

Yiqi Lyu

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Research Interests

Robotics, foundation models, multi-modal perception, meta-learning

Education

Northwestern University Sep 2024 - Present

Ph.D. in Mechanical Engineering

Relevant coursework: Generative Deep Models, Agent AI

Carnegie Mellon University Sep 2021 - May 2023

Master of Science in Mechanical Engineering

Relevant coursework: Machine Learning, Modern Control Theory and Design, Robotic Dynamics and Analysis

Huazhong University of Science and Technology Sep 2015 - Jun 2019

Bachelor of Engineering in Mechanical Design, Manufacturing and Automation

Experience

Safe AI Lab, Carnegie Mellon University – Pittsburgh, PA May 2023 – Jul 2024

Research intern, advisor: Ding Zhao

Topic: Generalizable robot control

WIPM, Chinese Academy of Science – Wuhan, China Aug 2020 – Jan 2021

Research intern, advisor: Bosong Kang

Topic: High-precision quartz-glass micro-cavity machining

Publications

ManiGuard: A Specification-Grounded Safety Benchmark for Foundation-Model Manipulation

Philip Wang, Simon Sinong Zhan, Yiyan Peng, **Yiqi Lyu**, Jixin Yan, Fiorelli Wong, Xinyu Cao, Hang Yin, Haoran Lu, Xiangyu Shi, Zhenyang Ni, Ruochen Jiao, Han Liu, Huajie Shao, Manling Li, Ruohan Zhang, Qi Zhu

Under submission

SENTINEL: A Multi-Level Formal Framework for Safety Evaluation of Foundation Model-based Embodied Agents

Simon Sinong Zhan, Philip Wang, Yao Liu, Yiyan Peng, **Yiqi Lyu**, Zinan Wang, Qineng Wang, Zhian Ruan, Xiangyu Shi, Xinyu Cao, Frank Yang, Zhenyang Ni, Kangrui Wang, Ruohan Zhang, Huajie Shao, Manling Li, Qi Zhu

Under submission

Embodied Action Hijacking: How Vulnerable Are Your Embodied VLM Agents?

Hangtao Zhang, Canyu Chen, Changgan Yin, **Yiqi Lyu**, Vardhan Dongre, Yechao Zhang, Jindong Gu, Chaowei Xiao, Qi Zhu, Gokhan Tur, Dilek Hakkani-Tür, Philip Torr, Dawn Song, Manling Li

Under submission

CrashAgent: Crash Scenario Generation via Multi-modal Reasoning

Miao Li, Wenhao Ding, Haohong Lin, **Yiqi Lyu**, Yihang Yao, Yuyou Zhang, Ding Zhao

arxiv.

Dynamics as Prompts: In-Context Learning for Sim-to-Real System Identifications

Xilun Zhang*, Shiqi Liu*, Peide Huang, William Han, **Yiqi Lyu**, Mengdi Xu, Ding Zhao

2025 IEEE Robotics and Automation Letters (RA-L)

Projects

Energy-Based Steering of Vision-Language-Action Models for Training-Free Task Adaptation Mar 2026 – May 2026

- Collected expert data in RoboTwin and trained energy model with gradient smoothing regularization
- Zero-shot adapted pi0.5 model to new tasks with energy-based guidance
- Improved few-shot success rate of Pi0.5 model on Franka robot via CAA steering

Skill-based Generalizable Robot Manipulation

Sep 2023 – Feb 2024

- Collected expert data of robot arms on robosuite simulator with path planning algorithms
- Achieved 98% success rate with a skill-based imitation learning policy, which is generalizable to randomly initialized scenarios with task-specific skills inferred by energy function
- Deployed model in real-world dynamic environments with Kinova Gen3 and Ufactory xArm7, improving safety via object avoidance in human interrupting scenarios

Skills

Technologies: Robotics, Deep Learning, Control, Optimization, Computer Vision, CAD/CAE, PLC, 3D printing

Tools: PyTorch, Scikit-learn, Numpy, OpenCV, ROS, Mujoco, PyBullet, Ansys, Solidworks, Arduino, Raspberry Pi

Programming: Python, C++, MATLAB, Latex