Zi-Yan Liu

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Education

University of Pennsylvania | M.S. Graduate Degree Program of Robotics   Pennsylvania, PA | May 2025
Coursework: Interactive Graphics (A) (C++), Computer Vision in Geometry (A) (Python), Operating System (A+) (C++), Applied Machine Learning (A+) (Python)

Work Experience

- **Teaching Assistant & Computer Vision Research Assistant** | Daniilidis Research Group.   Philadelphia | Jan. 2024 -
  Skills: Visual Localization, Event Camera, 3D Geometry, Computer Vision, Self-Supervised, Human Pose, Pytorch
  - ✓ Working on self-supervised <u>Interest Point Matching</u> on <u>event camera</u> for multiple-view geometry
  - ✓ Developing algorithm for <u>human pose estimation</u> and <u>pose optimization</u> (Working SUPER LATE for CVPR 2025)
- **Software Engineer Intern** | InstAI Inc.   San Jose, CA | Jun. 2024 - Aug. 2024
  Skills: Embedding System, ESP32, Linux, Model Quantization, ONNX, YOLO, Pytorch, C
  - ✓ <u>Quantized and optimized</u> deep learning models using ONNX to <u>reduce 50% of memory usage</u>
  - ✓ Developed object detection algorithms to fit hardware limitations of the <u>ESP32 developer board</u>
- **Software Engineer Intern** | Tron Future Tech Inc.   Hsinchu, Taiwan | May 2023 - Aug. 2023
  Skills: Time-Series Object Detection, Optical Flow, Computer Vision, OpenCV, YOLO, Pytorch, Conda
  - ✓ Integrated <u>optical flow</u> data to reduce <u>background interference</u>, resulting in an 3% improvement
  - ✓ Retrained <u>YOLO v7</u> and implemented a tracking system to optimize on-board computational resources
- **Computer Vision Research Assistant** | Artificial Intelligence
  and Multimedia Laboratory.   Hsinchu, Taiwan | Mar. 2022 - Jan. 2023
  Skills: Trajectory Prediction, Transformer, Self-Supervised, Self-driving System, ROS, GitHub
  - ✓ <u>Led a team</u> and Achieved Assistive Integration System for <u>Autonomous Vehicles</u>
  - ✓ Designed training and introduced <u>masked autoencoder</u> mechanism to improve <u>scene understanding</u>
  - ✓ Leveraged <u>contrastive learning</u> techniques to make 5% improvement in trajectory prediction
- **Robotic Research Assistant** | Assistive Robotics Group   Hsinchu, Taiwan | Mar. 2021 - Dec. 2021
  Skills: Indoor Navigation, Reinforcement Learning, Lidar, SLAM, UWB Localization, ROS
  - ✓ Reformed robots with interactive equipment to achieve <u>assistive navigation system</u> for visual impaired
  - ✓ Achieved <u>significant improvements</u> over SLAM and planning baselines using <u>RL</u> and <u>UWB localization</u>
  - ✓ Achieved heterogeneous unmanned ground vehicle and blimp robot team for <u>DARPA Subterranean Challenge</u>
  - ✓ Utilized <u>SLAM</u>, artifact classification, <u>reinforcement learning</u> to approach <u>search and rescue</u> system
  - ✓ Published papers to <u>Field Robotics 2021</u> and <u>Frontier of Robotics and AI</u>

Publications – 56 Citations since 2019

- Assistive Navigation using Deep Reinforcement Learning Guiding Robot with UWB/Voice Beacons and Semantic Feedbacks for Blind and Visually Impaired People - <u>(Second Author) In Frontier in Robotics and AI. 2021</u>
- A Heterogeneous Unmanned Ground Vehicle and Blimp Robot Team for Search and Rescue using Data driven Autonomy and Communication-aware Navigation - <u>(Fourth Author) In Field Robotics</u> - Special Issue: Advancements and lessons learned during Phase I & II of the DARPA Subterranean Challenge. 2021

Selected Projects

- **3D Reconstruction via NeRF** - 3D Geometry, Volume Rendering, Positional Encoding, Pytorch, Conda
  - ✓ Designed and trained <u>NeRF</u> with color and density parameters along rays in frustum
  - ✓ Applied volume rendering techniques to compute per-pixel color and produce the <u>reconstructed scene</u>
- **MineCraft Physical Engine** – Computer Graphics, OpenGL, Shader, GLSL, GPU, Rasterization, Texture, C++, Qt, Git
  - ✓ Established <u>CPU-to-GPU communication</u> to create a sandbox MineCraft physical engine for free exploration
  - ✓ Developed complex terrain and multiple biomes using intricately designed noise functions
- **NeRF Enhancement via Ensemble Learning** – Machine Learning, Bagging Ensemble, Prediction Aggregation, Pytorch
  - ✓ Led a team to enhance NeRF predictions using a novel <u>Bagging Ensemble</u> method with Gaussian sampling
  - ✓ Optimized ensemble rendering through proposed aggregation, achieving a <u>30% improvement</u> over baseline