Yun Zhang

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EDUCATION

University of California, Los Angeles (UCLA)   *Starting Sept. 2025*
Ph.D. Student in Mobility Lab, advised by Professor Jiaqi Ma

University of California, Los Angeles (UCLA)   *Sep. 2021 – Expected Jun. 2025*
B.S. in Mathematics of Computer Science and *B.S. in Statistics and Data Science*   Cumulative GPA: **3.823/4.0**
Honors:
- Dean's Honors List for Fall 2021/Winter/Spring/Fall 2022, Winter/Spring 2023
- Member of Upsilon Pi Epsilon, the International Honor Society for the Computing and Information Disciplines

RESEARCH EXPERIENCE

Mobility Lab, UCLA | Incoming PhD, *advised by Prof. Jiaqi Ma*   *Mar. 2023 – Present*
- Led database creation, scenario design, and comprehensive analysis of multi-camera sensor configurations at smart intersections using **CARLA, OPENCDA,** and **ScenarioRunner** to simulate and evaluate performance in diverse environments.
- Evaluated sensor configurations for benchmarking models under various conditions, utilizing models such as **BEVFormer, SparseBEV,** and **SOLOFusion** for enhanced object detection and tracking accuracy.
- Developed a **ROS package** with detailed documentation, improving sensor system integration and functionality.
- Participated in the **U.S. DOT Intersection Safety Challenge**, developed and tested a **trajectory UI tool** to improve the accuracy of real-time vehicle and road user trajectory predictions, contributing to safer and smarter transportation solutions.

Vwani Roychowdhury's Lab, UCLA | Research Assistant,   *Feb. 2023 – Dec. 2025*
- Contributed to the development of deep learning models using VGG (Visual Geometry Group) for PyHFO, a multi-window desktop application designed to provide **efficient neuro-biomarker detection** for artifact and spike classification.
- Developed and integrated the **Hilbert (HIL) detector** for HFO detection and the **Latent State (LS) detector** for spindle detection into PyHFO.
- **Enhanced detection run-time** performance by reducing processing time **50-fold** compared to state-of-the-art solutions, ensuring comparable accuracy through comprehensive validation.
- **Led model testing and benchmarking**, refining detection processes, and ensuring that PyHFO's algorithms achieved optimal performance against existing solutions.

HKU Summer Research Program | Researcher*, advised by Professor Liangqiong Qu*   *2024 Summer*
- Selected from over 1,800 candidates for a program with an acceptance rate of only **5.7%** (104 accepted).
- Conducted cutting-edge research on **brain tumor segmentation** using MiniGPT-4, applying Large Language Models (LLMs) to integrate MRI modalities (T1c, T1w, T2c, and FLAIR) for improved segmentation accuracy in medical imaging.
- Awarded **Best Presenter** and invited to shoot next year's **campaign video** for outstanding contributions.
- Received a **PhD offer** with a Presidential Scholarship for exceptional performance and research potential.

PUBLICATIONS

InSPE: Rapid Evaluation of Heterogeneous Multi-Modal Infrastructure Sensor Placement
- Zhaoliang Zheng*, Yun Zhang*, Zonglin Meng, Johnson Liu, Xin Xia, Jiaqi Ma
- Submitted to International Conference on Computer Vision on Mar. 9th, 2025.

AgentAlign: Misalignment-Adapted Multi-Agent Perception for Resilient Inter-Agent Sensor Correlations
- Zonglin Meng, Yun Zhang, Zhaoliang Zheng, Seth Z. Zhao, Jiaqi Ma

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[1] *These authors contributed equally to this work.

- Submitted to International Conference on Computer Vision on Mar. 9th, 2025.

RelMap: Enhancing Online Map Construction with Class-Aware Spatial Relation and Semantic Priors
- Tianhui Cai, <u>Yun Zhang</u>, Zewei Zhou, Zhiyu Huang, Jiaqi Ma
- Submitted to International Conference on Computer Vision on Mar. 9th, 2025.

[***V2XPnP:***](#) ***Vehicle-to-Everything Spatio-Temporal Fusion for Multi-Agent Perception and Prediction***
- Zewei Zhou, Hao Xiang, Zhaoliang Zheng, Seth Z. Zhao, Mingyue Lei, <u>Yun Zhang</u>, Tianhui Cai, Xinyi Liu, Johnson Liu, Maheswari Bajji, Xin Xia, Zhiyu Huang, Bolei Zhou, Jiaqi M
- Submitted to International Conference on Computer Vision on Mar. 9th, 2025.

V2X-ReaLO: An Open Online Framework and Dataset for Cooperative Perception in Reality
- Hao Xiang, Zhaoliang Zheng, Xin Xia, Seth Z. Zhao, Letian Gao, Zewei Zhou, Tianhui Cai, <u>Yun Zhang</u>, Jiaqi Ma
- Submitted to International Conference on Computer Vision on Mar. 9th, 2025.

PROJECTS

[**Large-Scale CARLA Scenario Design**](#) | Core Designer   *Feb. 2024 – Mar. 2025*
- Built a **flexible data-generation tool** that allows **configurable sensor positions and parameters**, enabling scalable benchmarking for **Infrastructure-to-Infrastructure (I2I) perception**.
- **Designed and developed Infra-Set**, a large-scale dataset covering **10 intersections** with diverse **geometries, traffic densities, and environmental conditions** to evaluate **multi-modal sensor placement** in autonomous driving.
- Created a **simulation pipeline in CARLA** to test **centralized, semi-distributed, and fully distributed** sensor configurations under diverse environmental and traffic conditions.
- Simulated **heterogeneous sensor configurations** (camera & LiDAR) using the **CARLA simulator**, generating **144,000 scenario frames (2.6TB of data)** for **sensor coverage, occlusion, and object detection analysis**.

