

# YIXUAN HUANG

Ph.D. student at University of Utah ◊ Personal Website

## EDUCATION

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### University of Utah, Salt Lake City, UT

Ph.D. in Computer Science

Advisor: Prof. Tucker Hermans

Selected Coursework: Robotics, Robot Control, Robot Learning, Motion planning, Computer Vision

*Aug 2020 - Current*

Overall GPA: 3.97/4.0

### University of California, San Diego, La Jolla, CA

Exchange student

Advisor: Prof. Sicun Gao

Senior Coursework: Deep Learning, Machine Learning, Operating System, Computer Networks

*Sep 2018 - Jun 2019*

Overall GPA: 3.91/4

### Northeastern University, Liaoning, China

B.E. in Computer Science and Technology (top student in the department)

Department of Computer Science and Engineering

Coursework: Discrete Mathematics, Statistics and Probability, Numerical Analysis, Electronic Theory

*Sep 2016 - Jun 2020*

Overall GPA: 93.2/100, Rank: 1/278

## PUBLICATIONS

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**Y. Huang**, J. Yuan, C. Kim, P. Pradhan, B. Chen, F. Li, and T. Hermans. Out of Sight, Still in Mind: Reasoning and Planning about Unobserved Objects with Video Tracking Enabled Memory Models (2024 IEEE International Conference on Robotics and Automation (ICRA)). (Uner Review); [Project Website] [Paper]

**Y. Huang**, A. Conkey, T. Hermans. Planning with Learned Multi-Object Relations Using Graph Neural Networks (2023 IEEE International Conference on Robotics and Automation (ICRA)); [Project Website] [Paper]

**Y. Huang**, N. C. Taylor, A. Conkey, W. Liu, and T. Hermans. Latent Space Planning for Multi-Object Manipulation with Environment-Aware Relational Classifiers (IEEE Transactions on Robotics (T-RO)). (Under review); [Project Website] [Paper]

**Y. Huang**, M. Bentley, T. Hermans, A. Kuntz. Toward Learning Context-Dependent Tasks from Demonstration for Tendon-Driven Surgical Robots (2021 International Symposium on Medical Robotics); (**Best Paper Award Finalist & Best Student Paper Award Finalist**) [Paper]

**Y. Huang**, M. Bentley, R. Benny, T. Hermans, A. Kuntz. Learning Context-Dependent Tasks from Demonstration and Partial-View Point Clouds for Tendon-Driven Surgical Robots (Journal of Medical Robotics Research (JMRR)). (In Preparation);

## RESEARCH EXPERIENCE

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### Reasoning and Planning for Unobserved Objects with Memory Models

Mar 2023 - now

- Investigated the problem of encoding object-oriented memory into a multi-object manipulation reasoning and planning framework;
- The first work to leverage learned transformer relational dynamics to encode the history of trajectories given partial-view point clouds and an object discovery and tracking engine;
- A real-world system to perform multiple challenging tasks including reasoning occluded objects, novel objects appearance, and object reappearance;
- Achieved sim-to-real transfer without fine-tuning;

### Efficient Long Term Planning with Multiple Objects and Environments

Sep 2022 - Mar 2023

- A novel framework to explicitly represent partial-view environments including tables and bookshelves;
- The first work to reason about how relations among multiple objects and environments change based on robot actions;
- Achieved efficient long-term planning with graph search and learned object semantics;

### **Planning with Multi-Object Relations Using Graph Neural Networks** May 2021 - Sep 2022

- Proposed a novel graph neural network framework for multi-object manipulation to predict how inter-object relations change given robot actions;
- Achieved multi-step planning to reach target goal relations;
- Showed our model trained purely in simulation transfers well to the real world;
- A system to rearrange a variable number of objects with a range of shapes and sizes using both push and pick and place skills;

### **Learning from Demonstration for Tendon-Driven Robot** Jan 2021 - Dec 2021

- Significant steps toward the automation of context-dependent surgical tasks learned from demonstration;
- Proposed three learning approaches to directly learn the context embedding from 3D partial-view point cloud to remove the burden of directly giving specific context;
- First use of contextual learning for producing complex trajectories for surgical robots and first instance of LfD in continuum robots;
- A system to perform learned tasks in novel context not seen during the demonstrations;
- A system to apply our approaches trained in simulation to real-world tendon robot without any fine-tuning;

### **Safe Reinforcement Learning** Jan 2019 - May 2020

- Proposed a novel model-based curriculum for solving safe reinforcement learning problems such as avoiding obstacles with an autonomous car;
- Leveraged model-based methods to plan safe actions and trained a safeguarding policy from these actions through imitation;
- Improved performance with lower sample complexity compared to Constrained Policy Optimization;

## **HONORS AND AWARDS**

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2021 International Symposium on Medical Robotics Best Paper Award Finalist	<i>Nov 2021</i>
2021 International Symposium on Medical Robotics Best Student Paper Award Finalist	<i>Nov 2021</i>
2021 International Symposium on Medical Robotics NSF Travel Award	<i>Oct 2021</i>
University of Utah School of Computing Department Fellowship	<i>Aug 2020</i>
National Scholarship (top 2% of degree cohort)	<i>Nov 2017 &amp; 2018</i>
Northeastern University Excellent Student (top 2% of degree cohort)	<i>Dec 2017 &amp; 2018</i>
Runner-up in National Mathematical Modeling Competition in China	<i>Oct 2017</i>
First Place in Provincial Mathematical Modeling Competition	<i>Oct.2017</i>

## **SKILLS**

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<b>Computer Languages</b>	C/C++, MATLAB, Python (TensorFlow, PyTorch), Java, VHDL
<b>Software &amp; Tools</b>	IsaacGym, ROS, Gazebo, PyBullet, HTML, LaTeX

## **SERVICE**

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<b>Reviewer</b>	ICRA (2023-2024), CoRL 2023
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