, T., and Jin, L., “Evaluation of headway threshold-based coordinated platooning over a cascade of highway junctions.” In *Transportation Research Board 99th Annual Meeting, 2019*.
- **Xiong, X.**, Jin, Z., Gao, D., and Lu, Q., “Development of HIL test platform based on VeriStand for hybrid powertrain controller.” In *IEEE ITEC Asia-Pacific, 2014*.

Working papers

- **Xiong, X.** and Wang X., “Traffic flow modeling in networks with partial differential equations and neural networks.”
- Liu, L. and **Xiong, X.**, “A Multi-Agent Rollout Approach for Highway Bottleneck Decongestion in Mixed Autonomy.”
- Wang, Y. and **Xiong, X.**, “Reinforcement Learning from Human Feedback for Lane Changing of Autonomous Vehicles in Mixed Traffic.”

Patent

- “A new method of fuel consumption test of fuel cell hybrid vehicle.” cn (CN) No. 201310631647.

TALKS AND PRESENTATIONS

- *2024 COTA International Conference of Transportation Professionals, Shenzhen.* (July 2024) “Combining Policy Gradient and Safety-based Control for Autonomous Driving.”
- *2023 INFORMS Annual Meeting, Arizona.* (October 2023) “Coordinated platooning and adaptive routing with reinforcement learning.”
- *2022 Young Investigators Symposium on Frontiers in Innovative Technology (FIT), the University of Michigan-Shanghai Jiao Tong University Joint Institute, Shanghai.* (December 2022) “Vehicle platooning in networks: modeling, optimization, and cooperation.”

- *2022 Transportation Research Board Annual Meeting, Washington, D.C.* (January 2023) “AD-Light: A universal approach of traffic signal control with augmented data using reinforcement learning.”
- *2022 Institute for International Affairs at CUHKSZ, Shenzhen* (July 2022) “Intelligent transportation systems and smart cities.” (hosted by Prof. Zheng Yongnian)
- *2022 International Center for Industrial and Applied Mathematics, CUHK Shenzhen* (May 2022) “Traffic flow on networks: modeling and optimization.” (hosted by Prof. Xiaoping Wang)
- *2022 CUHKSZ-Huawei Computational Mathematics Forum, Shenzhen* (July 2022) “Vehicle platooning in networks: modeling, optimization, and cooperation.”
- 2021 Session Chair at the International Workshop on Mathematical Issues in Information Sciences (MIIS), Shenzhen. (December 2021)
- *2020 Virtual INFORMS Annual Meeting* (November 2020) “Vehicle platooning coordination in networks: A multi-agent reinforcement learning approach.”
- *2020 Transportation Research Board Annual Meeting, Washington, D.C.* (January 2020) “Dynamic origin-destination matrix prediction with line graph neural networks and Kalman filter.”
- *2020 Transportation Research Board Annual Meeting, Washington, D.C.* (January 2020) “Evaluation of headway threshold-based coordinated platooning over a cascade of highway junctions.”
- *2019 INFORMS Annual Meeting, Seattle.* (October 2019) “Optimization of coordinated platooning for heavy-duty vehicles.”
- *Electrical and Computer Engineering, New York University.* (February 2019) “Micro and macro operations of vehicle platoons on the highway,”

INDUSTRIAL EXPERIENCE

LangRun FinTech

Co-Founder

Beijing

August 2017 – August 2018

- Developed a deep learning framework to forecast revenues in the financial market.
- Designed a deep reinforcement learning framework to make trading decisions under uncertainty.

JD.com, Inc.

Algorithm Engineer - Artificial Intelligence

Beijing

March 2017 – August 2017

- Constructed a simulation testbed for autonomous driving with deep reinforcement learning.
- Developed deep neural networks to recognize pavement for autonomous delivery vehicles.

REFERENCES

Prof. Li Jin
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