Xingyu Lin

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Current Position

University of California, Berkeley Aug 2022 - Aug 2024 (expected)
Postdoctoral Scholar (Advisor: Pieter Abbeel)

Education

Carnegie Mellon University Aug 2017 - Aug 2022
Ph.D. in Robotics (Advisor: David Held)
Thesis: *"Learning Structured World Model for Deformable Object Manipulation"*

Peking University Sep 2013 - May 2017
B.S. in Computer Science (Summa Cum Laude)

Research Interests

My research lies in robotics, machine learning, and computer vision, with the primary goal of learning generalizable robotic manipulation skills. Specifically, I am interested in (1) learning structured world models with abstractions for planning and control; (2) pre-training visual representation and skills to enable knowledge transfer from Internet-scale vision datasets and simulators. Ultimately, my goal is to enable robots to assist humans in unstructured environments.

Professional Experience

University of California, Berkeley Aug 2022 - Aug 2024 (expected)
Postdoctoral Scholar with Pieter Abbeel

MIT-IBM Research Lab May 2021 - Aug 2021
Research Intern with Chuang Gan

NVIDIA Seattle Robotics Lab May 2020 - Aug 2020
Research Intern with Dieter Fox, Arsalan Mousavian, and Clemens Eppner

Carnegie Mellon University May 2016 - Aug 2016
Undergraduate Research Intern with Tai Sing Lee

Microsoft Research Asia (MSRA) Feb 2016 - May 2016
Research Intern

Peking University Apr 2015 - Feb 2016
Undergraduate Research Intern with Yizhou Wang

Conference Papers * denotes equal contribution or equal advising

[C17] Chuan Wen*, **Xingyu Lin***, John So*, Kai Chen, Qi Dou, Yang Gao, and Pieter Abbeel. Any-point Trajectory Modeling for Policy Learning, *Robotics: Science and Systems (RSS)*, 2024

[C16] Carmelo Sferrazza, Dun-Ming Huang, **Xingyu Lin**, Youngwoon Lee, and Pieter Abbeel. HumanoidBench: Simulated Humanoid Benchmark for Whole-Body Locomotion and Manipulation, *Robotics: Science and Systems (RSS)*, 2024

[C15] **Xingyu Lin***, John So*, Sashwat Mahalingam, Fangchen Liu, and Pieter Abbeel. SpawnNet: Learning Generalizable Visuomotor Skills from Pre-trained Networks, *IEEE International Conference on Robotics and Automation (ICRA)*, 2024

[C14] Zixuan Huang, **Xingyu, Lin**, and David Held. Self-supervised Cloth Reconstruction via Action-conditioned Cloth Tracking, *IEEE International Conference on Robotics and Automation (ICRA)*, 2023

[C13] Zhenjia Xu, Zhou Xian, **Xingyu, Lin**, Cheng Chi, Zhiao Huang, Chuang Gan, and Shuran Song. RoboNinja: Learning an Adaptive Cutting Policy for Multi-Material Objects, *Robotics: Science and Systems (RSS)*, 2023

[C12] **Xingyu, Lin**, Carl Qi, Yunchu Zhang, Zhiao Huang, Katerina Fragkiadaki, Yunzhu Li, Chuang Gan, and David Held. Planning with Spatial-Temporal Abstraction from Point Clouds for Deformable Object Manipulation, *Conference on Robot Learning (CoRL)*, 2022

[C11] Zixuan Huang, **Xingyu, Lin**, and David Held. Mesh-based Dynamics Model with Occlusion Reasoning for Cloth Manipulation, *Robotics: Science and Systems (RSS)*, 2022

[C10] **Xingyu Lin**, Zhiao Huang, Yunzhu Li, Joshua B. Tenenbaum, David Held, and Chuang Gan. DiffSkill: Skill Abstraction from Differentiable Physics for Deformable Object Manipulations with Tools, *International Conference on Learning Representations (ICLR)*, 2022

[C9] Narasimhan Gautham, Zhang Kai, Eisner Ben, **Xingyu, Lin**, and Held David. Transparent Liquid Segmentation for Robotic Pouring, *IEEE International Conference on Robotics and Automation (ICRA)*, 2022

