

# Ziang Liu

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## EDUCATION

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### Stanford University

M.S. in Computer Science • GPA: 4.17 / 4.30

Sep 2021 - Present

### University of Southern California

B.S. in Computer Science & B.S. in Applied Mathematics • GPA: 3.92 / 4.00

Aug 2017 – May 2021

## PUBLICATIONS

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1. **Ziang Liu**, Ben Cheng, William Armstrong, Jeannette Bohg, “Hand-Torn Document Reconstruction with Large-Scale Synthetic Dataset”, in submission.
2. **Ziang Liu\***, Stephen Tian\*, Michelle Guo, Karen Liu, Jiajun Wu, “Learning to Design and Use Tools for Goal-Conditioned Manipulation”, in submission.
3. Eley Ng, **Ziang Liu**, Monroe Kennedy III, “It Takes Two: Learning to Plan for Human-Robot Cooperative Carrying”, to appear in *International Conference on Robotics and Automation (ICRA)*, 2023.
4. **Ziang Liu**, Roberto Martín-Martín, Fei Xia, Jiajun Wu, Li Fei-Fei, “BEHAVIOR in Habitat 2.0: Simulator-Independent Logical Task Description for Benchmarking Embodied AI Agents”, *CVPR Embodied AI Workshop*, 2022.
5. Eric Heiden, **Ziang Liu**, Vibhav Vineet, Erwin Coumans, Gaurav S. Sukhatme, “Inferring Articulated Rigid Body Dynamics from RGBD Video”, *International Conference on Intelligent Robots and Systems (IROS)*, 2022.
6. Heramb Nemlekar\*, **Ziang Liu\***, Suraj Kothawade, Sherdil Niyaz, Barath Raghavan, Stefanos Nikolaidis, “Robotic Lime Picking by Considering Leaves as Permeable Obstacles”, *International Conference on Intelligent Robots and Systems (IROS)*, 2021.
7. Han Zhang, Mingze Yao, **Ziang Liu**, Jiaoyang Li, Lucas Terr, Shao-Hung Chan, T.K. Satish Kumar, Sven Koenig, “A Hierarchical Approach to Multi-Agent Path Finding”, *Proceedings of the International Symposium on Combinatorial Search (SoCS)*, 2021.
8. Eric Heiden, **Ziang Liu**, Ragesh K. Ramachandran, Gaurav S. Sukhatme, “Physics-based Simulation of Continuous-Wave LIDAR for Localization, Calibration and Tracking”, *International Conference on Robotics and Automation (ICRA)*, 2020.

## EXPERIENCES

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### Stanford Vision and Learning Lab (SVL)

Research Assistant • Advisor: Jiajun Wu

Stanford, CA

Aug 2021 - Present

- **Adaptive Scene Representations for Manipulation:** Exploring methods to learn a model that automatically and adaptively selects different levels of abstractions of structured scene representations suited for different tasks and stages of tasks, to help robots operate in unstructured environments and build an intuitive understanding of the physical world.
- **Learning to Design and Use Tools for Goal-Conditioned Manipulation:** Proposed and implemented a reinforcement learning framework to learn a designer policy and a design-agnostic controller policy improved sample efficiency and zero-shot generalization capability on multi-goal robot tool manipulation tasks. (*Paper in submission*)
- **Simulator-Agnostic Task Description:** Integrated logic space benchmark activity definitions with different simulators by implementing an extension interface for BEHAVIOR in Habitat 2.0 simulator. (*Paper accepted to CVPR 2022 EAI Workshop*)

### Stanford Assistive Robotics and Manipulation Lab (ARM)

Research Assistant • Advisor: Monroe Kennedy III

Stanford, CA

May 2022 - Sep 2022

- **Human-Robot Collaborative Carrying:** Proposed, implemented, and tested a Variational Recurrent Neural Network model to learn from human demonstrations and predict realistic motion plans for human-robot collaborative table-carrying task, while capturing the multi-modal distribution over future states by leveraging interaction history. (*Paper in submission*)

