Zhaoyi Wang

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EDUCATION

Tongji University (Tongji), Shanghai, China Sep 2022 - Mar 2025

M.S.Transportation Engineering (Intelligent Vehicles track)

- GPA: 4.57/5.00 (88.9/100) | Top 30%
- Focus on the safety of autonomous vehicles in long-tail environments. Specifically includes safety-critical scenario generation, safety evaluation of autonomous vehicles, and self-evolve mechanism for decision-making algorithms.
- Advisor: Prof. Yanjun Huang
- Core Courses: Traffic Engineering (5.0/5.0), Transport Data Analysis and Application (5.0/5.0), Principles of Artificial Intelligence (5.0/5.0)

Jilin University (JLU), Changchun, China Sep 2017 - Jun 2021

B.Eng. Automotive Engineering

- GPA: 3.71/4.00 (90.0/100) | Top 10% | JLU Outstanding Student
- Core Courses: Differentiation and Integration (4.0/4.0), Probability Theory and Mathematical Statistics (4.0/4.0), Calculation Method (4.0/4.0), Maths Experiment (4.0/4.0), Automotive Theory (4.0/4.0), Vehicle Construction (4.0/4.0), Electrical Engineering (4.0/4.0), C Program Design (4.0/4.0), Principles of Mechanics (4.0/4.0), Fundamentals of Computer Technology (4.0/4.0), Fundamentals of Control Engineering (4.0/4.0), Principles of Microcomputer and Interface Technology (4.0/4.0)

PUBLICATIONS & MANUSCRIPTS

[1] **Zhaoyi Wang**, Xincheng Li, Dengwei Wei, Liwen Wang, and Yanjun Huang, "Efficient Generation of Safety-Critical Scenarios Combining Dynamic and Static Scenario Parameters," in IEEE Transactions on Intelligent Vehicles, doi: 10.1109/TIV.2024.3402221.

[2] Xincheng Li, **Zhaoyi Wang**, Yanjun Huang, and Hong Chen, "A Survey on Self-Evolving Autonomous Driving: A Perspective on Data Closed-Loop Technology," in IEEE Transactions on Intelligent Vehicles, vol. 8, no. 11, pp. 4613-4631, Nov. 2023, doi: 10.1109/TIV.2023.3319689.

[3] **Zhaoyi Wang**, Jialei Nie, Xincheng Li, Yanjun Huang, "Safety Boundary Online Identification for Autonomous Vehicle Considering Long-tailed Distribution", in IEEE Transactions on Intelligent Transportation System, 2024. **(under review)**

[4] **Zhaoyi Wang**, Xincheng Li, Shuo Yang, Shizhen Li, Jiatong Du, Xinyu Zhang, Yanjun Huang, "Safety Evaluation of Autonomous Driving Based on Safety-Critical Scenario Generation", in IEEE Intelligent Transportation System Conference, 2024. **(under review)**

[5] Xinyu Zhang, Zewei Zhou, Yangjie Ji, Jiaming Xing, **Zhaoyi Wang**, Yanjun Huang, "Co-HTTP: Cooperative Trajectory Prediction with Heterogeneous Graph Transformer for Autonomous Vehicles", in IEEE Intelligent Transportation System Conference, 2024. **(under review)**

PATENTS

[1] Yanjun Huang, **Zhaoyi Wang**, Jialei Nie, Haotian Chen, Xincheng Li, Jiatong Du, Safety-Critical Scenario Generation Method for Autonomous Driving Decision-Making Algorithm, 2024, Chinese Patent. **(under review)**

[2] Yanjun Huang, **Zhaoyi Wang**, Haotian Chen, Jialei Nie, Xincheng Li, Jiatong Du, Safety-Critical Scenario Generation Software for Autonomous Driving Decision-Making Algorithm, 2024, Chinese Software Copyright. **(under review)**

[3] Yanjun Huang, Xincheng Li, Jing Min, **Zhaoyi Wang**, Dengwei Wei, Jiatong Du, Closed-loop Self-Evolving Autonomous Driving Software, 2024, Chinese Software Copyright. **(under review)**

RESEARCH EXPERIENCE

Self-Evolving Learning-Based Autonomous Driving System: Safety-Critical Scenario Generation for Autonomous Driving Algorithm | Tongji University | Directed by Prof. Yanjun Huang Sep 2022 - Present

- Proposed a risk-guided policy optimization method for safety-critical scenario generation, which generates more diverse and plausible scenarios more efficiently.
- Proposed an adversarial traffic participant behavior model combining traffic prior and reinforcement learning, which solves the limitation that adversarial scenario generation can only be applied to specific working conditions.
- Proposed a safety-critical scenario generation method combining dynamic and static scenario parameters, which greatly improves the efficiency of scenario generation.
- Working on quantifying the diversity of scenarios and improving the diversity in safety-critical scenario generation for a comprehensive evaluation of autonomous vehicles.
- Working on combining naturalistic driving data with adversarial scenario generation to improve the naturalness and plausibility of the generated scenario.

