

HAOCHENG YIN

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RESEARCH OVERVIEW

My research goal is to develop intelligent embodied agents that are **generalizable** across diverse tasks and **adaptable** to various unseen environments in the physical world. To address this goal, my current work seeks to cover:

- Analyzing visual representations for robust robot control.
- Designing the generalizable control module for sim-to-real transfer.
- Realizing compositional generative models for effective world modeling.

Research Areas: Machine Learning, Robotics

EDUCATION

ETH Zürich

M.S. in Computer Science
Major in Machine Intelligence

Zürich, Switzerland

September 2021 - October 2024
GPA: 5.27/6.00

University of Illinois Urbana-Champaign (UIUC)

B.S. in Electrical Engineering
ZJU-UIUC Dual Bachelor's Degree Program

Champaign, IL

September 2017 - May 2021
GPA: 3.94/4.00

Zhejiang University

B.Eng. in Electrical Engineering & Automation
ZJU-UIUC Dual Bachelor's Degree Program

Hangzhou, China

September 2017 - June 2021
GPA: 3.96/4.00

PUBLICATIONS

(* indicates equal contribution)

- [1] Han Qi*, **Haocheng Yin***, Yilun Du, and Heng Yang. "Strengthening Generative Robot Policies through Predictive World Modeling". In: *arXiv preprint* (2025). arXiv: [2502.00622](https://arxiv.org/abs/2502.00622) [[cs.R0](#)].
- [2] Han Qi*, **Haocheng Yin***, and Heng Yang. "Control-oriented Clustering of Visual Latent Representation". In: *The Thirteenth International Conference on Learning Representations (ICLR)*. 2025. arXiv: [2410.05063](https://arxiv.org/abs/2410.05063) [[cs.LG](#)].

RESEARCH EXPERIENCE

Computational Robotics Lab, supervised by Prof. Heng Yang

Master Thesis: *Understand and Improve Diffusion Policy for Robot Control*

Harvard University

March 2025 (expected)

ICLR 2025: *Control-Oriented Clustering of Visual Latent Representation*

RSS 2025 (under review): *Strengthening Generative Robot Policies through Predictive World Modeling*

Soft Robotics Lab, supervised by Prof. Robert Katzschmann

Research Project: *Learning Behavior Priors for Dexterous Manipulation*

ETH Zürich

December 2023

Optimization & Decision Intelligence Lab, supervised by Prof. Niao He

Research Project: *Bioplausible Meta Reinforcement Learning*

ETH Zürich

September 2022

Research Project: *Inverse Reinforcement Learning from Suboptimal Demonstrations*

RESEARCH PROJECTS

Strengthening Generative Robot Policies through World Modeling **Harvard University**
RSS 2025 (under review) supervised by Prof. Heng Yang & Prof. Yilun Du *January 2025*

- Proposed a generative predictive control (GPC) framework that leverages the world model to help predict the future state sequences given the predicted action sequences from diffusion policy.
- Improved the test-time performance by either ranking multiple action rollouts or optimizing single action rollout via gradient descent based on reward values from world model predictions.

Control-Oriented Clustering of Visual Latent Representation **Harvard University**
ICLR 2025 supervised by Prof. Heng Yang *October 2024*

- Unveiled a control-oriented clustering phenomenon similar to *Neural Collapse* in the visual latent representation space under normal vision-based imitation training for various robotic tasks.
- Pre-trained the vision encoder under these control-oriented clustering metrics could improve test-time performance by 10% to 35% in the low-data regime.

Learning Human Behavior Priors for Dexterous Manipulation **ETH Zürich**
Semester project supervised by Prof. Robert Katzschmann *December 2023*

- Proposed to pre-train the model *robotics transformer* RT-1 on large-scale human dexterous demonstrations (ego4d) and fine-tune with limited in-domain robotic dexterous demonstrations.
- Designed a memory-efficient dexterous dataset metric from raw human dexterous videos including estimated camera intrinsics (by COLMAP), camera trajectories (by ORBSLAM3) and low-dimensional hand pose parameters (by FrankMocap).

Inverse Reinforcement Learning from Suboptimal Demonstrations **ETH Zürich**
Semester project supervised by Prof. Niao He *September 2022*

- Investigated and compared state-of-the-art inverse reinforcement learning algorithms on suboptimal demonstrations in MuJoCo environments.
- Revealed the strong robustness of model *Trajectory-ranked Reward EXtrapolation* (T-REX) trained under SAC suboptimal policy ablated from PPO expert policy.

TEACHING EXPERIENCE

ECE 365: Data Science and Engineering **University of Illinois Urbana-Champaign**
Teaching Assistant (remote) *Spring 2021*

ECE 385: Digital Systems Laboratory **Zhejiang University**
Teaching Assistant *Fall 2020*

AWARDS & HONORS

Swiss-European Mobility Programme (SEMP) Scholarship **ETH Zürich**
Covered by Swiss State Secretariat for Education, Research and Innovation (SERI) *February 2024*

High Honors at Graduation **University of Illinois Urbana-Champaign**
Receive at least 3.80 GPA at graduation *May 2021*

Dean's List in ECE Department **University of Illinois Urbana-Champaign**
Top 3 GPA of the college class for 4 years *May 2021*

Undergraduate Technology Innovation Award **Government of Zhejiang Province**
Top 7% student research projects of all universities in Zhejiang, China *August 2020*

Provincial Government Scholarship **Government of Zhejiang Province**
Top 3% undergraduate students of all universities in Zhejiang, China *December 2018*