Liu DAI

dailiu.cndl@gmail.com | liudai-homepage.github.io/

Research Interest

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 & INFORMATION ENGINEERING — *Sep. 2019 - Jun. 2024*

- GPA: 88.0/100 Overall Ranking: 4/113 (Top 3.5%)

University of California San Diego — *California, USA*

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

- Advisor: **Prof. Hao Su**

Peking University — *Beijing, China*

VISITING STUDENT RESEARCHER AT CENTER ON FRONTIERS OF COMPUTING STUDIES — *Mar. 2022 - Present*

- Advisor: **Prof. He Wang**

Publication

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

[C1] 3D-Aware Object Goal Navigation via Simultaneous Exploration and Identification [Paper 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] Discovering Novel Categories in SAR Images in Open Set Conditions [Paper Link]

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

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

[C3] GAMMAP: Graspability-Aware Mobile MAnipulation Policy Learning based on Online Grasping Pose Fusion [Paper Link]

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

Submitted 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 Embodied Tasks [On-Going]

- Aiming to generate large-scale 3D scenes enriched with diverse layouts and styles, through extracting knowledge from generative models.

Peking University — *Beijing, China*

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

Project: Active 3D Scene Understanding & Object Goal Navigation [C2]

- Proposed the first 3D-aware framework for the challenging Object Goal Navigation task, empowered by two concurrent sub-policies: corner-guided exploration policy and category-aware identification policy. We tackled the issue of low sample efficiency and high computational cost when learning from 3D data , while comprehensively leveraging the rich information contained in 3D representations to boost the performance.
- I contributed significantly to the method design, coding, and writing, and was primarily responsible for visualization in this project. It ignited my passion for Embodied-AI, further honing my skills in RL, coding, writing, and plotting.

Project: Mobile Manipulation in the Real World [C3]

- Introduced a fusion-driven, graspability-aware mobile manipulation method that ensures consistent temporal grasping pose observations. These observations can be encoded into a reward system, guiding the robot to emphasize detailed observations as it moves towards the best grasping positions. The approach's effectiveness was showcased through extensive real-world tests on a robot dog.

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 [C1]

- Introduced a multi-stage framework for discovering novel categories in remote sensing images. Initially, a representation extractor is trained using a self-supervised approach, optimizing the use of both labeled and unlabeled data. Subsequently, we estimate the number of new classes and cluster the unidentified data using open-set detection.
- This was my first research project, which ignited my research interest in the Open-World setting. I independently handled the majority of the coding, writing, and plotting.

Teaching

Course 55010501: *Opensource Hardware and Programming*

Tongji University

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

2021 Fall

- Delivered courses on Python & Arduino, guided undergraduate students to design and implement their Art projects through coding.

Honors & Awards

Personal Honors

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

– Highest Honor for 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 for All Undergrads at Tongji University (15/18536).

Competition Achievements

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

Project: We built a pest detection system based on deep learning to help the agricultural workers in the less-developed rural area in China, where there is a great lack of experts on pest detection and the farmhand could only diagnose based on some folk prescription before.

– 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 **Gold Award in Shanghai** of *Internet+* Competition

– Team Leader.

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

Skills

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

Frameworks Pytorch, NumPy, OpenCV, Open3D, trimesh, Habitat Simulator

Others Public Speaking and Presentation

Languages

Chinese Native

English Fluent

French Preliminary