Jiarui Li

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EDUCATION

Peking University (PKU)   Beijing, China
B.E. in Robotics Engineering (Rank 2 in class, GPA 3.7 / 4.0)   *Sep 2020 – Jul 2024 (expected)*

- **Relevant Curriculum:** Introduction to Machine Learning (94), Swarm Intelligence (99), Computer Vision (91.2), Set Theory and Graph Theory (91), Practice of Programming in C and C++ (93), Robotics Experiments (I) (91), Introduction to Computation (A) (91), Theoretical Mechanics (91), Electromagnetism (96), Social Statistics (91)

- **Technical Skills:**
- Programming Skills: Python, C/C++, MATLAB & Simulink, Embedded System (Arduino, STM32)
- AI & Robotics: ROS, Gazebo, PyBullet, Webots, SolidWorks, Moveit!, OpenCV, PyTorch, UR & Kinova manipulator programming

PUBLICATIONS

(*indicates joint first authors, red indicates representative papers)

Conference Papers:

[C3] Yao Su*, **Jiarui Li***, Ziyuan Jiao*, Meng Wang, Chi Chu, Yixin Zhu, Hangxin Liu, "Planning Sequential Aerial Manipulation for Over-actuated UAMs", in *Proceedings of IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS),* 2023.

[C2] Meng Wang*, Yao Su*, Hang Li, **Jiarui Li***, Jixiang Liang, Hangxin Liu, "Aggregating Single-wheeled Mobile Robots for Omnidirectional Movements", in *Proceedings of IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS),* 2023.

[C1] Yao Su*, Chi Chu*, Meng Wang, **Jiarui Li**, Yang Liu, Yixin Zhu, Hangxin Liu, "Downwash-aware Control Allocation for Over-actuated UAV Platforms", in *Proceedings of IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS),* 2022.

Journal Papers:

[J1] Wanlin Li*, Meng Wang*, **Jiarui Li**, Yao Su, Devesh K. Jha, Xinyuan Qian, Kaspar Althoefer, Hangxin Liu, "L³F-TOUCH: A Wireless GelSight with Decoupled Tactile and Three-axis Force Sensing", *IEEE Robotics and Automation Letters (RA-L),* 2023.

RESEARCH EXPERIENCES & SELECTIVE PROJECTS

Aerial Robotics: UAV & UAM's Design, Control and Planning   Beijing, China
Beijing Institute for General Artificial Intelligence (BIGAI)   *Jan 2022 – Jun 2023*
Supervisor: Dr. Yao Su, Prof. Yixin Zhu, Dr. Hangxin Liu, Prof. Song-Chun Zhu

- Designed and built a fully-actuated UAV platform; Implemented an optimal controller to avoid the downwash disturbance during flipping motion; Further designed a lightweight manipulator, integrated it into the UAV platform, implemented the planning and control algorithms to install a spare part on the ceiling.
- Accumulated experience in mechatronic design and implementing control and planning algorithms. These hardware-related experiences can help me deal with problems like algorithm implementation efficiently.
- The results of these works have been concluded in a few papers in IROS 2022 and IROS 2023 (submitted).

Collective Intelligence: Evolutionary Game Theory, Game & Cooperation on Complex Network   Beijing, China
Peking University, Supervisor: Prof. Aming Li, Dr. Lecheng Ruan, Prof. Long Wang   *Sep 2022 – Jun 2023*

- Used Monte Carlo Simulation to explore game strategy's evolution on complex networks, including Scale-Free network and Erdős-Rényi network, aimed to explain the emergence of cooperation in the sizable structured group. Compared the effects of different parameters and try to explain this phenomenon clearly.

Computer Vision: Image Processing, Classification, Object Detection, Segmentation, etc. Beijing, China
Peking University, Supervisor: Prof. Yixin Zhu, Dr. Siyuan Huang *Sep 2022 – Jan 2023*

- Used a transformer-based model to deal with transparent object segmentation problems. This task aims to develop a vision-based biological experiment monitoring system where transparent objects are pervasively used.
- Accumulated experiences in image processing, OpenCV, and PyTorch-based deep learning, including image classification, object detection, semantic segmentation, and other aspects during this final project and other course projects.

Machine Learning: Image and Video Classification, RL for manipulator's motion planning *Peking University*

Force sensor with Gelsight: Novel Sensor design and application with manipulator Beijing, China
Beijing Institute for General Artificial Intelligence (BIGAI) *Jun 2022 – May 2023*
Supervisor: Dr. Wanlin Li, Dr. Meng Wang, Dr. Hangxin Liu

- Designed and built the L^3 F-TOUCH sensor, an enhanced version of the classic GelSight sensor, to acquire a much better three-axis force sensing capability while being light-weight, low-cost and wireless for the ease of replication and deployment.
- Learned how to design and carry out persuasive experiments. Accumulated rich experience in hardware design and manipulator programming (sensing, planning, and actuating) with Moveit! and ROS.

Modular Robotics: Modular UAV & Modular WMR Beijing, China
Beijing Institute for General Artificial Intelligence (BIGAI) *Dec 2022 – Jun 2023*
Supervisor: Dr. Yao Su, Dr. Meng Wang, Dr. Hangxin Liu

- Explored ground- and air-based modular robotics. Used graph-theory-related methods to determine the optimal structure of our self-built novel multi-UAV system, and pave the way for building a multifunctional agile multi-UAV system.
- Designed and constructed an omni-wheeled dockable Wheel Mobile Robot (WMR). We investigated the docking issue and carried out the group transportation with our multi-WMR system.

APPOINTMENTS

School of Engineering and Applied Sciences, Harvard University Boston, MA
Undergraduate Researcher in Computational Robotics Research Group *Jun 2023 - Present*
<u>Research Advisor</u>: Prof. Heng Yang

Beijing Institute for General Artificial Intelligence (BIGAI) Beijing, China
Undergraduate Research Intern in Robotics Lab, Frontier Research Center *Jan 2022 – Jun 2023*
<u>Research Advisor</u>: Dr. Yao Su, Dr. Hangxin Liu

HONORS & AWARDS

- **Intern Outstanding Contribution Award** from Beijing Institute for General Artificial Intelligence 2023
- **University Merit Student** from Peking University 2022
- **Schneider Scholarship** from College of Engineering, Peking University 2022