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 - Oct. 2023

- 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] GAMMA: 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 [C1]

- 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 [C2]**
- 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 Experience

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.

Entrepreneurship

I co-founded LunarAI, a start-up specializing in leveraging AI and computer vision technologies to cater to the contemporary needs of industrial and agricultural sectors. 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

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

Languages Mandarin (native), English (fluent), French (preliminary)
Programming C/C++, Python, LaTex, HTML & CSS, SQL, Arduino, Bash
Frameworks Pytorch, NumPy, OpenCV, Open3D, trimesh, Blender
Others Public Speaking and Presentation