Zekai Yin

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Education

Boston University, Boston, USA **September 2025 –**
- **Major & Degree:** Ph.D in Computer Science (Enrolled) Advisor: Eshed Ohn-Bar

Boston University, Boston, USA **September 2023 –January 2025**
- **Major & Degree:** Master of Science in Artificial Intelligence Advisor: Eshed Ohn-Bar

Peking University, Beijing, China **September 2019-July 2023**
- **Major & Degree:** Bachelor of Science in Data Science and Big Data Technology Advisor: Hao Dong

Research Interest

Computer Vision - pose estimation, scene understanding, Visual Odometry / SLAM
Robotics - robot learning, human-robot-interaction, human-centered robotics

Publications

Robot Structure Prior Guided Temporal Attention for Camera-to-Robot Pose Estimation from Image Sequence
Yang Tian*, Jiyao Zhang*, **Zekai Yin***, Hao Dong
Accepted by *IEEE Conference on Computer Vision and Pattern Recognition (**CVPR**), 2023*

ZSVO: Zero-Shot Visual Odometry
Lei Lai*, **Zekai Yin***, Eshed Ohn-Bar
Submitted to *IEEE Conference on Computer Vision and Pattern Recognition (**CVPR**), 2025*

nuDiv: A Diverse Driving Demonstration Benchmark for Autonomous Driving
Hee Jae Kim, Jason Lee, **Zekai Yin**, Lei Lai, Eshed Ohn-Bar
Submitted to *IEEE Conference on Computer Vision and Pattern Recognition (**CVPR**), 2025*

Research Experience

Research Assistant at H2X Lab, Boston University **January 2024-Present**
- Proposed **ZSVO** (Zero-Shot Visual Odometry) as a co-first author, presenting a novel visual odometry algorithm with minimum assumption: only two images without knowing the camera intrinsics. achieves zero-shot generalization across diverse cameras and environments, overcoming limitations tied to specific sensors and environments.
- Fused the real-scale world text and geometric information with correspondence features, achieved lower translation and rotation error than the former methods without further alignment.
- Investigated the influence of high-generalizability descriptive insights of the scene derived from Vision Language Models, pseudo-lidar generated from metric depth, and optical flow-guided-scene flow on the visual odometry task.
- Collected a dataset using Grand Theft Auto with 600 on-road and 600 **off-road driving** videos (**300,000 images**).
- Proposed **nuDiv** and **nuCarla** dataset as third author, a diversified driving trajectory dataset to solve the negative effect of single-ground truth in the planning of driving policy in Autonomous Driving. Reconstructed the validation set of the nuScenes dataset using Nerfacto and **conducted user studies** to collect more alternative driving trajectories.
- Participated in building the simulation environment combining Virtual Reality and Racing Game Wheels for user study and data analysis afterward.
- Collected a dataset of over **20,000** feasible driving trajectories and re-evaluated other state-of-the-art autonomous driving planning models.

Research Assistant at PKU-Agibot Lab, Peking University **July 2022-May 2023**
- Proposed **SGTAPose** (Structure-Guided-Temporal-Attention Pose) as a co-first author, tackled camera-to-robot pose estimation from single-view successive frames of an image sequence using temporal cross-attention to estimate camera-to-robot pose in **real-time**, and achieved a higher precision than traditional hand-eye calibration.
- Helped develop the **first** synthetic video dataset for camera-to-robot pose estimation using Blender(**180,000 images**).

- Used Ros, Libfranka, Pybullet, Franka-Control, and Ctype to improve the control and motion planning system for the Franka Panda Emika robot to conduct **real-world experiments**.
- Designed the Refiner module, used the Levenberg-Marquart algorithm to refine the PNP solver by adding a weight to each point according to its reprojection error.
- Combined SAM(Segment Anything Model) and 6D pose estimation model and created a pipeline for the Xarm6 robot arm for stacking objects, pouring water and handover objects.

Leadership Experience

Tutor and organizer of an independent college course at Yuanpei College **March 2020-July 2023**

- Founded a carpentry course for students at Yuanpei College, including designing the syllabus, teaching classes, arranging classrooms, scheduling timetables, maintaining equipment, and ensuring safety.
- Expanded the course and promoted the establishment of a co-cultivation program on engineering technology between Yuanpei College and Beijing 101 Middle School.
- Taught the class for 3 years, improved course takers' hands-on skills, and won a 2022 YuanPei Special Contribution Award scholarship.

Founder and Leader of Yuanpei College 3D Printing and Designing Lab **Feburary 2023-July 2023**

- Founded the Yuanpei College 3D Printing and Designing Lab from scratch.
- Designed the graduation gift for Yuanpei College on behalf of all graduates.

Work Experience

Machine Learning Engineer Intern, Nanjing Zealen Technology **Feburary 2023-May 2023**

- Used PyTorch and Spatio-Temporal Graph Convolutional Networks and created a neural network model for 24-hour wind power prediction from wind speed, temperature, and precipitation.
- Explored XGboost and Temporal Fusion Transformer for machine learning model to predict long-term pollution.

Software Development Intern, Beijing Siling Robot Technology **January 2021-February 2021**

- Assisted with coding interaction interfaces and communication APIs using C++ and QT.
- Helped with the installation of the operating system of the robot arm.

Research Skills

- **Computer Skills**: Python (PyTorch, NumPy, Pandas, etc.), C, C++, MATLAB
- **Robotics/Mechanics Skills:** ROS, Libfranka, Franka-Control, CAD, 3D Printing, Carpentry