

Shuyang Shi

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EDUCATION

School of Mechanical Engineering, Shanghai Jiao Tong University (SJTU)

Sep 2019 - Jun 2023 (Expected)

- Bachelor of Mechanical Engineering. **Overall GPA: 89.8/100, Ranking: 7/163**
- Research Interests: Multi-Agent Systems, UAV, Planning, Control Theory

PUBLICATION

- [1] Shi, Shuyang, 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).
- [2] Shan, H., Chen, G., Shi, S., Qin, Z. W. M., & Dong, W. (2021, November). Dragon Rider-An Integrated Unmanned Quadrupe-
Hexarotor System for Flight-Impeded Area Exploration. In *2021 27th International Conference on Mechatronics and Machine Vision in Practice (M2VIP)* (pp. 411-416). IEEE.

PROFESSIONAL EXPERIENCE

- IEEE RA-L, ICRA 2023 reviewer

RESEARCH EXPERIENCE

Efficient Large-Scale Collective Behavior Manipulation | Research Assistant/Project Leader

Jun 2022 - present

Advisor: Rui Liu, Assistant Professor of College of Aeronautics and Engineering, Kent State University

- Proposed a social network informed distributed manipulation method to achieve collective behaviors with semantic meanings.
- A dynamic election paradigm was designed to find critical agents in a crowd and improve control efficiency.

Adaptive Control of UAVs with Parameter Estimation [1] | Research Assistant/Project Leader

Oct 2021 - May 2022

Advisor: Wei Dong, Associate Professor of Robotics Institute, SJTU

- Proposed an adaptive control method with mass-inertia estimation and disturbance rejection for aerial transportation tasks of multi-rotor UAVs.
- The method exploits the RISE robust compensation term and filter operations to improve the convergence performance of control.
- Evaluated the proposed method numerically in MATLAB and conducted a simulation in ROS gazebo.

Design of an Integrated Unmanned Quadrupe-Hexarotor System [2] | Group Member

Mar 2021 - Sep 2021

Advisor: Wei Dong, Associate Professor of Robotics Institute, SJTU

- Designed a hexarotor UAV capable of grasp and transport a quadrupe robot via an adaptive docking structure.
- Developed a vision-based approach for the quadrupe robot to detect and localize the hexarotor with yolo-v3 and QR-Code.
- Realized computing resource sharing between the hexarotor and the quadrupe during flight via the serial communication function of the docking structure.

A Wave Energy Capture Robot Based on Foldable Wings | Group Member

Oct 2020 - Oct 2021

Advisor: WeiXing Chen, Assistant Professor of School of Mechanical Engineering, SJTU

- Designed an autonomous underwater vehicle with wave energy capture ability based on foldable wings.
- Established the body dynamics model based on the Lagrange formulation to analyze the energy capture efficiency and conducted simulation in MATLAB Simulink.

SELECTED PROJECTS

Navigation for UR-10 Manipulator | Project Leader

Apr 2022 - Jun 2022

- Implemented the (inverse) kinematic and dynamic methods of UR-10 manipulators.
- Designed an artificial potential field algorithm with self-collision avoidance for path planning.
- Developed a trajectory planning with cubic splines based on dynamic programming.

Path Planning for Mobile Robots | Project Leader

Feb 2021 - May 2021

- Implemented the A* algorithm in ROS C++/Python, and smoothed the path based on the Floyd algorithm.
- Developed an interactive interface in Rviz to compare the effectiveness of the implementation between C++ and Python.

AWARDS

- Shanghai General Motors Wuling Scholarship (**Top 20%**) 2021
- Meritorious Winner of 2021 Mathematical Contest in Modeling (**Top 7%**) 2021

SKILLS

- Programming Languages:** Proficient in C/C++, MATLAB, Python
- Software:** Solidworks, ROS