YULIN LIU

(619)9537563 ⋄ yul266@ucsd.edu ⋄ Personal Page ⋄ Google Scholar

EDUCATION

Ph.D. of CSE, University of California San Diego   2023.9 - present

- Advisor: *Prof. Hao Su*, Research Topics: Perception, Robot Manipulation

Bachelor of Physics, Peking University   2019.9 - 2023.7

- Grade Point Average: **3.85**/4.00 (Ranking Top 10/174)

EXPERIENCE

Hillbot Inc., Research Intern   2024.6 - 2024.9

- Mentor: *Prof. Hao Su, Dr. Zhiao Huang*, Project: VR Teleoperation System

PUBLICATION

- Zhengdong Hong*, **Yulin Liu***, Haowen Hou, Bo Ai, Jun Wang, Tongzhou Mu, Yuzhe Qin, Jiayuan Gu, Hao Su *Learning Particle-Based World Model from Human for Robot Dexterous Manipulation*, **RSS-Dex 2025 (Oral)**

- **Yulin Liu***, Zihao He*, Fanbo Xiang*, Runlin Guo, Zhiao Huang, Jialin Zhang, Bo Ai, Stone Tao, Hao Su, *ImVR: Immersive VR Teleoperation System for General Purpose*, **RSS-Dex 2025 (Oral)**

- Zihao He*, Bo Ai*, **Yulin Liu**, Weikang Wan, Henrik I Christensen, Hao Su *Learning Dexterous Deformable Object Manipulation Through Cross-Embodiment Dynamic Learning*, **RSS-SWOMO, RSS-Dex, ICRA-WK 2025**

- Liangzhi Shi*, **Yulin Liu***, Lingqi Zeng*, Bo Ai, Zhengdong Hong, Hao Su, *Learning Adaptive Dexterous Grasping from Single Demonstrations*, **IROS 2025**

- Stone Tao*, Fanbo Xiang*, Arth Shukla, Yuzhe Qin, Xander Hinrichsen, Xiaodi Yuan, Chen Bao, Xinsong Lin, **Yulin Liu**, Tse-kai Chan, Yuan Gao, Xuanlin Li, Tongzhou Mu, Nan Xiao, Arnav Gurha, Zhiao Huang, Roberto Calandra, Rui Chen, Shan Luo, Hao Su, *ManiSkill3: GPU Parallelized Robotics Simulation and Rendering for Generalizable Embodied AI* **RSS 2025**

- Chao Xu, Ang Li, Linghao Chen, **Yulin Liu**, Ruoxi Shi, Hao Su, Minghua Liu, *SpaRP: Fast 3D Object Reconstruction and Pose Estimation from Sparse Views*, **ECCV 2024**

- Hansheng Chen, Ruoxi Shi, **Yulin Liu**, Bokui Shen, Jiayuan Gu, Gordon Wetzstein, Hao Su, Leonidas Guibas, *Generic 3D Diffusion Adapter Using Controlled Multi-View Editing*, **Arxiv Preprint**

- **Yulin Liu***, Haoran Liu*, Yingda Yin*, Yang Wang, Baoquan Chen, He Wang, *Delving into Discrete Normalizing Flows on SO(3) Manifold for Probabilistic Rotation Modeling*, **CVPR 2023**

SELECTED RESEARCH EXPERIENCE

Foundation Hand Pose Estimation Model

Prof. Hao Su, UC, San Diego, Dr. Rolandos, Imperial College London   2025.3 - present

- Ongoing project with intern.

Learning Simplified World Model from Human for Robot Dexterous Manipulation

Co-first author, **RSS-DEX 2025**

Prof. Hao Su, UC, San Diego   2025.1 - present

- Developed a novel framework that transfers the dynamics of human hand-object interactions to robot-object interactions, which guides RL for sample efficiency and enables generalization to new tasks.
- Utilized particle-based representation for embodiment transfer and integrated NVIDIA cuRobo planning pipeline to generate high-level, collision-free trajectories.
- Achieved zero-shot sim-to-real transfer by utilizing a trajectory-following reward from high-level trajectories, domain randomization, and control alignment.

