Yanzhenni Bai

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EDUCATION

Duration	Academic Qualification	University & Country	Weighted Average Mark (Ranking)
Sep. 2023-Jul. 2026	M.Eng. in Transportation	Beijing University of Technology, China	90.17/100 (5/66, latest academic year)
Sep. 2018-Jul. 2022	B.Eng. in Transportation	Inner Mongolia University, China	3.52/4 (4/41)

RESEARCH INTERESTS

- Connected and autonomous vehicles and their integration into large-scale transportation systems
- Data-driven modeling, generative AI and reinforcement learning for optimization, prediction and control in intelligent transportation systems
- Mixed traffic flow modeling using traffic flow theory(car-following model, cellular au-tomata, cell-transmission model)

RESEARCH EXPERIENCE

Conducting master dissertation research (dissertation title: Optimization of Dedicated Lane Configuration for Connected and Autonomous Vehicles in Mixed Traffic Environments)
Supervisor: Prof. Jian Zhang (Beijing University of Technology) Sep. 2023 - Present

- A multi-lane Cell Transmission Model (CTM) incorporating dedicated lanes for Connected and Autonomous Vehicles (CAVs) in mixed traffic was developed based on the fundamental diagram and a logit-based lane choice model. The model captures passing and lane-changing behaviors for heterogeneous traffic flows consisting of both CAVs and human-driven vehicles. Extensive simulation experiments were conducted to evaluate the impacts of the number, length, and spatial configuration of CAV lanes on overall traffic performance.
- Established a reinforcement learning (RL)-based dynamic lane-control framework that integrates an improved lane-level CTM with a Markov decision process (MDP) formulation. The CTM provides a computationally efficient macroscopic environment for RL training, while the MDP formulation defines the state, action, and reward spaces based on traffic density and CAV penetration rates. This integrated design bridges microscopic behavioral modeling and macroscopic control optimization, enabling adaptive dedicated lane allocation under varying traffic conditions. (working paper)

PUBLICATIONS

Refereed Journal Papers

- Zhang, J., **Bai, Y. Z.**, He, J., & Wang, T. (2025). On the impacts of dedicated lanes for CAVs in mixed traffic: Evaluation using a modified cell transmission model. Physica A: Statistical Mechanics and its Applications, 130418. (SCI Q2)
- Zhang, J., **Bai, Y. Z.**, Tang, T. Q., Yu, S., Li, X., & Chen, L. (2025). Experimental Investigation of Car-Following Behavior on Single-Lane Signalized Roads. Journal of Transportation Engineering, Part A: Systems, 151(6), 04025027. (SCI Q4)

Refereed Conference Papers

- Zhang, J., **Bai, Y. Z.**, He, J., & Wang, T. (2025, January). Evaluation of Dedicated Lanes for Connected Autonomous Vehicles in Mixed Traffic: A Cell Transmission Model Approach. In *Proceedings of the Transportation Research Board 104th Annual Meeting*. Transportation Research Board. https://annualmeeting.mytrb.org/Paper/59021 (TRB)
- **Bai, Y. Z.**, Zhang, J., & Wang, T. (2024, July). Mixed Traffic Flow Simulation with a Dedicated Lane for Connected and Autonomous Vehicles: A Cell Transmission Model Approach. In 2024 IEEE 25th China Conference on System Simulation Technology and its Application (CCSSTA) (pp. 1-5). IEEE. (EI)

Patents

- Zhang, J., **Bai, Y. Z.**, Jin, W., & Luo, Y. (2024). Evaluation Method for Setting Dedicated Lanes for Connected and Autonomous Vehicles Based on an Improved Cell Transmission Model. Chinese Patent CN117831295B. (Granted)
- Zhang, J., **Bai, Y. Z.**, Wang, X., He, J., & Chen, L. (2024). Wireless Charging Lane Control System for Middle Lanes of Bidirectional Highways. Chinese Patent CN117227556B. (Granted)

SCHOLARSHIPS AND HONORS

SCHOLARSHIPS

Year	Award Name	Institute	Level
2025	Master Student Academic Scholarship	Beijing University of Technology	First prize at university-level
2025	Science and Technology Innovation Award	Beijing University of Technology	Second prize at university-level
2025	Science and Technology Innovation Award	Beijing University of Technology	Third prize at university-level
2024	Master Student Academic Scholarship	Beijing University of Technology	First prize at university-level
2024	Science and Technology Innovation Award	Beijing University of Technology	Third prize at university-level
2023	Master Student Academic Scholarship	Beijing University of Technology	Second prize at university-level
2022	Undergraduate Academic Scholarship	Inner Mongolia University	Second prize at university-level
2021	Inner Mongolia Endeavor Scholarship	Inner Mongolia University	Provincial level
2021	Undergraduate Academic Scholarship	Inner Mongolia University	Second prize at university-level
2020	Undergraduate Academic Scholarship	Inner Mongolia University	Third prize at university-level
2019	National Endeavor Scholarship	Inner Mongolia University	National level
2019	Undergraduate Academic Scholarship	Inner Mongolia University	Second prize at university-level

HONORS

Year	Award Name	Institute	Level
2025	Excellent Student	Beijing University of Technology	University-level
2024	Excellent Student	Beijing University of Technology	University-level
2022	Excellent Student	Inner Mongolia University	University-level
2020	Excellent Student	Inner Mongolia University	University-level

SKILLS

Language: Chinese (native), English (CET-6)
Programming: MATLAB, Python
Writting Tools: LaTeX, Visio