

Education	B.S. (Honours) in Mathematics (Highest Distinction) <i>Department of Mathematics, National University of Singapore</i> Mathematics (Major) & Computer Science (Minor) <ul style="list-style-type: none">• Core Courses: Machine Learning (A+), Introduction to Artificial Intelligence (A), AI Planning and Decision Making (A+), Linear Algebra (A+), Calculus (A), Stochastic Process (A), Ordinary Differential Equations (A), Mathematical Modeling (A+), Matrix Computation (A+)• Research interests: RL, Embodied AI	Singapore 2021 – 2025 (expected)
	B.S. in Biomedical Sciences (Incomplete, transferred to NUS) <i>Department of Biomedical Sciences, City University of Hong Kong</i>	Hong Kong, China 2020 – 2021
Publications	<ol style="list-style-type: none">1. Hengkai Tan*, Xuezhou Xu*, Chengyang Ying, Xinyi Mao, Songming Liu, Xingxing Zhang, Hang Su, Jun Zhu. <i>ManiBox: Enhancing Spatial Grasping Generalization via Scalable Simulation Data Generation</i>. [Project Page]2. Chengyang Ying, Zhongkai Hao, Xinning Zhou, Xuezhou Xu, Hang Su, Xingxing Zhang, Jun Zhu. <i>PEAC: Unsupervised Pre-training for Cross-Embodiment Reinforcement Learning</i> [C]. <i>Accepted by NeurIPS 2024</i>. [Project Page]	
Research Experience	Department of Electrical and Computer Engineering National University of Singapore – Present <i>Advisor: Prof. Xingyu Liu</i>	March 2025
	Tsinghua SAIL Group Tsinghua University <i>Advisor: Prof. Jun Zhu, Prof. Hang Su</i>	Jan 2024 – Dec 2024
	<ul style="list-style-type: none">• Proposed ManiBox, a bounding-box-guided manipulation framework based on a scalable simulation-driven teacher-student paradigm, to facilitate policy and spatial generalization in embodied robotics.• Developed PEAC, a novel Pre-trained Embodiment-Aware Control algorithm that enables agents to acquire embodiment-aware and task-agnostic priors through online interaction in reward-free environments.	
	Existential Robotics Lab UC San Diego <i>Advisor: Prof. Nikolay A. Atanasov</i>	Jun 2023 – Aug 2023
	<ul style="list-style-type: none">• Contributed to developing methods to prove Lyapunov stability of uncertain dynamical systems and synthesized stabilizing controllers for control-affine systems under model uncertainty.	

Related Projects

Image Deconvolution Using Wavelet Transform | Mathematics Capstone Project *Jan 2025 – Apr 2025*

Advisor: Prof. Hui Ji

- Designed and implemented a Haar wavelet transform framework for denoising periodic signals contaminated with additive Gaussian noise, incorporating both soft-thresholding and hard-thresholding schemes for signal reconstruction.
- Conducted a comparative analysis of convolution strategies, including zero-padding, valid convolution, and circular convolution to evaluate their effects on boundary handling and reconstruction fidelity in the context of wavelet-based denoising.

Simulator-Driven Policy Learning for Robotics | AI Planning Course Project *Aug 2024 – Nov 2024*

Advisor: Prof. Leong Tze Yun

- Extended the Isaac Lab simulator to support custom RL algorithm integration, enabling seamless switching between A2C, SAC, TD3, DDPG, and PPO for large-scale policy benchmarking across diverse robotic tasks.
- Designed and trained a "Throw a Dice" manipulation task using the Franka arm, applying hierarchical reward shaping and curriculum learning to teach precise grasp-and-throw behavior.
- Applied domain randomization across object type, scale, and position to improve policy robustness and simulation data diversity, facilitating better generalization in robotic grasping scenarios.

Safe Policy Modification via Control Barrier Functions | UROPS Project *Aug 2023 – Nov 2023*

Advisor: Prof. Tong T. Xin

- Investigated safety guarantees in reinforcement learning by integrating Lyapunov-like Control Barrier Functions (LCBFs) into nominal control policies to ensure forward invariance within nonlinear systems.
- Designed and analyzed a safeguarding controller capable of modifying arbitrary policies to preserve safety, with formal theorems and simulation results validating its effectiveness across constrained dynamical systems.

Teaching

Teaching Assistant of CS4246/5446: AI Planning and Decision Making *Jan 2025 – April 2025*

Advisor: Prof. Akshay Narayan, Prof. Chun Kai Ling

- Led tutorials and assessed assignments for 100+ undergrad and grad students; contributed to assignment design and provided forum support.

Awards

Bestätigung zum Stipendium / Scholarship (€2,800) Heidelberg University	<i>Feb 2024</i>
Hong Kong Tech Seed Fund (HK\$10,000) City University of Hong Kong	<i>Oct 2021</i>
Dean's List AY20/21 Sem 1 City University of Hong Kong	<i>Jan 2021</i>
Dean's List AY21/22 Sem 2 City University of Hong Kong	<i>Jul 2021</i>

Skills

Programming: Python, Java, R, MATLAB, LaTeX.

Robotic Platforms: MuJoCo, Isaac Lab, Mobile Aloha, Leap Hand, xArm.

Language: Chinese (Native), English (Proficiency).