### USC Robotic Embedded Systems Lab (RESL)

Los Angeles, CA

- **Rigid Body Dynamics Inference from RGBD Video:** Designed and implemented a real-to-sim pipeline that combines inverse rendering with differentiable simulation to generate digital twins of real-world articulated mechanisms from RGBD videos. (*Paper accepted to IROS 2022*)
- **Task and Contact Optimization:** Coordinated high-level symbolic planning with low-level motion planning to solve complex contact planning problems, by formulating symbolic planning graph as a smooth optimization problem.
- **Physics-Based LIDAR Simulation:** Implemented a physics-based differentiable LIDAR in simulation that models light-surface interaction, continuous wave sampling, and beam divergence, showing significantly better accuracy and localization capability to facilitate sim-to-real transfer for robot learning. (*Paper accepted to ICRA 2020*)
- **Motion Planner Benchmark:** Benchmarked the performance of 20 motion planners across 4 path smoothing methods, implemented collision checking based on GJK and Separating Axis Theorem, built webpage to visualize results.

**USC Interactive and Collaborative Autonomous Robotics Lab (ICAROS)**

Los Angeles, CA

Research Assistant • Advisor: Stefanos Nikolaidis

Jun 2020 - Jul 2021

- **Cost-Based RRT for Robot Lime Picking:** Proposed and implemented a new variant of RRT planner with Artificial Potential Field to guide the sampling process, while creatively formulating lime tree leaves as permeable obstacles to avoid unnecessary detours. (*Paper accepted to IROS 2021*)

**USC IDM Artificial Intelligence Lab (IDM)**

Los Angeles, CA

Research Assistant • Advisor: Sven Koenig

Jun 2020 - May 2021

- **Hierarchical Multi-Agent Path Finding:** Explored and implemented a framework that substantially increased the scalability of Multi-Agent Path Finding problem solvers with near sub-optimal solution quality. (*Paper accepted to SoCS 2021*)

**USC Dynamic Robotics and Control Lab (DRCL)**

Los Angeles, CA

Research Assistant • Advisor: Quan Nguyen

Oct 2020 - Mar 2021

- **Autonomous Car Drifting:** Explored and implemented a multi-threaded pipeline to optimize car drifting trajectory with MPC under dynamics and collision constraints, using LIDAR for localization and pose estimation.

**AWARDS AND COMPETITIONS**

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**Siebel Scholar**

Sep 2022

- Recognizes the most talented students at the world's leading graduate schools based on academic excellence and leadership potential. One of 5 students nominated by Stanford CS, one of 83 students selected worldwide as class of 2023.

**USC Undergraduate Research Associates Program Recipient**

Fall 2020

- Research funding for working on the robot lime picking with cost-based RRT project with Professor Stefanos Nikolaidis.

**International Collegiate Programming Contest (ICPC) SoCal Regional Contest**

Fall 2019

- Algorithmic programming contest for college students, team ranked top 20 out of 90 teams.

**USC Programming Contest**

Fall 2019

- Ranked 3rd among undergraduate students, 4th among all participants.

**TEACHING**

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**Head Teaching Assistant**

Stanford University

- CS 161 Design and Analysis of Algorithms

Winter 2022

**Graduate Teaching Assistant**

Stanford University

- CS 229 Machine Learning
- CS 161 Design and Analysis of Algorithms

Spring 2022

Fall 2021 | Summer 2022 | Fall 2022

**Undergraduate Teaching Assistant**

University of Southern California

- CSCI 360 Introduction to Artificial Intelligence

Spring 2020 | Fall 2020

- CSCI 270 Algorithms and Theory of Computing
- CSCI 170 Discrete Methods in Computer Science
- CSCI 104 Data Structures and Object-Oriented Design

*Summer 2020*  
*Spring 2019 | Summer 2019 | Spring 2020 | Fall 2020*  
*Fall 2019*

## ACTIVITIES

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### **California Naturalist**

*Jan 2018 - Apr 2018*

- Engaged in volunteer research on natural coastal resources in California. Participated in birdwatching walks regularly at Malibu Lagoon. Awarded California Naturalist Certificate.

### **Birding Tour Guide**

*May 2015 - Aug 2018*

- Lead introductory community birding tours and taught young participants about bird behavior and bird species recognition from visual and auditory features.