Yi-Chen Zhang

Contact Information

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Work Experience

Isuzu Technical Center of America, Inc. (ITCA) Jan 2021 – Present

Lead Engineer, Autonomous & Artificial Intelligence – Advanced Engineering Jun 2024 – Present

- Deployed perception components on NVIDIA TensorRT, including FCOS object detection and segmentation, SORT multi-object tracking, and SCNN lane detection for autonomous driving applications.
- Conducted research on Transformer-based perception architectures and manifold (matrix Lie group) methods for vehicle localization.
- Designed and deployed a multi-user SLURM-based GPU compute environment on Linux workstations, supporting large-scale perception and localization experiments with CPU/GPU/memory isolation.
- Implemented system-level enforcement to prevent non-SLURM compute workloads using custom systemd services, including user warnings, automatic process termination, and centralized logging.
- Built HPC user and group management infrastructure with disk quotas, Docker access control, shared project workspaces, and automated onboarding scripts.
- Authored internal SLURM and HPC documentation to standardize GPU job submission, debugging workflows, and best practices across engineering teams.

Sr. Engineer, Autonomous & Artificial Intelligence – Advanced Engineering Jan 2022 – May 2024

- Led development of perception components: object detection, tracking, and visualization.
  Implemented ROS visualization for MVXNet: MVXNet demo.
  Developed structure-aware single-stage 3D object detection.
  Developed LiDAR object detection and tracking: 3D-LiDAR multi-object tracking.
  Developed multi-object tracking: Multi-object tracking demo.
- Developed localization components: wheel odometry, GNSS/IMU processing, and Fast-LOAM.
  Developed Visual SLAM: Visual SLAM demo.
- Acting scrum master; contributed to software architecture design and stack integration.
- Provided technical mentorship and supervised interns.

Autonomous Driving Engineer – Powertrain and Vehicle R&D Jan 2021 – Dec 2021

- Developed core sensor components for centralized sensor fusion (cameras and LiDARs).
- Curb detection using 3D LiDAR point clouds: Moriyama dataset demo.
- Object detection using 3D LiDAR point clouds: Moriyama dataset demo.
- Point cloud 3D map construction using Fast LOAM and OctoMap: Moriyama dataset demo.
- Software stack management with release tags and version control via git submodules.
- Component integration and testing in simulation and on the real truck.

APTIV Jul 2018 – Jan 2021

Algorithm Engineer – Scene Perception Algorithm Team Oct 2020 – Jan 2021

- Developed unit test cases in vectorCAST for perception components.

Algorithm Engineer – Fused Road Model (FRM) Team Sep 2018 – Sep 2020

- Developed fusion algorithms for object trail processing:
  Road shape estimation and lane centerline prediction.
- Designed FRM state machine and mode manager.
- Implemented error handling for vision, object fusion, and vehicle state inputs.
- Developed FRM analysis pipeline and dashboard.
- Coverity static analysis (AUTOSAR and MISRA C++); developed unit tests in Google Test.

Algorithm Engineer – Autonomous Driving Behavior Team Jul 2018 – Aug 2018

- Developed prediction and cost function algorithm for cooperative social behavior.

– Contributed to Ottomatika code migration from urban pilot to highway pilot.

Technical Skills

- **Programming Languages:** C++ (advanced), Python (advanced)
- **Robotics & Middleware:** ROS 2 (custom packages, ament/CMake, rviz, rosbag workflows)
- **Model Deployment & Acceleration:** TensorRT (engine build, ONNX import, C++/Python inference), CUDA
- **Computer Vision & 3D Perception:** OpenCV, Point Cloud Library (PCL), Ceres Solver, g2o
- **Machine Learning Frameworks:** PyTorch, ONNX ecosystem
- **Operating Systems:** Linux/Unix (extensive experience with Ubuntu, shell and system commands)
- **Software Quality & Standards:** AUTOSAR C++, MISRA C++, CERT C++ static analysis and compliance
- **Testing & Benchmarking:** Google Test, pytest, Google Benchmark
- **High-Performance Computing:** SLURM cluster administration, GPU scheduling, resource isolation (cgroups), multi-user HPC environments
- **Documentation:** LaTeX, Ti*k*Z
- **Build & Tooling:** CMake, colcon, git, docker

Publications

1. **Zhang, Y.-C.** (2025+) *Error State Kalman Filter on Matrix Lie Group.* preprint.
2. Zhang, W., Yu, W., Jia, Q., and **Zhang, Y.-C.** (2022) *Exploration and Sweeping for Autonomous Sweeper Truck*. Isuzu Technical Journal **134**, 42-51.
3. **Zhang, Y.-C.** (2021) *Road Geometry Estimation Using Vehicle Trails: A Linear Mixed Model Approach*. Journal of Intelligent Transportation Systems **27**, 127-144.
4. **Zhang, Y.-C.** and Sakhanenko, L. (2019) *The Naive Bayes Classifier for Functional Data*. Statistics & Probability Letters **152**, 137-146.
5. Chiou, J.-M., **Zhang, Y.-C.**, Chen, W.-H., and Chang, C.-W. (2014) *A Functional Data Approach to Missing Value Imputation and Outlier Detection for Traffic Flow Data*. Transportmetrica B: Transport Dynamics **2**, 106-129.
6. Fan, T.-H., Wang, Y.-F., and **Zhang, Y.-C.** (2014) *Bayesian Model Selection in Linear Mixed Effects Models with Autoregressive(p) Errors Using Mixture Priors*. Journal of Applied Statistics **41**, 1814-1829.

Research Talks

- Matrix Lie Theory for the Roboticist (slides)
  National Central University, Taiwan, February 2025
  National Taiwan University, Taiwan, February 2025
- Road Geometry Estimation Using Vehicle Trails: A Linear Mixed Model Approach (slides)
  National Central University, Taiwan, April 2022

Education

Ph.D., Department of Statistics and Probability Aug 2013 – Jun 2018
Michigan State University, East Lansing, MI
Advisor: Dr. Lyudmila Sakhanenko
Dissertation: Functional Data Analysis with Application to Traffic Flow Data

M.S., Graduate Institute of Statistics Sep 2007 – Jun 2009
National Central University, Taiwan
Advisor: Dr. Tsai-Hung Fan
Thesis: Bayesian Model Selection in Linear Mixed Effects Models with AR(1) Errors

B.S., Department of Mathematics Sep 2003 – Jun 2007
National Central University, Taiwan

Teaching

Teaching Assistant & Instructor, Michigan State University, USA (2013–2018)

Honors

- College of Natural Science Dissertation Completion Fellowship, Summer 2018, Michigan State University.
- College of Natural Science Dissertation Continuation Fellowship, Summer 2017, Michigan State University.