

PENGDA MAO

XueYuan Road No.37, HianDian District, Beijing, 100191, P.R.China

☎ +86-15652576519 ✉ maopengda@buaa.edu.cn  [Google Scholar](#)

Education

Ph.D. Candidate in Guidance, Navigation and Control

Department of Automation, Beihang University, Beijing, China

Sep. 2022 – Present

Advisor: Prof. Quan Quan

Master in Guidance, Navigation and Control

Department of Automation, Beihang University, Beijing, China

Sep. 2020 – July 2022

Advisor: Prof. Quan Quan

B.S. in Automation

Shen Yuan Honors College, Beihang University, Beijing, China

Sep. 2016 – July 2020

Research Interest

Robotics, Trajectory Planning, Optimization Control, Swarm Robotics

Publications

- 1 Pengda Mao, Rao Fu, and Quan Quan, “Optimal Virtual Tube Planning and Control for Swarm Robotics,” *International Journal of Robotics Research (IJRR)*, Vol 43, No 5, 2024, <https://doi.org/10.1177/02783649231210012> (Cover Paper).
- 2 Pengda Mao, and Quan Quan, “Making Robotics Swarm Flow More Smoothly: A Regular Virtual Tube Model,” *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 4498-4504, 2022, [10.1109/IROS47612.2022.9981842](https://doi.org/10.1109/IROS47612.2022.9981842).
- 3 Pengda Mao, Yan Gao, Bo Wang, An Yan, Xiaoyu Chi, and Quan Quan, “Fast Light Show Design Platform for K-12 Children,” *IEEE International Conference on Robotics and Automation (ICRA)*, pp. 9396-9402, 2021, [10.1109/ICRA48506.2021.9561445](https://doi.org/10.1109/ICRA48506.2021.9561445).

Research Experience

Trajectory Planning and Control for Swarm Robotics

Apr. 2022

- Introduced the concept of the “optimal virtual tube” for swarm robotics passing through obstacles-dense environment.
- Proposed a method for generating a set including infinite homotopic optimal trajectories.
- Combined with model predictive control (MPC), simulations and experimental validations were conducted to confirm the effectiveness of the proposed method.

Unmanned Aerial Vehicle (UAV) Intelligent Racing Competition

Oct. 2021

- Implemented YOLO for circular object detection in Airsim simulated environments, and employing estimation algorithms to predict the motion state of dynamic circular objects.
- Implemented visual servo control for autonomous landing and crossing diagonal gaps during actual flight of unmanned aerial vehicles.
- In the simulation competition, achieved first place; in the actual flight competition, secured second place.

Fast Light Show Platform Design

Aug. 2020

- Responsible for the research and development of algorithms for drone swarms, employing a model-based approach and utilizing the artificial potential field method to achieve collision avoidance and trajectory generation.
- Completed the design, construction, and testing of the platform prototype, and conducted actual flight experiments.

Selected Awards

The First Prize Scholarship

Top 15%, awarded by Beihang University

Sep. 2022

Beihang Outstanding Graduates

Top 10%, awarded by Beihang University

July 2020

Beihang Outstanding Student

Top 10%, awarded by Beihang University

Mar. 2017

Technical Skills

Languages: English at academic and daily communication level (CET-6)

Programming: Matlab, C++, Python, LaTeX