

EDUCATION

Institute of Automation, Chinese Academy of Sciences (CASIA) <i>Research Intern in Robot Learning, Advisor: Wenzhao Lian</i>	Beijing, China 11/2023-10/2024
Sichuan University - Pittsburgh Institute (SCUPI) <i>Bachelor of Engineering in Mechanical Engineering</i> ♦ GPA: 3.85/4.00, 91.54/100 (Top 4 of 65)	Chengdu, China 09/2019-06/2023
Sichuan University - The Hong Kong Polytechnic University Institute for Disaster Management and Reconstruction (IDMR) <i>International Disaster Reduction and Emergency Management Innovation Class</i>	Chengdu, China 09/2020-06/2023

PUBLICATIONS

- ♦ **Litao Liu**, Wentao Wang, Yifan Han, Zhuoli Xie, Pengfei Yi, Juyan Li, Yi Qin, Wenzhao Lian. "FoAM: Foresight-Augmented Multi-Task Imitation Policy for Robotic Manipulation." *arXiv preprint arXiv:2409.19528* (2024). <https://projfoam.github.io/> (Under review for the 2025 IEEE International Conference on Robotics and Automation, ICRA 2025; decision expected by January 2025)
- ♦ Pengfei Yi, Yifan Han, Junyan Li, **Litao Liu**, Wenzhao Lian. "Viewpoint Matters: Dynamically Optimizing Viewpoints with Masked Autoencoder for Visual Manipulation." <https://sites.google.com/view/mae-select> (Under review for the ICRA 2025)
- ♦ **Litao Liu**, Bingwei Tian. "Comprehensive Engineering Frequency Domain Analysis and Vibration Suppression of Flexible Aircraft Based on Active Disturbance Rejection Controller." *Sensors*, 22.16 (2022): 6207. <https://doi.org/10.3390/s22166207> (SCI, IF=3.85, JCR Q2)
- ♦ **Litao Liu**. "Stock Investment and Trading Strategy Model Based on Autoregressive Integrated Moving Average." *2022 IEEE Conference on Telecommunications, Optics and Computer Science (TOCS)*. IEEE, 2022. <https://doi.org/10.1109/TOCS56154.2022.10015924>
- ♦ **Litao Liu**, Lei Li, Haozhou Mo. "Research on Ecological Evaluation Model Based on Principal Component Analysis." *Proceedings of the 3rd International Conference on Green Energy, Environment and Sustainable Development (GEESD2022)*. Vol. 23. IOS Press, 2022. <https://doi.org/10.3233/ATDE220312>
- ♦ **Litao Liu**, Haozhou Mo. "Research on Raw Material Ordering and Transfer Strategy based on AHP-TOPSIS and 0-1 Planning." *Conference Proceedings of the 10th International Symposium on Project Management, China, ISPM 2022*, 1076-1083. <https://doi.org/10.52202/065147-0146>
- ♦ Yonggang Liang, Yuewei Ling, Yujie Li, **Litao Liu**, Nuo Xu. "Post-disaster air purification system based on bionic lung design." *International Conference on Automation Control, Algorithm, and Intelligent Bionics (ACAIB 2022)*, Vol. 12253. SPIE, 2022. <https://doi.org/10.1117/12.2639442>

RESEARCH EXPERIENCE

General Learning Policy with Intend Mechanism <i>Guided by Prof. Wenzhao Lian School of Artificial Intelligence, Shanghai Jiao Tong University</i>	Shanghai, China 10/2024-Present
<ul style="list-style-type: none">♦ Develop a novel robot imitation learning framework that enables agents to learn effectively from large-scale, non-proprioceptive demonstrations. This framework enhances the adaptability of agents by leveraging diverse datasets to acquire versatile skills applicable across various tasks.♦ Implement fine-grained sampling of agents' visual data to identify task operation intentions. These extracted intentions serve as generalizable skills, enabling agents to learn from diverse data domains and perform effectively in various scenarios.	
Exploration of Multi-Task Imitation Learning Policy <i>Guided by Prof. Wenzhao Lian CASIA</i>	Beijing, China 03/2023-09/2024

- ♦ Created the Foresight-Augmented Manipulation (FoAM) policy, an innovative multi-task imitation learning (MTIL) framework.
- ♦ Integrated a vision-language model as the Goal Imagination Module within FoAM, enabling the agent to leverage language prompts and initial visual observation to acquire multi-goal conditions autonomously. This approach overcomes the limitations of single-condition policies and effectively generalizes to unseen tasks and scenarios.
- ♦ Proposed the Foresight-Augmented module, which predicts the consequence of actions and learns the differences between current visual observations and corresponding goal images, significantly enhancing task activation success rates in multi-task learning.
- ♦ Developed, open-sourced, and actively maintained the FoAM benchmark including 10 task suites and over 80 tasks, accompanied by a dataset featuring 14 real-world tasks.
- ♦ Evaluated FoAM across 100+ tasks in both simulated and real-world environments, achieving up to a 41% improvement in success rate for specific tasks compared to state-of-the-art MTIL baselines.

