Zuyi Guo

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Education

- **Zhejiang University** *Sep. 2022 – Jun. 2026(Expected)*
  B.E. in Automation **GPA:4.06/4.3**

- **University of Notre Dame** *Jul. 2025 - Sep. 2025*
  International Summer Undergraduate Research Experience(*iSURE*) Advisor: *Mengxue Hou*

Research Interests

My research interests include AI, control theory and multi-agent systems. I aim to explore critical issues such as trustworthy autonomous driving and coordination of multi-agent systems. Specifically, I focus on building a solid understanding of both theoretical and practical aspects of AI, with an emphasis on developing *robust*, *safe* and *adaptive* intelligent systems. My goal is to connect foundational control theory with cutting-edge AI techniques to address real-world challenges where uncertainty, partial observability, and dynamic environments pose significant barriers to reliability.

Publications

Conference Papers

1. **[ACC'26]** Zuyi Guo, Ronghao Zheng†, Meiqin Liu, Senlin Zhang, "A Generalized Voronoi Graph based Coverage Control Approach for Non-Convex Environment", *American Control Conference (ACC), 2026.* [pdf]

Patents

2. Zuyi Guo, Ronghao Zheng, Meiqin Liu, Senlin Zhang, "A Generalized Voronoi Graph based Coverage Control Approach for Non-Convex Environment", *ZL202511364477 2, Under Review.*

Projects

- **Deadlock Avoidance for Decentralized Multi-agent Systems** *Jan. 2026 - Present*
  Advisor: Ronghao Zheng
  Objective: To develop a CBF-inspired method for deadlock avoidance for decentralized multi-agent systems.
  Achievements: (1) Addressed the deadlock issue in distributed multi-robot systems by improving the CLF-CBF framework. (2) Proposed a dynamic and robust deadlock indicator function that effectively measure the risk of deadlock.

- **A MZ Formalism based Estimation Approach for Dynamic Obstacle Avoidance**
  Advisor: Mengxue Hou *Jul. 2025 - Sep. 2025*
  Objective: To develop a dynamic obstacle avoidance approach for multi-robot systems by integrating the Mori-Zwanzig formalism.

Achievements: (1) Integrated the Mori-Zwanzig formalism into multi-robot systems, enabling dynamic obstacle avoidance using historical data. (2) Built a physical robot platform, adopted Optitrack for real-world validation, and incorporated PID control to regulate robot motion during experiments.

- **Coverage Control Method for Multi-robot Systems** *Mar. 2025 - Oct. 2025*
  Advisor: Ronghao Zheng
  Objective: To address the limited coverage performance of multi-robot systems in non-convex environment.
  Achievements: (1) Applied a general Voronoi graph to partition the entire area and implemented quant consensus to realize uniform distribution of robots. (2) Secured ACC acceptance for the paper, and submitted a patent application that is currently under review.

- **Grasping Control of Manipulators** *Sep. 2024 - Dec. 2024*
  Advisor: Qinyuan Ren
  Objective: To address the challenges of optimal grasping performance for objects with extreme physical characteristics.
  Achievements: (1) Developed a mathematical modeling framework enabling the robotic arm to perceive object shape and contact deformation. (2) Allowed the manipulator to adjust the applied force accordingly, while ensuring a secure grasp of the object.

- **Mutli-Model LLM Safety: Jailbreak Defense for Text-to-Image Models**
  Advisor: Yanjiao Chen *Mar. 2024 - May. 2024*
  Objective: To enhance the safety and functionality of multimodal large language models.
  Achievements: (1) Understood the vulnerabilities of text-to-image models generating Not-Safe-For-Work (NSFW) visual contents. (2) Explored novel methodologies to mitigate the generation of NSFW images, evaluating model robustness and ethical constraints for real-world deployment.

Industrial Experiences

- **Qingdao Wongoing Information Technology Co. Ltd.** *Jul. 2024 – Sep. 2024*
  PLC Algorithm Research Intern
  Objective: To design and implement a reliable PLC-based control system for a hyperbaric oxygen chamber, ensuring compliance with operational requirements.
  Achievements: (1) Thoroughly mastered the chamber's operational requirements as foundational preparation for system design. (2) Developed and optimized the PLC program and enhanced system responsiveness and stability.

Honors and Awards

- National Undergraduate Mathematics Competition(First Prize in Zhejiang Province) *2023*
- Third Class Scholarship *ZJU,2023,2025*