

Yun Zhang

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EDUCATION

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

PUBLICATION

Analysis of Multi-Camera and LiDAR Sensor Placement at Intersections: Evaluating Configurations

- Author
- Will be submitted in Dec. 2024 to IEEE Robotics and Automation Letters

Expanding the Utility of PyHFO: Lightweight Deep Learning-powered End-to-End High-Frequency Oscillations Analysis Application

- Second author
- Will be submit in Dec. 2024 to the Journal of Neural Engineering

Cooperative 3D Camera and LiDAR Based Object Detection with misaligned Multi-modality features from heterogeneous agents

- Author
- Will be submitted in Oct. 2024 to CVPR

Transforming Political Campaigns: The Impact of AI-Generated Personalized Emails on Voter Behavior

- Second Author
- Submitted to American Political Science

RESEARCH EXPERIENCE

Vwani Roychowdhury's Lab, UCLA | Research Assistant, *advised by PhD Yuanyi Ding*

Feb. 2023 - Present

- 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 biomarkers 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.

Mobility Lab, UCLA | Research Assistant, *advised by PhD Zhaoliang Zheng*

Mar. 2023 - Present

- Analyzed multi-camera sensor configurations at smart intersections using **CARLA**, **OPENCDA**, and **ScenarioRunner** to simulate and evaluate performance in diverse environments.
- Evaluated sensor configurations under various conditions, utilizing models such as **BEVFormer**, **SparseBEV**, and **SOLOFusion** for enhanced object detection and tracking accuracy.
- Led database creation, scenario design, and comprehensive analysis of **multi-LiDAR and camera systems**, optimizing sensor setups for real-world intersection challenges.
- Developed a **ROS package** with detailed documentation, improving sensor system integration and functionality.
- Participated in the **U.S. DOT Intersection Safety Challenge**, designing a **trajectory UI tool** to improve the accuracy of real-time vehicle and road user trajectory predictions, contributing to safer and smarter transportation 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.

PROJECTS

Integration of Camera Data into V2X Real Dataset | Developer *Sep.2024*

- **Enabled fusion of camera data** into the **v2x_real**, which previously supported only LiDAR, allowing for multimodal sensor fusion to enhance simulations for **Vehicle-to-Everything (V2X)** technologies.
- **Tested and evaluated benchmark models**, including object detection and tracking algorithms, to assess performance gains from the fusion of camera and LiDAR data.

CARLA Scenario Design and Sensor Evaluation for Smart Intersections | Main Developer *Feb.-Jun.2024*

- Designed and evaluated **multi-camera and LiDAR sensor** setups in CARLA to test sensor configurations under various conditions, including fisheye and infrared sensors.
- Implemented **real-time data collection** and analysis pipelines to assess sensor performance, improving accuracy in object detection and tracking across diverse environmental scenarios.
- Collaborated with researchers to **standardize sensor evaluation using surrogate matrices**, contributing to a paper submission to IEEE RA-L, advancing autonomous driving and sensor technologies.

Trajectory UI Tool for U.S. DOT Intersection Safety Challenge | Developer *Aug -Sep.2024*

- Developed a **manual verification and adjustment tool** for vehicle and road user trajectories, ensuring higher accuracy for downstream perception and evaluation teams.
- Implemented key features such as **trajectory smoothing, point adjustments, and time format transformation** to enhance data precision and usability.
- Delivered the project within a tight **three-week deadline**, incorporating last-minute feature requests and adding **user-friendly functionalities** like keyboard shortcuts and zooming for more efficient data handling.

Multi-Modality Brain Tumor Segmentation | Independent Developer *Jun.-Aug.2024*

- Designed and implemented an advanced brain tumor segmentation framework using **MiniGPT-4**, integrating four MRI modalities (T1c, T1n, T2, and FLAIR) to achieve a **212.3% increase in segmentation precision**.
- Adapted a **Large Language Model (LLM) for medical imaging** by integrating **BioMedClip** as a specialized visual encoder, resolving architecture conflicts and enabling synchronized bounding box generation across modalities.
- Developed a **cross-modality synchronization method** for consistent and accurate bounding box predictions across all four MRI inputs.
- Simplified the segmentation process with a **user-friendly interface**, making the framework accessible to medical professionals without machine learning expertise.

Personalized Campaign Emails | Developer *Sep.-Dec.2023*

- Developed an AI-driven system using **Large Language Models (LLMs)** to automate and personalize campaign emails, tailoring messages to voter concerns and preferences based on behavioral analysis.
- Implemented data-driven strategies by analyzing voter information from **social media, HubSpot, and public records**, leading to more targeted and efficient campaign outreach.
- Evaluated the impact of AI-generated communication in political campaigns, comparing its effectiveness to traditional methods in a published paper.

WhiteMatterWiki: Carmichael Lab, Neurology Department, UCLA | Main Developer *Jun.-Dec.2023*

- Developed a web application using **Node.js, React, AWS, and MongoDB**, enabling detailed search and filter functionalities within the lab's complex biological database.
- Utilized **Java and R** to create advanced visualizations, including **animations and circus graphs**, to represent intricate biological relationships in an intuitive and user-friendly manner.
- Deployed the application on **AWS**, ensuring scalability, reliability, and smooth operation for lab researchers and external collaborators.

MatchU: A Dating app focuses on all UC students | Main Developer

Jan.-Mar. 2023

- Developed a user-friendly dating app with secure **authentication protocols**, **profile management systems**, and robust **data handling** practices.
- Designed and implemented an **algorithm-based recommendation system** to efficiently match users based on shared interests and preferences.
- Integrated features such as **user comments**, **personalized search filters**, and tailored **matching algorithms** specifically for UC students.

Face Clustering with PCA and K-Medoids | Independent Developer

Mar.-Apr.2023

- Applied **Principal Component Analysis (PCA)** for dimensionality reduction on the **LFW dataset**, visualizing top eigenfaces and reconstructing images with varying numbers of components.
- Conducted face clustering using **K-Means** and **K-Medoids**, evaluating their effectiveness through **purity scores** and execution times.
- Analyzed the impact of dimensionality reduction on clustering performance, identifying the most and least discriminative face image pairs with **K-Medoids**.

Peach Party: 2D Arcade Mario Party-Inspired Game | Independent Developer

Aug-Sep.2022

- Designed a fast-paced, two-player arcade game where **Peach and Yoshi** compete to collect stars and coins on dynamic, obstacle-filled game boards.
- Developed interactive gameplay mechanics, including **rolling dice**, **navigating forks**, **firing projectiles**, and using **power-ups** across nine unique boards.
- Integrated strategic elements with **multiple paths** and competitive gameplay, offering a balanced mix of **luck and strategy** to enhance player engagement.

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, OpenCDA, OpenSCENARIO Documentation, Scenario 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.js, HTML, CSS, JavaScript, Tableau