Yiming Yang

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Department of Electrical and Computer Engineering, Michigan Technological University

EDUCATION

Ph.D. in Electrical and Computer Engineering Aug 2021 - Apr 2026
Michigan Technological University, Houghton, MI, USA

- Dissertation: Robust Autonomous Driving in Winter Weather: Perception and Integrated Control Under Adverse Conditions

Master in Control Science and Engineering Aug 2017 - Jul 2020
Chang'an University, Xi'an, China

- Thesis: Constrained Optimization and Distributed Model Predictive Control-Based Merging Strategies for Adjacent Connected Autonomous Vehicle Platoons

Bacholar in Automation Aug 2013 - Jul 2017
Chang'an University, Xi'an, China

- Graduated from the "Excellent Engineer" program

RESEARCH INTERESTS

- **Autonomous driving & Robotics, Resilient Perception in Adverse Conditions**
- **Stochastic & Data-Driven Optimal Planning & Control**

PUBLICATIONS

1. Geometric and Radiometric Enhancements of Vehicles in LiDAR Point Clouds with Snow Accumulation Under Review.
Yiming Yang, Jeremy P. Bos,
Submitted to IEEE International Workshop on Metrology for Automotive (IEEE MetroAutomotive 2026)

2. Beyond the Snowflakes: Disentangling Weather Effects from Confounding Meta-Factors in LiDAR Object Detection Under Review.
Yiming Yang, Jeremy P. Bos,
Submitted to IEEE/RSJ International Conference on INTELLIGENT ROBOTS & SYSTEMS (IROS)

3. Tracking the Invisible: Self-Supervised Wheel Track Detection with Thermal-RGB Fusion Under Review
Yiming Yang, Jeremy P. Bos,
Submitted to IEEE/RSJ International Conference on INTELLIGENT ROBOTS & SYSTEMS (IROS)

4. Aggressive Autonomous Control on Snow and Ice Apr 2025
Yiming Yang, Jeremy P. Bos

SAE International Journal of Advances and Current Practices in Mobility (10.4271/2025-01-8040)

5. Constrained optimization and distributed model predictive control-based merging strategies for adjacent connected autonomous vehicle platoons Nov 2019
Haigen Min, Yiming Yang, Yukun Fang, Pengpeng Sun, Xiangmo Zhao, 10.1109/ACCESS.2019.2952049

Open-Source Datasets & Tools

1. **ThermalTrack: Multi-modal self-supervised traversability estimation in whiteout conditions**
   A dataset of 7,608 synchronized Thermal/VIS frames for resilient perception in low-visibility environments.
2. **WADS-3D: LiDAR-based object detection under heavy snow**
   Features 2,050 labeled LiDAR scans and 30,104 3D bounding boxes for object detection in heavy snowfall.
3. **labelCloud-Enhanced: 3D bounding box labeling tool for point clouds**
   High-efficiency 3D labeling with AI pre-labeling, spatial copy-paste, and enhanced viewport rotation.

RESEARCH EXPERIENCE

Ph.D. Candidate, Michigan Technological University Aug 2021 – Present

Proposal: Robust 3D Human Pose Estimation in Adverse Winter Conditions Under Review

Lead Author | Sponsor: Sony Research Award Program

- Proposed a Thermal-VIS fusion approach and the first multi-modal dataset for heavy snow to bridge critical gaps in 3D-HPE under low-visibility conditions.

SAE Autodrive Challenge II Jan 2023 – Present

Sponsor: General Motors & SAE International

- Architected the vehicle control interface and ROS-dSPACE communication pipeline via MicroAutoBox III.
- Developed safety-critical autonomy state machines with robust failure handling and safe-exit mechanisms.
- Led HIL/VIL validation and authored DVP&R documentation to track system-wide reliability.

Railroad Crossing Vehicle Warning (RCVW) System Aug 2021 – Dec 2022

Sponsor: Federal Railroad Administration (U.S. DOT)

- Led V2X implementation, including VBS/RBS/RSU configuration, crossing map creation, and field testing.
- Developed an HIL system to accurately replicate and validate real-world connected vehicle scenarios.
- Presented large-scale PTV VISSIM simulations of the RCVW application for the RLS and FRA websites.

UAS Data Integration for Transportation Infrastructure Nov 2021 – Dec 2022

Sponsor: Michigan Dept. of Transportation (MDOT)

- Curated datasets from UAV imagery (I-96 corridor) to train deep learning counting models.
- Derived Origin-Destination (OD) metrics and verified system accuracy against state benchmarks.

