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 achieved the aerial cooperative transportation via formation controller that equipped with a disturbance observer. I also studied the theoretical formation control problem for multi-agent systems, including scaling control, affine formation control. Now I am working to explore the affine formation control approach in a more general form.

Formation design   2018 – Present

I have proposed a centralized formation optimization with the consideration of force distribution on cables. By utilizing the admittance model, I have achieved to simultaneously optimize both the internal tension and positions of UAVs. For multi-agent systems, I also have proposed a framework for cooperatively designing the formation scaling and translation parameters in response to environmental excitations. Now I am working to construct the interactive model between the environment and formation.

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 an 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 Signal and Information Processing over Networks, Journal of Advanced Computational Intelligence and Intelligent Informatics.

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