SHUCHENG ZHANG

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EDUCATION

University of Washington Seattle, Washington
Ph.D. in Transportation Engineering Expected May 2028

- **Lab:** Working in Smart Transportation Application Research (STAR) Lab, advised by Prof. Yinhai Wang

Duke University Durham, North Carolina
M.S. in Mechanical Engineering and Material Science Sep. 2021 – May 2023

- **GPA** 4.0/4.0
- **Lab:** Working in Cyber-physical System Lab, advised by Prof. Miroslav Pajic
- **Coursework:** Theory & Algorithm of Machine Learning; Deep Learning Theory; Robotics Learning; Robotics Theory; Programming & Algorithm

Wuhan University of Technology Wuhan, China
B.S. in Automotive Engineering Sep. 2017 – Jun. 2021

- **GPA** 4.04/5.00 (Rank 5/141)
- **Honor:** University Scholarship First Prize (Top 3%); Honor Graduate (Top 10%)
- **Coursework:** Automobile Technology & Principle; Mechanical Principle & Design; Thermodynamics & Fluid Mechanics; Control Theory; Probability & Statistics

University of Wales Trinity Saint David Southwest Wales, UK
B.Eng. with honors, in Automotive Engineering Sep. 2017 – Jun. 2021

- First Class Honor Degree

RESEARCH INTERESTS

Autonomous Vehicle Perception & Planning; Deep Learning; Intelligent Transportation System

RESEARCH EXPERIENCE

LLM-Facilitated Decision-Making for Autonomous Driving in Unsignalized Intersections
STAR Lab, University of Washington, Seattle, WA Sep. 2024 – Present

- Utilized reinforcement learning (RL) to train a decision model for collecting textual data to enhance LLM training.
- Designed a customized tokenizer to efficiently represent environmental information.
- Leveraged LLMs to generate explainable and transparent decision-making strategies for autonomous vehicles in complex scenarios.

Traffic Condition Assessment and Inventory Building Using Imagery Data
STAR Lab, University of Washington, Seattle, WA Sep. 2023 – Present

- Developed the DTSDA dataset to improve traffic sign condition assessment.

- Engineered a pipeline to extract retroreflectivity-related features for evaluating traffic sign conditions.
- Designed a system to automate traffic sign inventory creation, facilitating maintenance and asset management.

Safe Decision Model of Autonomous Vehicle Based on Reinforcement Learning
Cyber-physical System Lab, Duke University, Durham, NC Sep. 2022 – May. 2023

- Trained and deployed GNN to predict objects' future behaviors in Carla Simulator.
- Designed a DRL model for the autonomous vehicle to make safety decisions based on the predicted trajectory information of surrounding vehicles.

Learning-based Perception Autonomous Vehicle Building
Cyber-physical System Lab, Duke University, Durham, NC Jun. 2022 – May. 2023

- Developed a vehicle agent using self-designed planning strategies to accomplish self-driving, following, and overtaking in the CARLA urban traffic environment.
- Achieved object sensing and tracking by training and deploying learning-based models, including 2D/3D object segmentation and 2D lane lines detection functions.
- Implemented and compared different deep learning models' performance by our accessible autonomous vehicle system, *AVstack*.

Fast laser robot localization on surface point cloud
Brain Tool Lab, Duke University, Durham, NC Jun. 2022 – Sep. 2022

- Implemented four tree data structures and compared their region search efficiency using the tissue surface point cloud collected by OCT.
- Developed a 3D tissue surface point cloud pre-process pipeline for fast laser robot localization

PUBLICATIONS

[1] Liu C, Jantarathaneewat N, Zhang S, et al. Advancing Automatic Asset Management: An Edge-Based US-Specific Traffic Sign Detection and Recognition System Based on Image Processing[J]. Journal of Transportation Engineering, Part A: Systems, 2025, 151(3): 04025003.
[2] Hallyburton R S, Zhang S, Pajic M. Avstack: An open-source, reconfigurable platform for autonomous vehicle development[C]//Proceedings of the ACM/IEEE 14th International Conference on Cyber-Physical Systems (with CPS-IoT Week 2023). 2023: 209-220.
[3] S. Zhang, "The Research of RBPF-SLAM Accuracy under the Influence of Depth Camera Noises" International Conference on Computing and Data Science (CDS), 2020, pp. 439-442.

SKILLS

Programming: Python (Intermediate), C/C++ (Intermediate), MATLAB (Beginner)
Software & Tools: Carla(Intermediate), ROS (Intermediate), Pytorch (Intermediate), Sklearn (Beginner), AutoCAD (Intermediate), CATIA (Beginner)
Hardware & Platform: Jetson (Beginner)