

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***, and Heng Yang. "Control-oriented Clustering of Visual Latent Representation". In: *arXiv preprint* (2024). 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*
ICLR 2025 Submission (under review): *Control-oriented Clustering of Visual Latent Representation*

Harvard University
March 2025 (expected)

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*

Research Project: *Inverse Reinforcement Learning from Suboptimal Demonstrations*

ETH Zürich
September 2022

RESEARCH PROJECTS

Control-oriented Clustering of Visual Latent Representation

ICLR 2025 submission (under review) supervised by Prof. Heng Yang

Harvard University
September 2024

- Unveiled a control-oriented law of clustering in the visual latent representation space from multiple vision-based imitation learning models.
- Leveraged such control-oriented clustering metrics to pretrain the vision encoder to improve test-time performance when training under limited expert demonstrations for planar pushing task in both simulation and real world.

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.

Bioplausible Meta Reinforcement Learning

ETH Zürich

Semester project supervised by Prof. Niao He

January 2022

- Transferred a neuro-modulated framework from image classification to reinforcement learning.
- Migrated the neuro-modulated network as a gated function to the *model-agnostic meta-learning* (MAML) policy network to selectively update network parameters in bi-level optimization.

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