

Yiqian Li

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Education

University of Pennsylvania (UPenn), MSE in Robotics Sept 2024 – May 2026

- **Coursework:** Machine Perception, Advanced Robotics, Learning in Robotics, Principle of Deep Learning

The Chinese University of Hong Kong, Shenzhen (CUHKSZ), BE in Computer Science Sept 2020 – June 2024

- **Coursework:** Advanced Machine Learning, 3D Data Processing, Computer Graphics, Parallel Programming, Operating System, Computer Architecture, Optimization II

The University of California, Irvine (UCI) Jan 2023 – June 2023

- **Coursework:** Design and Analysis of Algorithms, Introduction to Graphical Models, Project in AI, Introduction to Artificial Intelligence

Publications

- **Yiqian Li**, Wen Jiang, Kostas Daniilidis, *Next-Best-View Selection for Semantic and Dynamic 3D Gaussian Splatting*. **International Conference on 3D Vision 2026**. [1]
- Aojun Jiang, Miao Hao, **Yiqian Li**, Jiaqi Wang, Chunfeng Yue, Zongjie Huang, Ying Yang, Meng Ma, Qifeng, Lyu, Yu Sun, Zhuoran Zhang, *Automated Point-of-Care Semen Analysis Using Smartphone Imaging and Occlusion-Aware Multi-Object Tracking*. **IEEE Transactions on Automation Science and Engineering**. [2]
- Haodong Jiang, Xiang Zheng, Yanglin Zhang, Qingcheng Zeng, **Yiqian Li**, Ziyang Hong, Junfeng Wu, *SCORE: Saturated Consensus Relocalization in Semantic Line Maps*. **International Conference on Intelligent Robots and Systems 2025**. [3]
- Zhijing Li, Qiuai Fu, Zhijun Huang, Jianbo Yu, **Yiqian Li**, Yuanhao Lai, Yuchi Ma, Pinjia He, *Revisiting Log Parsing: The Present, The Future, and The Uncertainties*. **IEEE Transactions on Reliability**. [4]

Research Experience(Selected)


Next-Best-View Selection for Semantic and Dynamic 3D Gaussian Splatting [1]

UPenn | Prof. Kostas Daniilidis 

03/2025 – 05/2025

- Modeled next-best-view selection as Fisher Information maximization over SE(3) scene parameters, semantic features distilled from 2D semantic model, and deformation MLP weights.
- Derived Jacobian-vector approximations of the Fisher matrix for 3D Gaussians and dynamic MLPs under gradient-based rendering.
- Implemented a fully differentiable pipeline with custom CUDA kernels to support fast Fisher computation within real-time NBV selection loops.

Unified 4D VLA: Action-Conditioned Video Generation for Robot Learning

UPenn | Prof. Jiatao Gu 

09/2025 – Present

- Proposed a unified framework to represent robot actions as spatial *action maps*, enabling joint reasoning over RGB, 3D pointmap, and action modalities.
- Integrated action maps into a video generative backbone (Wan 2.2) to produce temporally coherent video-action sequences via cross-attention fusion.
- Designed an injective action encoding that prevents error accumulation between perception and control stages, enhancing long-horizon generalization.
- Aimed to achieve a generalizable video-language-action (VLA) model that jointly learns world dynamics and robot behavior for downstream robotic planning.


Uncertainty-Aware Monocular SLAM with Transformer-Based Depth Modeling

UPenn | Prof. Kostas Daniilidis 

09/2024 – 12/2024

- Extended DROID-SLAM by integrating monocular depth prediction from pretrained models into the BA layer with uncertainty modeling.
- Designed a Vision Transformer to estimate depth uncertainty, enabling uncertainty-weighted bundle adjustment.
- Explored joint optimization of poses and depths under noisy monocular input.


Semantic Line-Based Visual Relocalization[3]

CUHKSZ | Prof. Junfeng Wu 

03/2024 – 08/2024

- Proposed a scene-agnostic visual relocalization framework using compact semantic 3D line maps extracted from posed RGB-D images.
- Formulated a novel Saturated Consensus Maximization framework to solve robust Perspective-n-Line problems.
- Designed a globally optimal solver with interval-based Branch-and-Bound acceleration.


Sperm Quality Analysis under Smartphone Imaging [2]

CUHKSZ | Prof. Zhuoran Zhang 

12/2022 – 09/2023

- Developed a pseudo-labeling pipeline using DBSCAN clustering on standard and unlabeled sperm images.
- Applied Vision Transformer for semi-supervised classification to estimate morphologically normal sperm ratios.
- Optimized U-Net upsampling and improved occlusion-aware JPDA tracking to enhance sperm segmentation and motility analysis.

Design of a Log Detection and Analysis System for Enterprise Cloud Server [4]

CUHKSZ | Prof. Pinjia He 

09/2021 – 07/2022

- Built a semantic log parser with word2vec-based clustering and invariant mining to support root cause analysis.
- Evaluated and compared CNN, autoencoder, and LSTM models for log anomaly detection; deployed the system in a production cloud service.

Competition

DJI RoboMaster Robotics Competition

CUHK | 10/2020 – 05/2021

- Established a simulation environment in Gazebo to facilitate the intelligent robot development and testing.
- Evaluated QMIX and VDN multi-agent RL algorithms for decision-making across engineering, infantry, supply, and aerial robot units.
- Enabled route planning via A* algorithm, Dijkstra's algorithm, and a greedy heuristic.

Projects

Scalable Quadruped Imitation

Learning in Robotics | UPenn

- Reconstructed 3D animal motions using learned skeletons from monocular dog videos.
- Retargeted motions to Unitree Go2 via inverse kinematics and trained imitation policies in simulation.
- Designed custom RL rewards to improve gait realism and policy convergence.

Pick and Place Robot Competition

Introduction to Robotics | UPenn

- Designed an algorithm to align gripper poses with target objects exhibiting pose equivalence under varying object-centric coordinate systems.
- Implemented a collision-free path planning framework for constrained grasping tasks on a rotating platform.
- Developed a dynamic object motion prediction module to enable grasping of targets moving on a rotating disk.

Transient Rendering in Participating Media

Computer Graphics | CUHKSZ

- Integrated volumetric scattering into a differentiable transient renderer to model participating media.
- Generated transient images capturing photon trajectories for enhanced realism in extreme weather simulation.
- Applied principles of light transport and volume rendering for physically accurate visual effects.

Reinforcement Learning for Optimal Traffic Signal Control

Project in AI | UCI

- Designed reinforcement algorithms for traffic signal control to minimize vehicle wait times.
- Simulated traffic in SUMO with visualized vehicle flows.
- Implemented DQN, Double DQN, Dueling DQN, PPO with various exploration strategies and compared results.

Technologies

Languages: C/C++ | Python | CUDA | OpenMP | Java | MATLAB | SQL | ARM Assembly | AHDL | Verilog HDL

Libraries: PyTorch/LibTorch | TensorFlow | OpenCV | Open3D | PCL | Colmap | ROS | Diffusers | Eigen