[C8] **Xingyu Lin***, Yufei Wang*, Zixuan Hunag, and David Held. Learning Visible Connectivity Dynamics for Cloth Smoothing, *Conference on Robot Learning (CoRL)*, 2021

[C7] **Xingyu Lin**, Yufei Wang, Jake Olkin, and David Held. SoftGym: Benchmarking Deep Reinforcement Learning for Deformable Object Manipulation, *Conference on Robot Learning (CoRL)*, 2020

[C6] Yufei Wang*, Narayan Gautham*, **Xingyu Lin**, Brian Okorn, and David Held. Visual Self-Supervised Reinforcement Learning with Object Reasoning, *Conference on Robot Learning (CoRL)*, 2020

[C5] **Xingyu Lin***, Harjatin Baweja*, George Kantor, and David Held. Adaptive Auxiliary Task Weighting for Reinforcement Learning, *Neural Information Processing Systems (NeurIPS)*, 2019

[C4] **Xingyu Lin**, Pengsheng Guo, Carlos Florensa, and David Held. Adaptive variance for changing sparse-reward environments, *IEEE International Conference on Robotics and Automation (ICRA)*, 2019

[C3] **Xingyu Lin**, Hao Wang, Zhihao Li, Yimeng Zhang, Alan Yuille, and Tai Sing Lee. Transfer of view-manifold learning to similarity perception of novel objects, *International Conference on Learning Representations (ICLR)*, 2017

[C2] **Xingyu Lin**, Mingxuan Chai, Sheng Li, and Guoping Wang. Time-varying light motion in single convergence, *Computer Animation and Virtual Worlds*, 2018

[C1] Hao Wang, **Xingyu Lin**, Yimeng Zhang, and Tai Sing Lee. Learning robust object recognition using composed scenes from generative models, *Conference on Computer and Robot Vision (CRV)*, 2017

Journal Paper

[J1] Carl Qi, **Xingyu Lin**, and David Held. Learning Closed-loop Dough Manipulation Using a Differentiable Reset Module, *Robotics and Automation Letters (RA-L) with presentation at the International Conference on Intelligent Robots and Systems (IROS)*, 2022

Under Review and Pre-prints

[P4] Philipp Wu, Yide Shentu, Zhongke Yi, **Xingyu, Lin**, and Pieter Abbeel. GELLO: A General, Low-Cost, and Intuitive Teleoperation Framework for Robot Manipulators, *Under review; Presented at Workshop on Towards Generalist Robots (Oral)*, 2023

[P3] Kai Chen, Yiyao Ma, **Xingyu Lin**, Stephen James, Jianshu Zhou, Yun-Hui Liu, Pieter Abbeel, and Qi Dou. Pose-Adaptor: Object Pose Estimation for Novel Object Categories by Adapting Vision Foundation Models with Synthetic Data, *Under review*, 2023

[P2] Carl Qi, Sarthak Shetty, **Xingyu Lin***, and David Held*. Learning Generalizable Tool-use Skills through Trajectory Generation, *arXiv preprint arXiv:2310.00156*, 2023

[P1] **Xingyu Lin**, Harjatin Singh Baweja, and David Held. Reinforcement learning without ground-truth state, *Workshop on Multi-Task and Lifelong Reinforcement Learning, ICML*, 2019

Invited Talks

A Bottom-up Approach Towards Generalizable Robot Learning

- Invited talks at Google DeepMind, Apple, Toyata Research Institute 2024
- Invited talks at UCSB, Purdue, Georgia Institute of Technology, NUS, HKU 2024
- Invited talk at Berkeley AI Seminar 2024

Generalizable Robot Learning beyond the Training Data

- Invited talk at UCSD 2023
- Invited talk at Princeton 2023
- Invited talk at NYU, Computational Intelligence, Learning, Vision and Robotics group 2023
- Invited talk at Columbia 2023
- Invited talk at UCLA, Machine Intelligence (MINT) group 2023
- Invited talk at UT Austin, Robot Perception and Learning (RPL) Lab 2023

Generalizable Manipulation with Large Internet Data and Small Robot Data

- Invited talk and panelist at RSS Workshop on Interdisciplinary Exploration of Generalizable Manipulation Policy Learning 2023

Learning Structured World Model for Deformable Object Manipulation

- Invited talk at Stanford Vision and Learning Lab 2022
- Invited talk at UC Berkeley Robot Learning Lab 2022
- Invited talk at MIT Computational Design and Fabrication Group 2022
- RSS Workshop on Deformable Object Simulation in Robotics 2021

Selected Press Coverage

[P1] Can robots make pizza? Scientists are working on it, by Galadriel Watson, *Washington Post*, Sep 6, 2022.

