# YIQING XU

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My research focuses on *translating* human objectives into signals for robotic optimization. I design *inverse reinforcement learning (IRL) algorithms* and develop *compositional and hierachical structures as intermediate representations* to better align robotic agents with human goals, enabling them to understand and assist people more effectively.

**Keywords**: Inverse Reinforcement Learning, Imitation Learning, Goal Specification for Robotics, Neuro-Symbolic Representation.

## RESEARCH HIGHLIGHT

My latest work, "Set It Up!", addresses the challenge of grounding the under-specified instructions, such as "set up a Chinese dining table for two", for tabletop arrangement tasks. We introduce a neuro-symbolic framework that integrates semantic inference from large language models with geometric reasoning from pre-trained diffusion models of basic object relationships.

I'm excited to extend this neuro-symbolic framework to a wider range of robotic tasks, such as generating complex 3D structures from simple sub-units and effectively chaining skills through compositional skill functions.

## EDUCATION

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|---|---|
| **National University of Singapore** | Aug, 2020 - Dec, 2025 (Expected) |
| Ph.D in Computer Science, advised by *Prof. David Hsu* | GPA: 5.00 |

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| **National University of Singapore** | Aug, 2016 - Jun, 2020 |
| B.A. in Computer Science | GPA: 4.61 |
| B.A. in Applied Mathematics | GPA: 4.79 |

## RESEARCH EXPERIENCE

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|---|---|
| **Visiting Ph.D Student** | Sep, 2023 - Feb, 2024 |
| *CSAIL MIT, Prof. Leslie Kaelbling* and *Prof. Tomás Lozano-Pérez* | |

Developed *"Set It Up!"*, a neuro-symbolic system that interprets and optimizes under-specified instructions for table-top arrangements. Published at RSS 2024.

## SELECTED PUBLICATIONS / PREPRINTS

1. "Set It Up!": Functional Object Arrangement with Compositional Generative Models [Link]
   *Yiqing Xu, Jiayuan Mao, Yilun Du, Tomás Lozano-Pére, Leslie Kaelbling, David Hsu*
   Robotics: Science and Systems (RSS), 2024

2. On the Effective Horizon for Inverse Reinforcement Learning [Link]
   *Yiqing Xu, Finale Doshi-Velez, David Hsu*
   In submission.

3. Differentiable Particles for General-Purpose Deformable Object Manipulation [Link]
   *Siwei Chen, Yiqing Xu, Cunjun Yu, Linfeng Li, David Hsu*
   In submission.

4. Grounding Common-sense Objective for Tabletop Object Rearrangement [Link]
   *Yiqing Xu, David Hsu*
   Robotics: Science and Systems (RSS), 2023, Lang2Rob Workshop

5. Learning Reward for Physical Skills using Large Language Models [Link]
   *Yuwei Zeng, Yiqing Xu*
   Conference on Robot Learning (CoRL), 2023, the 2nd Lang2Rob Workshop

6. Benchmarking Deformable Object Manipulation with Differentiable Physics [Link]
   *Siwei Chen\*, Yiqing Xu\*, Cunjun Yu\*, Linfeng Li, David Hsu*
   International Conference on Learning Representations (ICLR): **Notable Top 5%**, 2023

7. Receding Horizon Inverse Reinforcement Learning [Link]
   *Yiqing Xu, Wei Gao, David Hsu*
   Advances in Neural Information Processing Systems (NeurIPS), 2022

8. Coach: Cooperative robot teaching [Link]
   *Cunjun Yu, Yiqing Xu, Linfeng Li, David Hsu*
   Conference on Robot Learning (CoRL), 2022

## PROFESSIONAL SERVICE

**Workshop Organizer**

- Task Specification Workshop at RSS 2024 [Website]                                July 2024

- Second LEAP Workshop at CoRL 2024 [Website]                          November 2024

**Reviewer**: ICRA, RSS, AAMAS, AAAI, NeurIPS, ICLR, ICML

## SKILLS

Python, Jax, Java, Mujoco, IssacSim