Yinong He

734-465-8368 | heyinong@umich.edu | hyn-kulu.github.io

Education

UM-SJTU Joint Institute — Ann Arbor, Michigan / Shanghai, China
B.S.E. in Data Science and Electrical and Computer Engineering — *Sept. 2021 – May 2025*

- Completed the program with two years at the University of Michigan and two years at Shanghai Jiao Tong University.

University of Michigan — Ann Arbor, Michigan
B.S.E in Data Science — *Sept. 2023 – May 2025*

Shanghai Jiao Tong University — Shanghai, China
B.S.E. in Electrical and Computer Engineering — *Sept. 2021 – Aug. 2023*

Research Interests

Embodied AI, Human-Robotics Interaction, Planning, Robotic Manipulation, Large Language Model

WORKING PAPER AND PUBLICATION

1. Teaching Embodied Reinforcement Learning Agents: Informativeness and Diversity of Language Use
   Yinong He*, Jiajun Xi*, Jianing Yang, Yinpei Dai, Joyce Chai
   Accepted at EMNLP 2024 Main Conference (* indicates equal contribution) [Paper]

2. Implicit Contact Diffuser: Sequential Contact Reasoning with Latent Point Cloud Diffusion
   Zixuan Huang, **Yinong He***, Yating Lin*, Dmitry Berenson
   Under review at ICRA 2025 (* indicates equal contribution) [Paper]
   Best Technical Contribution Award at Michigan AI Symposium

Patent

1. Knowledge-Graph based Question-Answer System for Geology Dataset
   Ze Zhao, Bin Lu, Jinwen Wu, **Yinong He**, Xiaoying Gan, Luoyi Fu, Xinbing Wang

Research Experience

Autonomous Robotic Manipulation Lab — May 2024 – Present
Advisor: Dmitry Berenson, Associate Professor in Robotics & EECS Department — *Ann Arbor, Michigan*

- Developed a cable routing task within the Mujoco environment, and created a scripted policy for data collection.
- Designed embodied grounding tasks for rope manipulation, and trained the 3D-aware LLM to ground the 3D scene, interpret user commands, and predict the final states of deformable ropes with the latent diffusion model.
- Trained a Neural Descriptor Field (NDF) incorporating both color rendering and geometric information for encoding the rope representations and improved the LLM's grounding accuracy from 68% to 97.5% when judging how the rope interacted with the hooks.
- Refined the diffusion model using geometry-centric NDF supervision to differentiate ropes with similar Euclidean distances but distinct spatial relationships to hooks, improving the generation accuracy from 66% to 92%.

Situated Language and Embodied Dialogue Lab — Aug. 2023 – Present
Advisor: Joyce Chai, Professor in EECS Department — *Ann Arbor, Michigan*

- Designed and developed an offline reinforcement learning algorithm to build embodied agents capable of functioning effectively with human-provided language feedback.
- Conducted empirical studies across four RL benchmarks, demonstrating that agents trained with diverse and informative language feedback achieved enhanced in-domain performance and effective transfer to new tasks with human language instructions.
- Investigated which task settings allow language inputs to most effectively aid agents, and analyzed agent performance under adversarial attacks or varying language frequency scenarios.

Selected Projects

Reasoning-Guided Video Generation for Robotic Manipulation

Course Project for EECS692 Advanced Artificial Intelligence. *Instructor: Joyce Chai*

- Applied the diffusion model for video generation, leveraged foundation models for interpreting the robots' behaviors and providing instructions, and proposed to fine-tune an image-editing model for generating corrected subgoals.

State-Feedback Control Design with Sector-Bounded Nonlinearities

Course Project for ECE598 Convex Optimization in Control. *Instructor: Peter Seiler*

- Developed state-feedback control theorems using advanced mathematical tools, including the Lyapunov Theorem, Circle Criterion, Schur Complement, and Linear Matrix Inequalities (LMI), leveraging Semi-Definite Programming (SDP) for convex optimization to ensure stability and performance under nonlinear sector-bounded dynamics.
- Optimized controllers with both H_2 performance for minimizing energy response and H_∞ performance for robust disturbance rejection.

Enhance Distilled Feature Field for Complex Language Query

Course Project for ROB498 Deep Learning for Robot Perception *Instructor: Xiaoxiao Du*

- Trained a distilled feature field with CLIP and NeRF for interpreting and rendering the scene.
- Implemented a pipeline leveraging foundation models to decompose the complex language queries, analyze the spatial relationship, and locate the querying object by grounding to the feature field.

Empowering VLM with Spatial Reasoning Ability

Course Project for EECS498 Large Language Model *Instructor: Samet Oymak*

- Reproduced the SpatialVLM pipeline for augmenting data by lifting 2D images to 3D point clouds and extracting spatial relationships. Finetuned the LLaVA model with the generated data.
- Calibrated LLaVA's bias towards trusting the given spatial relationships.

Awards

Best Technical Contribution Award @ Michigan AI Symposium Oct. 2024
Dean's Honor List Apr. 2024
Dean's Honor List Dec. 2023
Silver Medal in University Physics Competition Nov. 2022
Shanghai Jiao Tong University Science and Technology Scholarship May 2023

Language Proficiency

- TOEFL: 113 (Reading: 30, Listening: 28, Speaking: 26, Writing: 29)
- GRE: 331 (Verbal: 161, Quant: 170)

Teaching Experience

Grader for EECS498 Large Language Models Aug. 2024 – Dec. 2024
Instruction Assistant for MATH186 Honors Calculus II Aug. 2022 – Jan. 2023

Selected Coursework

Advanced Artificial Intelligence (A), Large Language Models (A+), Convex Optimization in Control (A+), Introduction to Robotic Manipulation (A+), Deep Learning for Robot Perception (A), Introduction to Machine Learning (A), Data Structure and Algorithms (A+), Discrete Stochastic Process (A), Combination and Graph Theory (A+), Differential Equation (A+)

Extra Curriculum

Minister of Student Science, Technology and Innovation Association Aug. 2022 – Jun. 2023

- Prepared for workshops intended for students in the department.
- Organized the Robotics Competition in the department.

Class Advisor Aug. 2022 – Present

- Assisted class students in their coursework, research, and future plans.