

XIAOZHEN ZHANG

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1 EDUCATION

Beijing Institute of Technology, China 2021 – Present

Ph.D. candidate, School of automation, Supervisor: Qingkai Yang

Northwestern Polytechnical University, China 2018 – 2021

M.S. degree, School of aerospace, Supervisor: Panfeng Huang

Northwestern Polytechnical University, China 2014 – 2018

B.S. degree, Honour college.

2 RESEARCH EXPERIENCE

Cooperative transportation 2018 – 2021

I focus on the tethered aerial cooperative transportation system, where the payload is tethered by multiple multi-rotor UAVs via cables. I have studied the tracking control problem of the payload, the synchronization problem of UAVs' local mission times, and the transportation formation design problem based on cable tension.

Formation control 2018 – Present

I have contributed to aerial cooperative transportation by designing formation coordinate control laws that are equipped with disturbance observers. I have also studied the theoretical formation control problem for multi-agent systems, including scaling control and affine formation control. Now, I am working to explore the affine formation control approach in a more general form.

Formation design 2018 – Present

For tethered aerial cooperative transportation systems, I have proposed a centralized formation optimization with the consideration of force distribution on cables. By utilizing the admittance model, I have achieved the simultaneous optimization of both the interactive tensions on cables and the positions of UAVs. For multi-agent systems, I have proposed a framework for cooperatively designing the formation scaling and translation parameters in response to environmental excitations. Now, I am working to construct an interactive model between the environment and formations.

Cooperative estimation 2021 – Present

I find that the cooperative estimation is essentially solving a system of linear equations in a distributed manner. I have proposed a distributed algorithm for solving a system of time-varying linear equations. Now, I am working on the application of the proposed algorithm in formation control.

3 PUBLICATIONS

[1] **Xiaozhen Zhang**, Fan Zhang, Panfeng Huang, Jiale Gao, Hang Yu, Chongxu Pei, Yizhai Zhang, "Self-Triggered Based Coordinate Control With Low Communication for Tethered Multi-UAV Collaborative Transportation", *IEEE Robotics and Automation Letters*, 2021.

[2] **Xiaozhen Zhang**, Fan Zhang, Panfeng Huang, "Formation Planning for Tethered Multirotor UAV Cooperative Transportation With Unknown Payload and Cable Length", *IEEE Transactions on Automation Science and Engineering*, 2023.

[3] **Xiaozhen Zhang**, Qingkai Yang, Jingshuo Lyu, Xinyue Zhao, and Hao Fang, "Distributed Variation Parameter Design for Dynamic Formation Maneuvers With Bearing Constraints," *IEEE Transactions on Automation Science and Engineering*, 2023.

[4] **Xiaozhen Zhang**, Qingkai Yang, Fan Xiao, and Hao Fang, "Linear Formation Control of Multi-agent Systems," *Automatica*. (submitted)

- [5] **Xiaozhen Zhang**, Qingkai Yang, Xianlin Zeng, Hao Fang, and Jie Chen, “Cooperative Shape-Translation Estimation and Control for Time-Varying Linear Formation,” *IEEE Transactions on Automatic Control*. (submitted)
- [6] Ya Liu, Fan Zhang, Panfeng Huang, **Xiaozhen Zhang**, “Analysis, planning and control for cooperative transportation of tethered multi-rotor UAVs”, *Aerospace Science and Technology*, 2021.
- [7] **Xiaozhen Zhang**, Fan Zhang, Panfeng Huang, Chen Wang, and Ya Liu, “Distributed Control for Cooperative Transportation in Presence of Unknown Disturbance”, in *IEEE International Conference on Real-time Computing and Robotics (RCAR)*, 2019.
- [8] **Xiaozhen Zhang**, Jingshuo Lv, Shaolei Wei, and Qingkai Yang, “Distributed Decision Making on Scaling Size for Obstacle Avoidance in Affine Formation Control”, in *37th Youth Academic Annual Conference of Chinese Association of Automation (YAC)*, 2022.
- [9] **Xiaozhen Zhang**, Qingkai Yang, Rui Yu, Delong Wu, Shaozhun Wei, Jingqiang Cui, and Hao Fang, “Design and Analysis of Truss Aerial Transportation System (TATS): The Lightweight Bar Spherical Joint Mechanism”, in *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2022.
- [10] **Xiaozhen Zhang**, Qingkai Yang, Haijiao Wei, Wei Chen, Zhihong Peng, and Hao Fang, “A Distributed Algorithm for Solving A Time-Varying Linear Equation” in *62nd IEEE Conference on Decision and Control (CDC)*, 2023.

4 ACADEMIC SERVICE

- **Conference Reviewer:** IROS2019, IROS2021, IROS2022, ACC2022, CDC2023, ICIT2024.
- **Journal Reviewer:** IEEE Transactions on Automation Science and Engineering, IEEE Transactions on Control Systems Technology, IEEE Transactions on Signal and Information Processing over Networks, Journal of Advanced Computational Intelligence and Intelligent Informatics, Discover Applied Sciences.

5 SKILLS

- Programming Languages: C++ == Matlab > Python == Android.
- Platform: Windows, Linux.
- Design Tools: ROS, Solidworks, QT creator, Visual Studio.
- Paper writing: Skilled in Latex.

6 OTHERS

- **Google scholar:** <https://scholar.google.com/citations?user=rcMx3LUAAAAJ>
- **Personal page:** <https://mkb9559.github.io/zxz-main/>
- **GitHub:** <https://github.com/mkb9559>