Curriculum Vitae

Shilong Ji

jishilong200005@gmail.com/ShilongJi@buaa.edu.cn/17376505@buaa.edu.cn

(+86) 13261807577

Education

August 2021—June 2024	**Degree:**	Master of Engineering in Automation Science and Engineering
	Where:	Beihang University, Beijing, China
	GPA:	3.83/4.0 (ranking 2/39)
	Research:	
		Bicopter control, Robotics
	Advisor:	Yingxun Wang, Xiang He

August 2017—June 2021	**Degree:**	Bachelor of Engineering in Automation Science and Engineering
	Where:	Beihang University, Beijing, China
	GPA:	3.81/4.0 (ranking 22/205)
	Research:	
		Event Camera-base vision
	Advisor:	Zhihao Cai, Jiang Zhao

Verbal ability

TOEFL: 103 (Reading: 30; Listening: 29; Speaking: 22; Writing: 22)

GRE: 339 + 5(Verbal Reasoning: 169; Quantitative Reasoning: 170; Analytical Writing: 5. 0)

Research Interest

LLM for Robotics, Learning-based Control, Planning

Research

Project: Flipping an Upright-Inverted Bimodal Bi-Copter UAV [1]

Contributions:

- In this work we designed a bimodal bicopter that can fly both upright and upside-down. The platform can take off easily in the upright mode, half-flip into the inverted pose, which is a minimum phase system in attitude that enables agile flight. It can then flip back to upright flight for safe landing.

- We solved three major problems in this work. First, we built an accurate bldc motor model that capture the stochastic reversal delay time which is found statistically fitting well to a lognorm diistribution. Next, we designed a parameterized angular rate trajectory that enables the half-flip transition between the two modes. Last but not least, we optimized the half flip through particle swarm optimization for minimum position offset, which takes into account

the random motor reversal delay time by setting the worst trail out of five as the particle pose. **The bicopter is able to achieve half flip in 0.8 seconds within 1 meter and reaching 3g with maximum angular rate of 600 degrees per second.**

- For further information, please refer to our full length video here, which explains the platform and design in detail.

Project: LSTM-based observer for a quadcopter with suspended payload
Contributions:

- For a quad-rotor with a cable-suspended payload, we designed an **LSTM(long short term memory) Neural Network** to predict the position and velocity of the payload based solely on the status of the quadcopter **without cameras or other sensors** on the payload. The mean square error of the payload's position is less than 0.2m.

- We are designing a corresponding controller and we aim to achieve accurate control of payload in real-world experiments.

Publications

1 **Shilong Ji**, Yingxun Wang, Xiang He*, "Flipping an Upright-Inverted Bimodal Bi-Copter UAV: Attitude Control and Optimization", IEEE Robotics and Automation Letters (RA-L) (manuscript in preparation)

2 Jiang Zhao, **Shilong Ji**, Zhihao Cai, Yiwen Zeng, Yingxun Wang, "Moving Object Detection and Tracking by Event Frame from Neuromorphic Vision Sensors", Biomimetics 2022

3 Yingxun Wang, **Shilong Ji**, Zhihao Cai, Jiang Zhao, "An Event-based Angle Measurement Method", ICGNC 2022

Technical experience

Matlab/Simulink, Solidworks, C, Linux, ROS, Python

Honors and awards

- Outstanding students of BUAA (2018, 2023)

- Top-Grade Scholarship for Excellence BUAA (2018)

- First-class Scholarship for Excellence BUAA (2022, 2023)

- Second-class Scholarship for Excellence BUAA (2019, 2020, 2021)

- Second Award for National Undergraduate Curling AI Challenge (2018)

- Third Award for "Huawei Cup" The 18th China Postgraduate Mathematical Modeling Competition (2022)