

Dianwei Chen

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EDUCATION

University of Maryland

Doctor of Philosophy, Civil and Environmental Engineering

Honors and Awards: UMD Graduate School Dean Fellowship, Academic Honors Fall 2023-Spring 2024

The Ohio State University

Master of Science, Electrical and Computer Engineering

Zhejiang University

Bachelor of Engineering, Ocean Engineering and Technology

Honors and Awards: ZJU Chunzhen International Exchange Scholarship, Academic Honors Fall 2018

College Park, MD

Aug 2023 - May 2027 (Estimate)

Columbus, OH

Aug 2021 - May 2023

Hangzhou, Zhejiang, China

Aug 2016 - May 2020

SKILLS

Simulation & ML: CARLA Simulator, Python, SUMO, OpenAI Gym, MATLAB, Simulink, Reinforcement Learning, Federated Learning, Raspberry Pi, ROS, PyTorch **Dev Tools & Platforms:** Linux, Git/GitHub, Docker, PyCharm, LaTeX

WORK EXPERIENCE

Research Assistant

M-Trail Lab, University of Maryland, Department of Civil and Environmental Engineering

College Park, MD

Sep 2023 – Present

- Built a stochastic digital-twin platform (highway/urban) for AV safety under winter low-friction conditions; modeled vehicle interactions and crash risk using physics-aware PRGP with uncertainty quantification.
- Implemented robust federated reinforcement learning and benchmarked secure aggregation against poisoning attacks across 5+ adversarial, safety-critical simulation scenarios.
- Integrated ROS/Autoware with a test vehicle for PCD mapping and trajectory planning; created reproducible pipelines for data ingestion, model serving, and continuous evaluation across scenarios and weather.

RELEVANT EXPERIENCE

Autonomous Vehicle Safety Simulation and Field Validation

Lab Research Project, Mentor: Prof. Xianfeng Terry Yang

College Park, MD

Aug 2023 – Present

- Applied a Physics-Regularized Gaussian Process (PRGP) model to simulate vehicle interactions on icy/snowy roads, embedding first-principles dynamics constraints
- Deployed ROS and Autoware on a Chrysler Pacifica Hybrid to capture point-cloud maps and plan reference trajectories across urban, campus, and highway scenarios.
- Predicted crash probabilities under winter conditions by coupling traffic simulation with vehicle dynamics; validated algorithms across multi-weather and edge-case scenarios.

Implementing Robust Federated Reinforcement Learning in Safety-Critical Systems

Lab Research Project, Collaborator: Zifan Zhang, North Carolina State University

College Park, MD

March 2024 – Present

- Designed HighwayDT, a digital-twin environment for realistic highway simulation to systematically evaluate vehicle control and collision avoidance strategies.
- Evaluated SecApp (Secure Aggregation with Poisoning-Prevention) within the digital-twin testbed; validated resilience under data poisoning and Byzantine attacks, demonstrating robust convergence in adversarial settings.

Control and Intelligent Transportation Research Lab, Ohio State University

Lab Research Project, Mentor: Dr. Ekim Yurtsever, Prof. Keith Redmill, Prof. Umit Ozguner

Columbus, OH

Sep 2021 – July 2023

- Developed a deep RL algorithm to generate adversarial pedestrian behaviors that systematically target collisions in simulation.
- Leveraged RL with a novel collision-momentum reward to uncover critical failure modes in AV controllers, stress-testing planning algorithms across complex edge-case scenarios.

PUBLICATIONS

[1] Using Collision Momentum in Deep Reinforcement Learning–Based Adversarial Pedestrian Modeling

Chen, D.; Yurtsever, E.; Redmill, K. A.; Özgüner, Ü.

IEEE Intelligent Vehicles Symposium (IV), 2023, pp. 1–6.

[2] INSIGHT: Enhancing Autonomous Driving Safety through Vision-Language Models on Context-Aware Hazard Detection and Edge Case Evaluation

Chen, D.; Zhang, Z.; Liu, Y.; Yang, X. T.

arXiv:2502.00262; Accepted by IEEE Intelligent Vehicles Symposium Workshop 2026.

[3] Synergizing AI and Digital Twins for Next-Generation Network Optimization, Forecasting, and Security

Zhang, Z.; Fang, M.; Chen, D.; Yang, X.; Liu, Y.

IEEE Wireless Communications, vol. 32, no. 3, pp. 98–105, 2025.

[4] Advanced Longitudinal Control and Collision Avoidance for High-Risk Edge Cases in Autonomous Driving

Chen, D.; Gong, Y.; Yang, X.

Manuscript submitted to IEEE Transactions on Intelligent Vehicles, 2025, accepted by TRB Annual Meeting 2026

[5] Reconstructing physics-informed machine learning for traffic flow modeling: a multi-gradient descent and pareto learning approach.

Lei, Y. Z.; Gong, Y.; Chen, D.; Cheng, Y.; & Yang, X. T.

Transportation Research Part C: Emerging Technologies, 180, 105344.

[6] Adversarial Pedestrian Modeling Based on Deep Reinforcement Learning Method by Using Collision Momentum

Chen, D.

Master's Thesis, The Ohio State University, 2023.

[7] Deep Reinforcement Learning for Advanced Longitudinal Control and Collision Avoidance in High-Risk Driving Scenarios

Chen, D.; Gong, Y.; Yang, X.

arXiv:2404.19087, 2024. (Accepted by TRB Annual Meeting 2026)

[8] Potential Failures of Physics-Informed Machine Learning in Traffic Flow Modeling: Theoretical and Experimental Analysis

Lei, Y. Z.; Gong, Y.; Chen, D.; Cheng, Y.; Yang, X. T.

arXiv:2505.11491; submitted to Transportation Science, 2025.

[9] Implementation Robust Federated Reinforcement Learning in Safety-Critical Edge Case Systems

Zhang, Z.; Chen, D.; Fang, M.; Liu, Z.; Khanduri, P.; Yang, X.; Liu, Y.

Manuscript submitted to IEEE INFOCOM 2026.

[10] Customized Generative AI Agent for Transportation Engineering Practice: A Development and Continued Pre-Training Guideline

Chen, D.; Lei, Y. Z.; Zhang, Z.; Liu, Y.; Yang, X. T.

Accepted by TRB Annual Meeting 2026; submitted to Journal of Transportation Engineering.

[11] Securing Autonomous Vehicle Systems via Twin-Aware Federated Reinforcement Learning

Zhang, Z.; Fang, M.; Chen, D.; Liu, Z.; Khanduri, P.; Yang, X.; Das, A.; Liu, Y.

Manuscript submitted to IEEE Transactions on Dependable and Secure Computing 2026.

[12] Network Digital Untwinning: Towards Backward Optimization of Digital Twins

Zhang, Z.; Chen, D.; Gao, A.; Wang, M.; Chen, M.; Fang, M.; Yang, X.; Das, A.; Liu, Y.

Manuscript submitted to IEEE ICDCS 2026.