shuyangs@andrew.cmu.edu (412) 679-9902 https://sy-shi.github.io

Shuyang Shi

EDUCATION

Carnegie Mellon University Pittsburgh, PA

Master of Science in Robotics, GPA: 4.0/4.0 Aug. 2025

Coursework: Intro to RL, Math for Robotics, Visual Learning

Shanghai Jiao Tong University Shanghai, China

Bachelor of Science in Mechanical Engineering, GPA: 3.84/4.3 June 2023

Coursework: Robotics, CV, Artificial Intelligence, Data Structure, Modeling Analysis and System Control

SKILLS

Programming Languages: Python, C/C++, MATLAB, Shell Script

Robotics and Automation: Control algorithms, planning, multi-robot systems, and system design.

Machine Learning: Deep reinforcement learning, transfer learning, multi-agent learning, and computer vision.

Software & Tools: ROS, PyTorch, Ray, RLlib, TorchRL, OpenAI Gym, SolidWorks, and Simulink.

RESEARCH EXPERIENCE

Reinforcement learning & transfer learning | *Carnegie Mellon University Robotics Institute* Oct. 2023 – Present

- Proposed and verified a **reinforcement learning** framework which exploits **LLM** feedback for reward specification based on potential functions. Improved learning efficiency compared with traditional **RLHF** algorithms. **Paper published**.
- Developed **policy transfer strategy** based on action advising to improve reinforcement learning efficiency in multi-agent **ad hoc teaming**, focusing on accelerating policy adaptation based on skill identification. **Submitted to AAMAS 2025**.

Large-scale multi-agent RL | *Kent State University College of Aeronautics & Engineering* June 2022 – Jan. 2023

- Established a **distributed behavior control** pipeline using social network insights and reinforcement learning for large-scale multi-agent teams; responsible for the design of **MARL** framework and multi-agent control pipeline.

Multi-robot motion planning | *Shanghai Jiao Tong University School of Mechanical Engineering* Dec. 2022 – June 2023

- Initiated a **vision-based control** framework for multiple **collaborative mobile robots**, enabling vision-based localization of an aerial vehicle for safe navigation. Guaranteed robust **UAV localization** for **96.6%** of the experiment duration, utilizing a team of two ground vehicles.

Mechatronics design & control | *Shanghai Jiao Tong University School of Mechanical Engineering* Mar. 2021 – May 2022

- Proposed an **adaptive control** method with mass-inertia estimation and disturbance rejection tailored for **multi-rotor UAVs** in aerial transportation tasks. Achieved high-quality trajectory tracking performance in **Gazebo simulation**. **Paper published**.
- Designed a **hexarotor UAV** capable of grasping and transporting a quadruped robot via an adaptive docking structure; responsible for **vision-based localization** development and **serial communication** system design for UAV-quadruped data exchange. **Paper published**.

ACADEMIC PROJECTS

Creative Mobile Robot Wall-Painting | *CMU* Jan. 2024 – May 2024

- Implemented a **mobile manipulator navigation** framework for flexible wall-painting based on STRETCH-RE1 platform; responsible for **ROS** software development.
- Integrated pre-trained **VLM** models to enable image-to-stroke creative painting.

Guided Exploration for Safe RL in Self-Driving | *CMU* Oct. 2023 – Dec. 2023

- Explored value-based schemes for **guided RL** with imperfect expert demonstrations. Tested the methods in a **self-driving** scenario. Effectively reduced training cost and improved sample efficiency compared with vanilla RL algorithms.

Strategy Distillation for Multi-Player Card Game | *SJTU* Mar. 2022 – June 2022

- Developed an expert player movement dataset and distilled an explainable strategy using **decision tree models**.
- Predicted player win rates from hand cards based on **Naïve Bayes estimation** and **deep neural networks**. Achieved over 70% accuracy on the collected dataset.

Navigation for UR-10 Manipulator | *SJTU* Apr. 2022 – June 2022

- Implemented a **navigation system** for UR-10 manipulator and verified on Simulink; responsible for **dynamics modeling and path planning** algorithm design.

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- Enhanced **self-collision avoidance** based on artificial potential field algorithms.

Others: Obstacle-Climbing Robot, Mobile Robot Path Planning, Foldable Wave Energy Capture Robot.

PUBLICATIONS

- **Shuyang Shi**, Yue Guo, et al. *Enhancing Multi-Agent Teaming Efficiency Through Experience-Based Action Advising*. Submitted to 24th International Conference on Autonomous Agents and Multiagent Systems (AAMAS 2025).
- Muhan Lin, **Shuyang Shi**, et al. *Speaking the Language of Teamwork: LLM-Guided Credit Assignment in Multi-Agent Reinforcement Learning*. Submitted to 24th International Conference on Autonomous Agents and Multiagent Systems (AAMAS 2025).
- Muhan Lin, **Shuyang Shi**, et al. *Navigating Noisy Feedback: Enhancing Reinforcement Learning with Error-Prone Language Models*. In Findings of the Association for Computational Linguistics: EMNLP 2024.
- Muhan Lin, **Shuyang Shi**, et al. *A Reward Analysis of Reinforcement Learning from Large Language Model Feedback*. Workshop on Reinforcement Learning Beyond Rewards@ Reinforcement Learning Conference 2024.
- **Shuyang Shi**, Yuzhu Li, and Wei Dong. *RISE-Based Adaptive Control with Mass-Inertia Parameter Estimation for Aerial Transportation of Multi-Rotor UAVs*. arXiv preprint arXiv:2209.08209 (2022).
- Shan, H., Chen, G., **Shi, S.**, Qin, Z. W. M., & Dong, W. *Dragon rider-An integrated unmanned quadruped-hexarotor system for flight-impeded area exploration*. In *2021 27th International Conference on Mechatronics and Machine Vision in Practice (M2VIP)* (pp. 411-416). IEEE.