

MINSEN YUAN

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EDUCATION

Doctor of Philosophy in Aerospace Engineering and Mechanics Sept. 2023 – Present

University of Minnesota, Twin Cities GPA: 4.0/4.0

- **Advisors:** Prof. Yue Yu and Prof. Ryan Caverly.

Master of Science in Intelligent System Engineering Sept. 2021 – May 2023

University of Michigan, Ann Arbor GPA: 3.5/4.0

Bachelor of Engineering in Civil Engineering Sept. 2017 – June 2021

Wuhan Institute of Technology GPA: 3.7/4.0

TECHNICAL SKILLS

Core Expertise: Motion Planning, Trajectory Optimization, Decision-Making for Autonomous Systems, Nonlinear Optimization, Optimal Control, Multi-Agent Systems, Collision Avoidance, System Identification, Optimal State Estimation, Signal Processing, Robust Control, Dynamics and Control

Programming & Frameworks: C++, Python, MATLAB, ROS2, CasADi, Mathematica

Tools & Platforms: Git, Linux, GAMS, ANSYS, AutoCAD, LaTeX

PUBLICATIONS

- **Minsen Yuan**, R. J. Caverly, and Y. Yu, “Filtering-linearization: A first-order method for nonconvex trajectory optimization with filter-based warm-starting,” accepted to the *2025 American Control Conference (ACC)*, [[link](#)].
- **Minsen Yuan** and Y. Yu, “Sequential convex programming with filtering-based warm-starting for continuous-time multiagent quadrotor trajectory optimization,” accepted to *Journal of Guidance, Control, and Dynamics* [[arXiv](#)].

RESEARCH EXPERIENCE

Warm-Started Sequential Convex Programming for Multiagent Quadrotor Trajectory Optimization

Advisor: Prof. Yue Yu and Prof. Ryan Caverly, University of Minnesota

- Developed a warm-started Sequential Convex Programming (SCP) framework using nonlinear state estimation and filtering techniques for three-dimensional (3D) multi-agent motion planning and control with collision avoidance.
- Implemented the proposed warm-started SCP for multi-agent quadrotor systems, achieving 10× runtime speedup over state-of-the-art benchmark solvers, and validated on hardware flight tests under collision-avoidance constraints.

Trajectory Optimization for Energy-Sharing UAV-UGV with Multiple Task Locations

Advisor: Prof. Yue Yu, University of Minnesota; Dr. James Humann, DEVCOM

- Developed novel decision-making models for UAV-UGV energy-sharing and task coverage constraints.
- Proposed a novel nonlinear programming (NLP) framework to generate dynamically feasible trajectories while satisfying task coverage and energy-sharing constraints.
- Analyzed scalability and performance against mixed-integer nonlinear programming (MINLP) formulations, demonstrating superior scalability and reducing computation time by two orders of magnitude.

Cost-Benefit Optimization for Noise-Aware and Equitable Urban ATFM

Advisor: Prof. Zhenyu Gao, The Hong Kong University of Science and Technology; Prof. Yue Yu, University of Minnesota

- Proposed an integrated Urban Air Mobility (UAM) traffic management framework that balances noise exposure costs with commuting benefits.
- Formulated the traffic flow problem as a nonconvex, nonlinear optimization model and developed a tailored two-stage heuristic algorithm.
- Conducted a city-scale case study using real-world geospatial and acoustic data from Austin, Texas, demonstrating a 50% improvement in solution quality compared to benchmarks.

Hybrid Control of Vibratory Networks

Advisor: Prof. Jeff Scruggs, University of Michigan

- Converted vibratory control problems into QCQP formulations for large-scale infrastructure systems.
- Investigated Lagrange dual functions for optimizing dynamic control strategies.

TEACHING EXPERIENCE

Teaching Assistant, Dynamics

Sept. 2023 – Dec. 2023

University of Minnesota, Twin Cities

Minneapolis, MN

- Led weekly discussions, prepared materials, and supported students to improve understanding of key concepts in rigid-body dynamics and kinematics.

HONORS AND AWARDS

- John A. & Jane Dunning Copper Fellowship Apr. 2024
- Second Prize, 10th Chinese Undergraduate Mathematics Competition Oct. 2018

SERVICES

- **Paper Review:** IFAC World Congress 2025 – 2026
- **Paper Review:** Journal of Guidance, Control and Dynamics 2024 – 2025
- **Paper Review:** IFAC journal Automatica 2024 – 2025
- **Paper Review:** IEEE Control Systems Letters 2024 – 2025