Develop High-Performance Heat Exchanger

Chengdu, China

Guided by Prof. Minking Chyu & Dr. Dong Liang | SCUPI

09/2022-09/2023

- ♦ Designed and manufactured a bionically inspired heat exchanger (HX) featuring an F-RD porous structure. Utilized ANSYS-ICEM and CFX to perform simulation experiments, uncovering the internal flow mechanisms and heat transfer characteristics of the F-RD HX.
- ♦ Conducted extensive real-world experimental studies to compare the F-RD HX with the state-of-the-art S-D HX. The results demonstrated that the F-RD achieves comparable heat transfer efficiency while significantly outperforming the S-D in mechanical properties, highlighting its potential as an ideal solution for applications requiring both superior heat transfer performance and mechanical durability.
- ♦ Explored hybrid bionic structures for HXs to improve design flexibility and enhance performance control.

Research on Vibration Suppression of Aircraft

Chengdu, China

Guided by Prof. Bingwei Tian | IDMR

11/2021-08/2022

- ♦ Designed a second-order Active Disturbance Rejection Controller (ADRC) to suppress the fourth-order pitch angle vibration dynamic model of an aircraft.
- ♦ Developed a MATLAB-Simulink simulation program to conduct detailed simulation experiments and evaluate the controller's performance.
- ♦ Analyzed the closed-loop system's robustness, tracking response, and anti-disturbance capabilities. The Monte Carlo Shooting method was utilized to validate the controller's robust control performance under 3σ conditions, achieving a 99.7% confidence level. The results highlight the controller's strong potential for practical applications in aircraft vibration suppression.

Post-Disaster Air Management

Chengdu, China

Guided by Prof. Tetsuo Shoji | IDMR & Tohoku University, Sendai, Japan

09/2020-10/2022

- ♦ Designed a water-based air scrubber inspired by the purification mechanism of mammals. This membrane-free, portable system is specifically suited for post-disaster rescue scenarios, providing clean air to victims. By mimicking the two-stage purification process in mammals, it effectively removes particulate matter such as PM2.5 and PM10, achieving a purification efficiency of up to 99.7%.
- ♦ Conducted comprehensive tasks, including market and policy research, technical documentation writing, patent application, experimental data measurement, and product performance evaluation.
- ♦ Established a partnership with an urban emergency equipment company in Sichuan province to apply our scrubber in real post-disaster scenarios.

Service Learning, Community Toughness and Resilience

Chengdu, China

Guided by Prof. Bingwei Tian | IDMR

08/2021-3/2022

- ♦ Conducted a comprehensive review of over 100 articles on community resilience and service learning, analyzing and summarizing key issues in the field.
- ♦ Analyzed and synthesized key insights, including the characteristics of service learning and actionable implementation goals for enhancing community resilience.
- ♦ Contributed to the editing and publication of a book, ensuring accuracy and clarity in presenting research findings.

INTERNSHIP

Beijing CoreNetic Technology Co., Ltd., CoreNetic.ai

Beijing, China

Dual-arm Robot Manipulation Development Intern	11/2023-10/2024
<ul style="list-style-type: none"> Operated and applied a dual-arm robot in the field of drug grasping, aiming to enhance the intelligence of pharmacy operations. Utilized the Dynamic Movement Primitives (DMP) algorithm, which models and generates complex motion trajectories. Initially, smooth trajectory data is collected, and these complex trajectories are reproduced using the DMP algorithm. This approach enables the robot to perform consistent actions from different starting points, allowing it to combine various meta-actions to accomplish diverse tasks. 	
Shanghai Zhangxiaomen Education Technology Co., Ltd.	Shanghai, China
High Scholl Theoretical Physics Teaching Teaching Intern	08/2020-07/2021
<ul style="list-style-type: none"> Offered personalized instruction to high school students, focusing on building a solid understanding of complex physics concepts and supporting their academic growth. Conducted over ten hours of dynamic and interactive teaching sessions each week, tailored to address diverse learning needs. Furthermore, utilized the earnings from this internship to independently finance my undergraduate education, demonstrating both dedication and self-sufficiency. 	

