Binghao Huang

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Education

University of Illinois Urbana-Champaign — *Champaign, IL*
Ph.D. student in Computer Science, Advisor: Prof. Yunzhu Li — Aug. 2023 - now

University of California, San Diego — *San Diego, CA*
Master of Science in Mechanical and Aerospace Engineering, Advisor: Prof. Xiaolong Wang — Sep. 2021 - Mar. 2023

Zhejiang University of Technology — *Hangzhou, Zhejiang*
Bachelor of Engineering in Mechanical Engineering — Sep. 2015 - Jun. 2019

Publications

[1] Hanxiao Jiang, **Binghao Huang**, Ruihai Wu, Zhuoran Li, Shubham Garg, Hooshang Nayyeri, Shenlong Wang, and Yunzhu Li " RoboEXP: Action-Conditioned Scene Graph via Interactive Exploration for Robotic Manipulation" *Arxiv*, [Project] [Paper]

[2] Entong Su, Chengzhe Jia, Yuzhe Qin, Wenxuan Zhou, Annabella Macaluso, **Binghao Huang**, Xiaolong Wang " Sim2Real Manipulation on Unknown Objects with Tactile-based Reinforcement Learning" *International Conference on Robotics and Automation(**ICRA**) 2024*, [Project] [Paper]

[3] Ying Yuan*, Haichuan Che*, Yuzhe Qin*, **Binghao Huang**,Zhao-Heng Yin, Kang-Won Lee, Yi Wu, Soo-Chul Lim, Xiaolong Wang " Robot Synesthesia: In-Hand Manipulation with Visuotactile Sensing" *International Conference on Robotics and Automation(**ICRA**) 2024*, [Project] [Paper]

[4] **Binghao Huang***, Yuanpei Chen*, Tianyu Wang, Yuzhe Qin, Yaodong Yang, Nikolay Atanasov, Xiaolong Wang. "Dynamic Handover: Throw and Catch with Bimanual Hands" *Conference on Robot Learning (**CoRL**) 2023*, [Project] [Paper]

[5] Zhao-Heng Yin*, **Binghao Huang***, Yuzhe Qin , Qifeng Chen, Xiaolong Wang."Rotating without Seeing: Towards In-hand Dexterity through Touch" *Robotics: Science and Systems (**RSS**), 2023*, [Project] [Paper]

[6] Yuzhe Qin, Wei Yang, **Binghao Huang**, Karl Van Wyk, Hao Su, Xiaolong Wang, Yu-Wei Chao, Dieter Fox. "AnyTeleop: A General Vision-Based Dexterous Robot Arm-Hand Teleoperation System," *Robotics: Science and Systems (**RSS**), 2023*, [Project].

[7] Yuzhe Qin*, **Binghao Huang***, Zhao-Heng Yin , Hao Su, Xiaolong Wang."DexPoint: Generalizable Point Cloud Reinforcement Learning for Sim-to-Real Dexterous Manipulation" *Conference on Robot Learning (**CoRL**), 2022*, [Project] [Paper]

[8] Jianglong Ye*, Jiashun Wang*, **Binghao Huang**, Yuzhe Qin, Xiaolong Wang."Learning Continuous Grasping Function with a Dexterous Hand from Human Demonstrations" *IEEE Robotics and Automation Letters (**RA-L**), 2023*, [Project] [Paper]

Research Experience

Research on Robotic Perception, Interaction, and Learning Lab (RoboPIL) — *Champaign, IL*
Research Assistant, Advisor: Prof. Yunzhu Li — Sep. 2023 - Now

- **Hardware**: Constructed a bimanual teleoperation system equipped with high-resolution tactile information.
- **Imitation Learning**: Engineered a system for data collection that incorporates tactile information and enables the training of a diffusion policy. Investigated how contact information can facilitate imitation learning processes.

Research on University of California, San Diego — *San Diego, CA*
Research Assistant, Advisor: Prof. Xiaolong Wang — Sep. 2021 - Aug. 2023

- **Hardware**: Designed an arm-hand system based on XArm and Allegro-Hand and manufactured the connector; attached 16 Force Sensitive Resistor (FSR) sensors with STM32 board to the Allegro hand.
- **System Engineering**: Developed a ROS-based control pipeline for the hand-arm system, and a pipeline for in-hand manipulation tasks with tactile information. Replicated the real-world setting inside simulators (Sapien, Isaacgym).
- **Reinforcement Learning**: Trained RL policies for dexterous manipulation with Point Cloud input to solve grasping and door-opening tasks, and trained RL policies for dexterous manipulation with tactile information to solve a rotation task.
- **Sim2Real**: Transferred the grasping and door opening policy trained in SAPIEN simulator to the real robot. Designed controllers to transfer the bimanual ball throwing and catching policy trained in IsaacGym to the real system..

Research on Lab of Flexible Sensors and Intelligent Interaction (Zhejiang University) — *Hangzhou*
Research Assistant, Advisor: Prof. Geng Yang — Aug. 2020 - Aug. 2021

- **Hardware**: Designed a mobile robot system with two Kinova arms and designed the speech recognition module based on Arduino and integrated it into the robot.
- **System Engineering**: Developed a ROS-based control pipeline for the navigation system, integrating 2D-Lidar and depth camera for obstacle detection and avoidance. Implemented a Speech offline Control Strategy using Pocketsphinx to enable voice command control of the robot.
- **Computer Vision**: Designed a vision tracking method for obstacle avoidance of a mobile robot using object detection algorithm (YOLOv4) as a part of the computer vision task.

Services

Conference Reviewer

• International Conference on Intelligent Robots and Systems (IROS)

Journal Reviewer

• IEEE Robotics and Automation Letters (RA-L)

Workshop Organizer

• Learning Dexterous Manipulation(Workshop at RSS 2023),[Link]

Talks

Facebook AI Research (FAIR)

Invited Speaker: In-hand dexterous manipulation with tactile information May. 2023

Technical Skills

Programming	Matlab, C++, Python, PLC
Professional Softwares	Sapien, IsaacGym, Gazebo, Solidworks, AutoCAD, Ansys, Altium Designer
Drawing & Typesetting	Photoshop, Office, LaTeX, Premiere
Languages	Chinese(Native), English

Other Activities

NEXTEV Formula Student Electric China (FSEC)

Member of Steering system Sep. 2016 - Oct. 2017

- Led the steering system design for the team, responsible for completing engineering drawings, commissioning factory processing, and assembling the steering system into a formula car
- Utilized Matlab optimization to select an optimal steering trapezoidal layout, corrected and manufactured corresponding steering assembly, pressing device, and adjust tie rod with Adams.
- Applied for a patent: ”A kind of university student’s equation motorcycle race steering, manufacture and its installation method: 2017105998790.1”[Google Patent Link]

Zhejiang College Student Mechanical Innovation Design Competition Project

Leader Dec. 2016 - Aug. 2017

- Designed and built a machine that assisted babies in exercising and replacing the need for manual labor.
- Programmed the machine’s movements to mimic the actions of artificial baby exercise.
- Constructed a platform for the baby to lie on and equipped it with the device for assisting movement. The motor drove the hand joints, while another controlled the leg joints, and controlled the motor rotation sequence by PLC programming.