[**Benchmarking Infrastructure-Based Sensor Placement**](#) | Core Developer   *Sept. 2024 – Mar. 2025*
- Designed and implemented a **scalable benchmarking framework** to evaluate **multi-modal infrastructure sensor placement** in autonomous driving scenarios.
- Developed a **flexible Infrastructure Unit (IU) formulation** to systematically model sensor placements across heterogeneous urban environments.
- Integrated **LiDAR and camera sensor fusion** into a **Heterogeneous Multi-Modal (HM) Perception Framework**, improving detection accuracy in occluded environments.
- Conducted benchmarking experiments using state-of-the-art (SOTA) infrastructure-based multi-modal perceptional algorithms, resulting in a **comprehensive evaluation of infrastructure-aware perception models**.

[**Multi-Agent Multi-Modal Fusion on V2X Real Dataset**](#) | Developer   *Sep. 2024*
- Implemented a multi-agent multi-modal fusion framework for the V2X-Real dataset in a Vehicle-to-Vehicle (V2V) context, enhancing simulations and real-time communication for **Vehicle-to-Everything (V2X) technologies.**
- Integrated **camera data** into the existing fusion model, independently modifying critical components such as the **dataloader, loss function, and internal modules** to ensure seamless multi-modal data inclusion.
- Tested and evaluated **benchmark models** for object detection and tracking algorithms, showing significant performance improvements from the fusion of camera and LiDAR data.
- Worked on using **camera data** solely for **3D car detection**, advancing the model's capability for 3D object detection with only camera inputs.
- Introduced **noise simulatio**n on both **camera and LiDAR data** to enhance the model's robustness, improving its ability to handle sensor misalignment and real-world noise variability.

[**Model Design & Training Optimization for Map Generation**](#) | Research Contributor   *Jan. 2025 – Mar. 2025*

- Assisted in designing **RelMap's Transformer-based architecture**, optimizing **relation-aware learning** for **online map generation**.
- Developed a **feature extraction pipeline** integrating **LiDAR, camera, and radar** data to improve spatial reasoning.
- Designed **custom loss functions** to penalize **spatial inconsistencies** and improve mapping accuracy.
- Optimized training with **data augmentation**, **contrastive learning**, and **adaptive learning rates** for convergence.
- Conducted **hyperparameter tuning** and **cross-validation** to refine the model, leading to **SOTA results on benchmark datasets**. Developed **automated training and evaluation scripts**, streamlining the benchmarking process and ensuring **reproducible experiments**.

[Data Generation & Trajectory Correction for V2XPnP](#) | Research Contributor   *Sept. 2024 – Dec. 2025*
- Automated the **data generation pipeline** for the V2XPnP dataset, ensuring efficient multi-agent perception and prediction. Developed scripts to generate CSV files containing **all detected trajectory combinations**.
- Utilized **localization techniques** and worked on obtaining LiDAR pose estimation within the V2X-PnP dataset.
- Corrected **problematic scenarios** in the V2X-PnP dataset, and resolved **incorrect detection coordinates** during vehicle turns, minimizing pose estimation errors and enhancing trajectory accuracy.
- Implemented **trajectory modifications** to align multi-agent vehicle movements with real-world driving dynamics.
- Ensured **consistent IDs** for detected objects across different agents, improving tracking stability and multi-frame association.

WORK

Office of Palo Alto Councilmember Greg Tanaka | AI/Data Analyst Intern   *Jun. – Dec. 2023*
- Analyzed voter data from multiple sources, including **social media**, HubSpot, and public records, to detect trends and develop predictive models for voter behavior in California's congressional district.
- Applied **LLMs** to personalize campaign emails, improving engagement and enhancing campaign efficiency through targeted outreach.
- Led the development of AI-based tools to streamline campaign services, optimizing outreach strategies and decision-making processes for the campaign team.

Uber, Hong Kong | Data Analysis Intern   *Dec. 2022 – Mar. 2023*
- Participated in Uber's COVID-19 **facial mask recognition project**, ensuring the backend infrastructure and utility functions were optimized for performance.
- Conducted comprehensive **analysis and forecasting**, evaluating factors like weather conditions, time of day, and demand fluctuations in regional operations, helping Uber refine its service strategies.
- Built predictive models to **analyze customer behavior** and optimize driver allocation during peak hours, resulting in improved efficiency and customer satisfaction.

TECHNICAL SKILLS

Programming Languages: Python, C++, JavaScript, C#, R, LaTeX, Bash/Shell Scripting
Machine Learning & Data Science: Pytorch, TensorFlow, Scikit-learn, Pandas, NumPy, MATLAB, Jupyter Notebooks
Autonomous Systems & Simulation: CARLA, OpenCDAScenario Runner, ROS
Medical Imaging & Biomedical Analysis: Segment Anything Model (SAM), nnUNet, BraTS, Image Segmentation
DevOps & Cloud Computing: Docker, AWS, Git, GitKraken
Web Development & Frontend Technologies: React, Node.jsm HTML, CSS, JavaScript, Tableau