XI XIONG

CONTACT INFORMATION

Tongji University
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EDUCATION

New York University *New York, NY*
Doctor of Philosophy in Transportation Engineering May 2021
Dissertation: "Operations of Vehicle Platooning: Prediction, Optimization, and Cooperation."
Guidance committee: Li Jin, Kaan Ozbay, Dengfeng Sun, and Keith Ross.

Tsinghua University Beijing
Master of Science in Mechanical Engineering July 2015

Jilin University Changchun
Bachelor of Science in Automotive Engineering July 2012

ACADEMIC POSITIONS

Tongji University Shanghai
College of Transportation Engineering April 2023 - Present
Research Professor (Principle Investigator)

The Chinese University of Hong Kong, Shenzhen Shenzhen
Shenzhen Research Institute of Big Data September 2021 - March 2023
Research Scientist

Harvard University Cambridge, MA
Harvard Kennedy School July 2021 - April 2022
Postdoctoral Visiting Fellow

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

RESEARCH EXPERIENCE

Harvard University Cambridge, MA
Postdoctoral Visiting Fellow July 2021 - April 2022
Supervisor: Soroush Saghafian

- 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   New York, NY
Research Assistant   August 2018 - May 2021
Supervisor: Li Jin

- 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   New York, NY
Research Assistant   August 2017 - July 2018
Supervisor: Kaan Ozbay

- 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   Beijing
Research Assistant   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.

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.

- 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.

- 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.

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*, Accepted for publication, September 2024.

Conference papers

- Liu, L., Wang, M., Pun, M., and **Xiong, X.**., "A Multi-Agent Rollout Approach for Highway Bottleneck Decongenston in Mixed Autonomy." In *27th IEEE International Conference on Intelligent Transportation Systems, ITSC 2024.*

- **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 *Transportation Research Board 102nd Annual Meeting, TRB 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, CDC 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, TRB 2019.*

- **Xiong, X.**, Jin, Z., Gao, D., and Lu, Q., "Development of HIL test platform based on VeriStand for hybrid powertrain controller." In *IEEE Conference and Expo Transportation Electrification Asia-Pacific, ITEC Asia-Pacific 2014.*

Working papers

- Pang, A., Wang, M., Pun, M., Chen, C., and **Xiong, X.**, "iLLM-TSC: Integration Reinforcement Learning and Large Language Model for Traffic Signal Control Policy Improvement"

- Wang, Y. and **Xiong, X.**, "Reinforcement Learning from Human Feedback for Lane Changing of Autonomous Vehicles in Mixed Traffic."

- Zou, Y., Jin, L., and **Xiong, X.**, "Dyna-Style Learning with A Macroscopic Model for Vehicle Platooning in Mixed-Autonomy Traffic."

Patent

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

TEACHING

Tongji University

UY-15033204: Operations Research II, Spring 2024, Undergraduate

Shanghai Jiao Tong University

ECE-4530J: Decision Making in Smart Cities, Summer 2021, Undergraduate

New York University

CE-UY 4393: Analytics and Learning Methods for Smart Cities, Fall 2020, Undergraduate

TR-GY 8023: Stochastic Models and Methods for Engineering Systems, Spring 2020, Graduate

SERVICE AND TEACHING

Editorial Board

Communications in Transportation Research

Professional Committees

Session Chair at the 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

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)

TALKS AND PRESENTATIONS

- *2024 IEEE International Conference on Intelligent Transportation Systems, Edmonton, Canada.* (September 2024) "A Multi-Agent Rollout Approach for Highway Bottleneck Decongestion in Mixed Autonomy."

- *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)

- *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   Beijing
Co-Founder   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.   Beijing
Algorithm Engineer - Artificial Intelligence   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

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