[P2] Solving the challenges of robotic pizza-making, by Adam Zewe, *MIT News*, March 31, 2022.

[P3] This deep learning technique solves one of the tough challenges of robotics, by Ben Dickson, *Tech Talks*, May 9, 2022.

[P4] Better learning through 'complex dough-manipulation', by Brian Heater, *Tech Crunch*, Mar 31, 2022.

[P5] Robotic Manipulation of Deformable Objects, by Katyanna Quach, *AZO Robotics*, Apr 4, 2022.

[P6] Here's to the rise of the robot bartender, by *Institution of Mechanical Engineers*, Jun 9, 2022.

Selected Honors and Awards

RSS Pioneer 2022
Awarded to 30 early-career researchers in robotics worldwide

DAAD AInet Fellowship in AI and Robotics 2022

Founder Scholarship, Peking University 2016

Guanghua Scholarship, Peking University 2015

***1st Place Award*, Mathematical Modelling Contest of Peking University** 2014-2015
Back-to-back winners for two years among 60 teams.

Scholarship of Yitianmingsheng, Peking University 2014

Silver Medal in China National Olympiad in Informatics 2014

Student Mentoring

Ph.D. Students

- Philiip Wu (UC Berkeley) — GELLO [P4]
- Chuan Wen (Tsinghua, visiting)

Master's Students

- Yufei Wang (CMU MSCS → Ph.D. student at CMU) — CoRL 2020 [C6, C7], CoRL 2021 [C8]
- Carl Qi (CMU MSML → Ph.D. student at UT Austin) — RA-L 2022 [J1], CoRL 2022 [C12]
- Zixuan Huang (CMU MSR → Ph.D. student at Umich) — CoRL 2021 [C8], RSS 2022 [C11], ICRA 2023 [C14]
- Gautham Narasimhan (CMU MSME → Path Robotics) — CoRL 2020 [C6]
- Pengsheng Guo (CMU MRSD → Apple) — ICRA 2019 [C4]

Undergraduate Students

- John So (UC Berkeley → MSCS at Stanford) — SpawnNet [C15]
- Sashwat Mahalingam (UC Berkeley) — High-dimension Control with RL
- Aryan Jain (UC Berkeley) — Trajectory Pre-training from Videos with Diffusion Models

Teaching

Teaching Assistant

- CMU 16831: Statistical Techniques in Robotics (Instructor: Kris Kitani) Spring 2021
- CMU 10703: Deep Reinforcement Learning and Control (Instructor: Katerina Fragkiadaki) Fall 2019
- Peking University: Algorithm Analysis and Design (Instructor: Yizhou Wang) Fall 2016
- Peking University: Introduction to Computer System (Instructor: Yingfei Xiong) Fall 2015

Diversity, Equity, and Inclusion

- Mentor for undergraduate AI mentoring program, CMU 2018-2019
- Mentor for undergraduate AI mentoring program, UC Berkeley 2022-present
  - Mentor undergrads from underrepresented groups to help them get started in AI.
- Podcast speaker for high-school students about AI and robotics 2023

Services

Workshop Organizer

- *Co-Organizer*, 3D Visual Representations for Manipulation Workshop, ICRA 2024
- *Co-Organizer*, RSS Pioneers Workshop, RSS 2023

Reviewer

- Journal: IEEE Transactions on Robotics (T-RO), IEEE Robotics and Automation Letters (RA-L), Autonomous Robots
- Conferences: NeurIPS, ICML, ICLR, RSS, CoRL, ICRA, IROS

Department Service

- UC Berkeley EECS PhD Admissions Committee, 2022 - 2023
- CMU Master in Computer Vision (MSCV) Admissions Committee, 2019 - 2020