Automated Infrastructure Generation (OSM to VISUM/VISSIM) Aug 2021 – Dec 2022

Research Assistant | Dept. of Civil, Environmental, and Geospatial Engineering

- Developed automated pipelines to convert OpenStreetMap data into simulation-ready networks for PTV VISUM/VISSIM.
- Automated network connectivity, zone division, and spline-based connector generation, reducing modeling time from days to minutes.
- Conducted multi-scale OD analysis using Waymo (micro-level) and Weijo (macro-level) datasets.

Master's Student, Chang'an University Aug 2017 – Jul 2020

Autonomous Vehicle Control & Trajectory Tracking Jul 2018 – Jun 2020

Sponsor: National Key R&D Program / Shaanxi Province Key Projects

- Designed drive-by-wire algorithms for steering, propulsion, and braking using incremental PID.
- Deployed power supply system, embedded system for trajectory tracking algorithm and remote controller.
- Managed the gasoline-to-EV architecture transition and developed an MCU-based vehicle controller.

QLTD Intelligent Connected Expressway Testbase Apr 2019 – Sep 2020

Sponsor: QiLu Transportation Development Group

- Implemented V2X-based adaptive IDM and Forward Collision Warning systems using DSRC/C-V2X.
- Validated V2V functionalities through real-world highway platoon tests and remote-control system deployment.

TEACHING EXPERIENCE

Graduate Teaching Assistant Jan 2023 – Present

Course: Robotic Systems Enterprise (Michigan Tech)

- Graduate teaching assistant for teams: Controls & MathWorks, Safety & Testing
- Organized regular meetings and workshops, translating high-level goals into actionable tasks and sprints using SMART criteria, while providing ongoing technical support.
- **Controls Focus:** Guided deployment of steering/propulsion/brake/lighting control and trajectory-tracking algorithms using Model-Based Design (MBD) and Stateflow autonomy state machines.
- **Safety Focus:** Directed functional safety validation (SOTIF) and decoupled lateral/longitudinal controller testing for autonomous functions.

TALKS & PRESENTATIONS

1. Beyond the Snowflakes: Disentangling Weather Effects from Confounding Meta-Factors in LiDAR Object Detection Feb 2025

Robotics Colloquium presentation, Michigan Tech Robotics Initiative, 2026, Houghton, MI, USA

2. Aggressive Autonomous Control on Snow and Ice Apr 2025

Conference proceedings talk, World Congress Experience (WCX), 2025, Detroit, MI, USA

3. Deep Deterministic Policy Gradient based Cooperative Platoon Logitudinal Control Strategy Jan 2021

Conference presentation, Transportation Research Board (TRB), 2021, Virtual

4. Research on Automatic Emergency Line Change Control Strategy Based on MPC Jun 2019

Conference presentation, World Transport Convention (WTC), 2019, Beijing, China

PATENTS

1. Autonomous vehicle controllers (NO: ZL 2019 2 0786357.5)

2. Autonomous vehicle platoon controller (NO: ZL 2019 2 0784716.3)

3. Unmanned vehicle power system and unmanned vehicle (NO: ZL 2019 2 1037928)

SELECTED HONORS & AWARDS

1. 2nd Place, Concept design report & SRS - SAE/GM AutoDrive Challenge II (Year 4) Jun 2025
2. 2nd Place, Highway Challenge - SAE/GM AutoDrive Challenge II (Year 2) Jun 2023
3. 3rd Place, Overall Dynamics - SAE/GM AutoDrive Challenge II (Year 2) Jun 2023
4. Excellent graduate of Chang'an University Jun 2020
5. First-class Academic Scholarship 2017-2018 Nov 2018
6. 2017-2018 University-level Outstanding Graduate Student Nov 2018
7. Best Technology Award of 2018 i-VISTA Auto Driving Challenge Aug 2018
8. First Prize of 2018 i-VISTA Auto Driving Challenge - Urban Traffic Scene Challenge Aug 2018
9. Second Prize of 2018 China Robot Competition - General Service Robot Project Aug 2018
10. First-class academic scholarship 2016-2017 - Chang'an University Nov. 2017

SKILLS

Computational: Python, C/C++, MATLAB/Simulink for algorithm development and data analysis
Control Systems: Real-time control design and implementation (dSPACE, ConfigurationDesk, ControlDesk)
Traffic Simulation: PTV Vissim, PTV Visum
Robotics: ROS, GAZEBO, dSPACE integration with ROS
Embedded Systems: Microcontrollers (STM32, Teensy, Arduino), V2X hardware configuration, HIL testing
Hardware: CAN bus analysis, CAD (SOLIDWORKS), and PCB design (Altium Designer)