Liu DAI

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Research Interests

My research interests lie in Data-Driven Embodied AI, with a focus on: (1) Generate large-scale and information-rich 3D environments to support robot learning, especially leveraging generative and foundation models; (2) Develop data-driven and generalizable robot perception and planning algorithms which demonstrate high robustness when being transferred from simulation to the real world.

Education

Tongji University — *Shanghai, China*

B.ENG. IN COMPUTER SCIENCE, COLLEGE OF ELECTRONIC AND INFORMATION ENGINEERING — *Sep. 2019 - Jun. 2024 (expected)*

- GPA: 87.8/100.0, Overall Ranking: 4/113 (Top 3.5%)

Peking University — *Beijing, China*

VISITING STUDENT RESEARCHER AT CENTER ON FRONTIERS OF COMPUTING STUDIES — *Mar. 2022 - Mar. 2023 (on-site)*

- Advisor: **Prof. He Wang**

University of California San Diego — *California, USA*

VISITING STUDENT RESEARCHER AT SU LAB, JACOBS SCHOOL OF ENGINEERING — *Mar. 2023 - Present (on-site)*

- Advisor: **Prof. Hao Su**

Publication

***: equivalent contribution, †: corresponding author(s)**

[C1] 3D-Aware Object Goal Navigation via Simultaneous Exploration and Identification [Link]

Jiazhao Zhang*, **Liu Dai***, Fanpeng Meng, Qingnan Fan, Xuelin Chen, Kai Xu, He Wang†

Accepted to *IEEE/CVF Computer Vision and Pattern Recognition Conference (CVPR) 2023*

[C2] CGI-Scene: Controllable Generation of Open-Vocabulary Interactive Scenes [Link]

Liu Dai, Fanbo Xiang, Minghua Liu, Hao Su†

Submitted to *IEEE/CVF Computer Vision and Pattern Recognition Conference (CVPR) 2024*

[C3] Discovering Novel Categories in SAR Images in Open Set Conditions [Link]

Liu Dai, Weiwei Guo†, Zenghui Zhang, Wenxian Yu

Accepted to *IEEE/GRSS International Geoscience and Remote Sensing Symposium (IGARSS) 2022*, Oral

[C4] GAMMA: Graspability-Aware Mobile MAnipulation Policy Learning based on Online Grasping Pose Fusion [Link]

Jiazhao Zhang*, Gireesh Nandiraju*, Jaylon Wang, Xiaomeng Fang, Chaoyi Xu, Weiguang Chen, **Liu Dai**, He Wang†

Accepted to *IEEE Conference on Robotics and Automation (ICRA) 2024*

Research Experience

University of California San Diego — *California, USA*

RESEARCH INTERN AT SU LAB, ADVISED BY **PROF. HAO SU** — *Mar. 2023 - Present*

Project: 3D Scene Generation for Interactive Embodied Tasks [C2]

- Proposed a novel pipeline to leverage 2D generative models for controllable generation of interactive 3D scenes that encompass a broad spectrum of room types, layouts, and object distributions. We provided a tool to generate fully interactive, diverse, realistic, and physically plausible 3D scenes at scale, empowering community users to produce vast data for downstream tasks.
- I led this project and contributed to the idea proposal, method design, implementation, and paper writing. Through the insights gained from this project, I realized the significant role of big data in embodied AI and how generative technologies can be immensely beneficial in this field. Based on the experiences acquired from this and previous projects, I formulated my research proposal focused on data-driven embodied AI.

Peking University — *Beijing, China*

RESEARCH INTERN AT EPIC LAB, ADVISED BY **PROF. HE WANG** — *Mar. 2022 - Mar. 2023*

Project: Active 3D Scene Understanding & Object Goal Navigation [C1]

- Proposed the first 3D-aware framework for the challenging embodied task of Object Goal Navigation, driven by exploration and identification sub-policies. We achieved effective learning from 3D data while maintaining acceptable levels of sample efficiency and computational cost.
- I contributed to the method design, implementation, and paper writing. This project ignited my passion for embodied AI, and further honed my skills in reinforcement learning, 3D vision, 3D visualization, coding, and paper writing.

Project: Robot Dog Mobile Manipulation in the Real World [C4]

- Introduced a fusion-based, graspability-aware mobile manipulation method that ensures consistent temporal grasping pose observations.

Tongji-MIT City Science Lab

Shanghai, China

Research Intern, advised by **Prof. Weiwei Guo**

Sep. 2021 - Mar. 2022

Project: Remote Sensing Image Interpretation in the Open & Challenging World [C3]

- Introduced a multi-stage framework for discovering novel categories in remote sensing images.
- This was my first research project, where I was introduce to deep learning and computer vision.

Teaching Experience

Course 55010501: *Open Source Hardware and Programming*

Tongji University

Teaching Assistant for **Prof. Xiaohua Sun** in College of Design and Innovation

2021 Fall

- Delivered courses on embedded systems and programming, covering Python, Arduino, and Raspberry Pi. Guided undergraduate students in designing and implementing their art projects by applying the knowledge from these subjects.

Entrepreneurship

I am the co-founder and CEO of LunarAI (*Unified Social Credit ID: 91310110MA7BXR9W2N*), a start-up in China that specializes in leveraging computer vision technologies to serve contemporary industrial and agricultural partners . We are the provider of a visual safety inspection system for Shanghai Yangshan Port, which is one of the largest and busiest ports in the world.

Honors & Awards (Selected)

Personal Honors

2023 **Pursuit of Excellence Scholarship** with 50000¥ (≈7000$) *Tongji University*

– Highest honor among all members of Tongji University (10/43106, among faculty, students & admin staff).

2022 **SenseTime Scholarship** with 20000¥ (≈3000$) *SenseTime Co.,Ltd.*

– Nationwide selected 30 undergraduates in the field of AI.

2022 **Undergraduate Academic Star of Tongji** *Tongji University*

– Highest honor among undergraduate students at Tongji University (15/18536).

Competition Achievements

2021 **National First Prize** of *Challenge Cup* Competition: Research Track

Project: We developed a deep learning-based pest detection system to assist agricultural workers in underdeveloped rural areas of China, where there is a significant shortage of pest detection experts, and farmers previously had to rely on folk remedies for diagnosis.

– Most influential research competition among university students in China.

– Best record in college history.

– Team leader.

2023 **National Silver Award** of *Challenge Cup* Competition: Entrepreneurship Track

– Best record in college history.

– Team leader.

2022 **Shanghai Gold Award** of *Internet+* Competition

– Team leader.

2020 **University Champion** of *FLTRP Cup* National English Public Speaking Contest

Skills

Languages Mandarin (native), English (fluent), French (preliminary)

Programming C/C++, Python, Arduino, SQL, Bash, LaTex, HTML & CSS

Frameworks Pytorch, NumPy, OpenCV, Open3D, trimesh, Blender

Others Public Speaking and Presentation