Adaptive Evolution and Evaluation of Secure and Confident Intelligent Systems: Safety Evaluation of Autonomous Driving Algorithms in Complex Environments | Tongji University | Directed by Prof. Yanjun Huang Sep 2023 - Present

- Proposed an approach for the safety analysis of autonomous vehicles from complex safety-critical scenario data, which can intuitively reveal the distribution and characteristics of safety-critical scenarios for any given algorithm.
- Proposed a safety boundary online identification method that learns from the test data, which can enhance the safety of autonomous vehicles under a long-tailed environment.

Close-loop Self-Evolve Mechanism for Autonomous Vehicle Based on Mixed Reality Testing | Tongji University | Directed by Prof. Yanjun Huang Dec 2023 - Present

- Participated in constructing a mixed-reality simulation test platform by combining vehicle hardware-in-the-loop and virtual traffic scenarios.
- Working on the closed-loop self-evolve mechanism for autonomous driving algorithms under safety-critical scenarios.

Undergraduate thesis: Design of New Generation Chassis Vehicle and Analysis of Its Dynamic Performance | State Key Laboratory of Automotive Simulation and Control, Jilin University | Directed by Prof. Hsin Guan and Prof. Pingping Lu | Grades: 4.0/4.0 (Top 5%) Sep 2020 - Jun 2021

- Designed a new chassis with four-wheel independent drive and four-wheel steering.
- Designed an algorithm for the torque distribution and steering angle control of each wheel considering maneuverability and stability.
- Vehicle dynamics simulation and its performance analysis based on Matlab/Simulink and CarSim.

Design of Automated Lane-Changing System for Intelligent Vehicle and Its Hardware-in-the-Loop Testing | State Key Laboratory of Automotive Simulation and Control, Jilin University | Directed by Prof. Bing Zhu Sep 2018 - Jun 2020

- Designed a lane change decision-making algorithm combining risk and efficiency and a lane-changing trajectory planning and control algorithm considering driving comfort and stability.
- Designed a hardware-in-the-loop test bench for the lane detection system.
- Hardware-in-the-loop testing of active lane changing systems for intelligent vehicles.

TECHNICAL STRENGTHS

Languages Skills:

TOEFL iBT: 93 (Reading 23, Listening 23, Speaking 23, Writing 24)

College English Test-6: 562/710 (Top 20%)

College English Test-4: 581/710 (Top 20%)

Software Skills:

Carla, CarSim, Prescan

Development Tools:

Gym, PyTorch, TensorFlow

Programming:

Python, Matlab, Simulink, C

HONORS & AWARDS

- Outstanding Graduate of School of Automotive Engineering, Jilin University (Top 5%) Mar 2021
- First Class Scholarship of Jilin University (Top 10%) Mar 2021
- First Class Scholarship of Jilin University (Top 10%) Oct 2020
- Outstanding Student of Jilin University (Top 10%) Oct 2020
- Outstanding Student Leader of Jilin University Oct 2020
- Second Prize in the Mathematical Modeling Competition for College Students in Jilin Province Sep 2020
- Outstanding Innovation and Entrepreneurship Program for College Students of Jilin University Apr 2020
- Outstanding Student of Jilin University (Top 10%) Oct 2019
- Outstanding Student Leader of the College of Automotive Engineering, Jilin University Oct 2019
- Second Class Scholarship of Jilin University (Top 15%) Oct 2018
- Second Prize in the National University Students Zhou Peiyuan Mechanics Competition in Jilin Province Sep 2019
- Outstanding Student of the College of Automotive Engineering (Top 15%), Jilin University Oct 2018
- Scholarships for Outstanding Work of The Student Union, College of Automotive Engineering, Jilin University Oct 2018
- Third Prize in the National College Students' English Competition Oct 2018
- Runner-up in Tongji University Basketball Tournament May 2023
- Runner-up in the Football Tournament in the School of Automotive Study, Tongji University Oct 2023

ACADEMIC SERVICES & MENTORSHIP

Reviewers

Part D: Journal of Automobile Engineering Nov 2023 - Present

Mentoring

Haotian Chen (BS) Efficient Generation of Safety-Critical Scenarios for Autonomous Driving Decision Algorithms Dec 2023 - Present

Jialei Nie (BS) Online Identification of Safety Boundaries for Autonomous Driving Decision Algorithms Jan 2024 - Present

Peilun Han (BS) Diversity Enhanced Adversarial Scenario Generation Method Mar 2024 - Present

LEADERSHIP EXPERIENCE

Basketball Team of School of Automotive Study, Tongji University May 2023 - Present

Forward/Center

Student Union of College of Automotive Engineering, Jilin University Sep 2019 - Jun 2020

Head of Student Union Life Department