COMPETITIONS

Robot Scheme Design and Production Competition	04/2022
<ul style="list-style-type: none"> Designed and built an intelligent unmanned vehicle, utilizing an STM32 microcontroller as the central control unit. The vehicle was equipped with various modules, including grayscale sensors and visual equipment, enabling navigation and autonomous grasping capabilities. 	
Mathematical Contest in Modeling	02/2022
<ul style="list-style-type: none"> Developed and evaluated time series prediction models for Bitcoin and gold prices, utilizing Autoregressive Integrated Moving Average (ARIMA) and XGBoost neural networks. After comparing predictions against ground truth data, the ARIMA model was ultimately chosen for its superior performance in supporting effective trading decisions. 	

TEACHING ASSISTANT

Class MEMS 0031: Electric Circuits, SCUPI	2023 Spring
Class ME 0071: Introduction to Fluid Mechanics, SCUPI	2022 Fall & 2023 Spring
Class ENGR0135: Statics and Mechanics of Material I, SCUPI	2022 Fall
Class ENGR0145: Statics and Mechanics of Material II, SCUPI	2022 Spring
Class MEMS0024: Introduction to Mechanical Design, SCUPI	2021 Fall & 2022 Fall
Class PHYS 0174: Physics for Science and Engineering I, SCUPI	2021 Spring

ACTIVITIES & SERVICE

Deputy Monitor & Study Committee, Class Council, IDMR	09/2020-06/2023
Deputy Monitor & Study Committee, Class Council, SCUPI	09/2021-06/2022
Vice President, International English Exchange Association, SCU	09/2020-09/2021
Delegate, Model United Nations Conference, SCU	04/2021-05/2021
Representative, The 32 nd Student Congress, SCU	09/2020-09/2021
Student Ambassador, SCUPI	05/2020-06/2020
Volunteer, Return to High-school Social Practice of Winter Vacation, SCUPI	02/2020
Competition Coordinator, SCU Freshman Cup English Writing Competition 2019	12/2019
International Spiritual Rescue Training, SCU	10/2019

HONORS & AWARDS

Outstanding Graduate, Sichuan Province, China (Top 4%)	2023
National Scholarship, China (Top 1%)	2022
National-level Project in 2022 Undergraduate Innovation and Entrepreneurship Training Program	2022
Outstanding Graduate, Sichuan University	2022

- ♦ Outstanding Student Leader, Sichuan University 2022
- ♦ Dean's List, SCUPI (Top 10%) 2022
- ♦ Provincial Comprehensive Quality Assessment, Grade A, Sichuan Province 2022
- ♦ First prize, The Second Emergency Science Popularization Competition of Disaster Prevention and Reduction, Sichuan Province 2022
- ♦ Honorable Mention, 2022 Mathematical Contest in Modeling 2022
- ♦ Outstanding Volunteer, Press of Chinese Journal of Health Psychology 2021
- ♦ First Prize, "Chinese Tale – English Talk" Activity, SCUPI 2021
- ♦ Excellent Student Scholarship, IDMR 2022 & 2021
- ♦ Excellent Volunteer, National College Students Psychological Assessment and Psychological Knowledge Competition 2021
- ♦ Second Prize, 2020 China Disaster Prevention and Reduction Day - Emergency Escape and Evacuation Drawing Competition, IDMR 2020

OTHER INFORMATION

- ♦ **Standardized Tests:** TOEFL 107 (R 30, L 29, S 21, W 27); GRE 337 (V 168, M 169) + AW 3.5
- ♦ **Programming Skills:** Proficient in Python, MATLAB, C, LaTeX; Advanced in C++, Java Script
- ♦ **Technical skills: Software:** MuJoCo, Unreal Engine, CATIA, SolidWorks, ANSYS, Adobe (Photoshop), Microsoft Office (Certificate of Level II), SPSS, Origin; **Hardware:** Xarm Robots, Universal-Robots, Micro Controller Unit (51 MCU, STM32), RealSense, Orbbec Camera
- ♦ **Hobbies:** Traveling, Listening to music while strolling, Reading, Badminton, K-pop, Cooking, Dancing

Litao Liu

(English)

刘力滔

(Chinese)

December 15, 2024