

Qie Sima

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1-510 FIT Building, Tsinghua University Haidian District, Beijing 100084, CHINA.

EDUCATION

Tsinghua University

Master of Science; GPA: 3.61/4.0 Supervised by [Prof. Huaping Liu](#)

BeiJing, China

Aug 2020 - Jul 2023

Research interests: Robotic Manipulation, Embodied Artificial Intelligence, expected to graduate in June 2023

Tsinghua University

Bachelor of Engineering ; GPA: 3.34/4.0 ;rank:13/135

BeiJing, China

Aug 2016 - Jul 2020

Enrolled in [TEEP program](#)(Tsien Excellence in Education Program, elite program, consists of top 28 students from 8 engineering departments)

RESEARCH EXPERIENCE

Lenovo Research, Lenovo Inc

Research Engineer on mobile intelligence

Beijing, China

Jul 2023 - now

- **Foundation Model for Multi-Modal Perception** : Participated in the design, development, and debugging of large-scale pre-trained models for multi-modal sensing of personal terminal smart devices. Conduct research on model compression methods for deploying pre-trained models based on GPT-3 architecture on mobile platforms with limited resource (manipulator, autonomous vehicle etc.)

AI lab Research, Bytedance Inc

Research Intern on robotics mentored by [Dr. Tao Kong](#)

Beijing, China

Jun 2022 - Mar 2023

- **Visual Pre-training for Robot Manipulation** : Conducted research on enhancing robotic performance in manipulation tasks through mainstream vision and language pre-training models. Constructed specialized datasets for robot manipulation tasks based on large-scale vision datasets. Compared and evaluated the performance of different visual pre-training architectures (CLIP, MOCOv3, MAE) in various downstream manipulation tasks, considering multiple modalities such as language, vision, and temporal information.
- **Indoor Scene Reconstruction**: Contributed to the design and real-world testing of a household service robot, focusing on 3D scene reconstruction during the robot's mobile operations and performing common tasks like grasping, lifting, door handling, and switch operations.

Tsinghua University

Graduate Research Assistant Supervised by [Prof. Huaping Liu](#)

Beijing, China

Aug 2020 - Sep 2022

- **Manipulation Question Answering Task in Embodied Scenario**: Proposed a category of embodied intelligent agents for performing robot tasks involving exploration and answering questions, referred to as Manipulation Question Answering (MQA). Constructed a dataset specifically for MQA tasks in the context of robotic arm grasping scenarios within the V-REP simulation environment. Developed a novel model approach combining imitation learning for action generation and knowledge graph-based question understanding for MQA tasks.
- **Multimodal Perception of Embodied Agents** : Proposed and developed the Remote Embodied Manipulation Question Answering (REMQA) task, which combines Embodied Referring Expression (ERE) with manipulation tasks. Constructed a benchmark dataset in the AI2-THOR simulator specifically for REMQA. Designed and implemented a framework that integrates 3D semantic reconstruction and modular network paradigms to address the REMQA task. Evaluated the effectiveness of the framework using the REMQA dataset.

Georgia Institute of Technology

Visiting Student Researcher Supervised by [Dr. Ye Zhao](#)

Atlanta, GA, USA

Aug 2019 - Feb 2020

- **Soft Contact Mechanics for Real-time Trajectory Optimization** : Study the control of Manipulator for soft material processing. A soft body deformation model is constructed for several common types of bio-compatible silicone materials in biomedical engineering when subjected to single point compression from manipulator. The force feedback control method based on ADMM optimization algorithm is designed and the simulation and real machine experiment results are presented to validate its efficiency. Follow-up work based on proposed deformation model was published in [IEEE Transactions on Robotics\(TRO\)](#)

Purdue University

Visiting Student Researcher Supervised by [Prof. Richard Voyles](#)

West Lafayette, IN, USA

June 2018 - Sep 2018

- **Surgical Robotic System with Visual Servo** : Working on the research of a system of Invasive cardiac surgical robot with visual servo system. Assembled a system consist of a catheter, guide wires, a Y-shaped valve, a stepper motor actuator, and a visual servo system. Realized the synchronization between motor actuation system and visual servo system with PID controller.
- **3D Printing of Soft Sensors for Robots**: Designed a surface tactile sensor circuit for dexterous manipulation of robotic hands, fabricated it using liquid-state organic optoelectronic materials with a 3D printer, and applied it to grasp tasks with the manufactured device.

Tsinghua University

Undergraduate Research Assistant Supervised by [Prof. Ou Ma](#)

Beijing, China

Oct 2017 - Jan 2018

- **Flexible Manipulator System for Non-cooperative Target Capture** : Designed a Flexible manipulator system for non-cooperative target capture and active debris removal, trying to apply it in orbit service satellite for space debris cleaning. Explored the application of DDPG algorithm in multi-robot system control and coordination by setting an award function based on real-time signal from distance sensor and velocity sensor.

PUBLICATIONS

- **Exploring Visual Pre-training for Robot Manipulation: Datasets, Models and Methods:** IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2023)
- **MOMA-Force: Visual-Force Imitation for Real-World Mobile Manipulation:** IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2023)
- **Exploring Visual Pre-training for Robot Manipulation: Datasets, Models and Methods:** Conference on Robot Learning (CoRL2023) workshop on Pre-train Robot learning
- **Embodied Referring Expression for Manipulation Question Answering in Interactive Environment:** IEEE International Conference on Robotics and Automation (ICRA2023), first author
- **Simultaneous Trajectory Optimization and Force Control with Soft Contact Mechanics:** IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2020), co-author
- **Dynamics analysis for spacecraft with a tendon-driven continuum manipulator:** The 16th European Conference on Spacecraft Structures, Materials and Environmental Testing (ECSSMET 2018)

RESEARCH PAPERS UNDER REVIEW

- **Scene Graph for Embodied Exploration in Cluttered Scenario:** submitted to IEEE/ASME Transactions on Automation Science and Engineering (TASE), first author, minor revision
- **Smooth Computation without Input Delay: Robust Tube-Based Model Predictive Control for Robot Manipulator Planning:** submitted to IEEE International Conference on Robotics and Automation (ICRA2024), co-author

ACADEMIC ACTIVITIES

- Posted a research poster about micro-robots applied in medical service at Weizmann Institute-Tsinghua University Workshop on Nano Science and Bioengineering, Weizmann Institute, Rehovot, Israel
- Presented a oral report in section of space structure and dynamic at The 16th European Conference on Spacecraft Structures, Materials and Environmental Testing, Noordwijk, Netherland
- Participated in the RoboTHOR Challenge (visual semantic navigation in embodied simulators), organized by the Embodied AI Workshop at CVPR 2020. Proposed a depth-aware reinforcement learning method and achieved the **2nd** position in the competition.
- Posted a research poster online about physical modeling and control of soft mechanics in surgical robot scenarios at The IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2020)
- Reviewer of ACM/IEEE International Conference on Human-Robot Interaction (HRI2023)
- Attended ICRA 2023 and post a poster on-site as the first author, London, UK
- Attended IROS 2023 and post a poster on-site, Detroit, USA
- Reviewer of IEEE International Conference on Robotics and Automation (ICRA2024)