- Demonstrated **SOTA** performance in extensive real-world experiments, outperforming baselines on complex **generalization tasks** like grasp-with-obstacle.

AdaDexGrasp: Learning Adaptive Dexterous Grasping from Single Demonstrations[Project, Paper]

Co-first author, mentor **IROS 2025**

Prof. Hao Su, UC, San Diego 2024.11 - 2025.3

- Developed a novel framework enabling robots to efficiently learn a library of dexterous skills from single human demonstrations and integrating VLM to allow for adaptive, context-driven skill selection.
- Designed a trajectory following reward based on states' proximity to a human demonstration and employed curriculum learning to enhance RL sample efficiency and policy robustness.
- Demonstrated successful zero-shot transfer to a real-world robotic hand, achieving a 90% success rate across various objects.

TF-HOT: Training-Free Hand-Object Pose Tracking and Optimization for Dexterous Manipulation

First author, In submission

Prof. Hao Su, UC, San Diego 2024.8 - 2024.11

- Build an efficient, training-free pipeline for in-the-wild hand-object tracking, leveraging differentiable rendering and 2D foundation models to convert videos into trajectories under 1 minute.
- Demonstrated **SOTA** performance over in-the-wild videos and successfully applied extracted trajectories to imitation learning, training dexterous manipulation policies that significantly outperformed baseline methods.

***ImVR*: Immersive VR Teleoperation System for General Purpose**[Project, Docs, Code]

First author, **RSS-DEX 2025**

Prof. Hao Su, Hillbot Inc. 2024.3 - 2024.8

- Build a versatile and immersive VR teleportation system for intuitive and precise control of diverse robots, including single- and dual-arms, grippers, dexterous hands, and wheel-based robots.
- Core features: Fully immersive 3D virtual world; smooth user experience with 4K @ 60 Hz rendering; easy deployment with docker and out-of-box examples; support mainstream VR devices like Meta Quest 3, Apple VisionPro, etc.; modular control architectures; unified sim & real teleoperation interface; etc.

Delving into Discrete Normalizing Flows on SO(3) Manifold for Probabilistic Rotation Modeling[Project, Paper, Code]

First author, **CVPR 2023**

Prof. He Wang, Peking University 2022.7 - 2023.3

- Proposed the **first** discrete normalizing flows on SO(3) manifold that avoids the discontinuity and many-to-one mapping problems of prior methods.
- Designed a novel flow by combining a Mobius-transformation-based coupling layer and a quaternion affine transformation to create a stable and expressive model.
- Achieved **SOTA** results, significantly outperforming all baselines on both unconditional SO(3) distribution modeling and conditional rotation prediction, especially for symmetrical objects.

HORNORS & REWARDS

- National Scholarship (Top 1%), *Ministry of Education in China* 2021
- Merit Students (Every year), *Peking University* 2019-2023
- Wu-Si Scholarship, highest scholarship in *Peking University* 2022
- First-Class Scholarship, *Peking University* 2020
- 1st Prize in Chinese Physics Olympiad, ranking 3rd among girls, *China* 2018

TEACHING

- Teaching Assistant, CSE276F Machine Learning For Robotics, *UC, San Diego* Spring 2025
- Teaching Assistant, Electromagnetism, *Peking University* Spring 2023

MENTORING

- Chen Si (MS, *UC, San Diego*) 2025
- Liangzhi Shi (Undergrad, *Tsinghua University*) 2024-2025
- Lingqi Zeng (Undergrad, *Hong Kong University of Science and Technology*) 2024-2025

SERVICES

- Conference Reviewer: ICRA '23, ICLR-Robotics '25, IROS '25, CoRL '25, RSS-DEX '25

SKILLS

- **Programming**: Python, C, C++, LaTeX
- **Robotics & Simulation**: SAPIEN, ManiSkill, IsaacGym
- **AI Framework**: Pytorch, Pytorch Geometric
- **DevOps & HPC**: Git, Docker, Kubernetes
- **Robots**: UFACTORY xArm6/7, ACTORY xArm Gripper, Ability Hand, XHAND
- **Lauguage**: English(TOEFL 104, fluent), Chinese (native)

MISC.

Last update: 25.9.