Wang Xinyi

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Education

- **Postdoctoral Fellow,** Robotics Department, University of Michigan   09/2024-Now
- **Postdoctoral Fellow,** Department of Mechanical & Automation Engineering,
  The Chinese University of Hong Kong   10/2023-09/2024
- **Ph.D. Degree,** Department of Mechanical & Automation Engineering,
  The Chinese University of Hong Kong   08/2019-09/2023
  Supervisor & Co-supervisor: Prof. Ben M. Chen (IEEE Fellow & Academy of Engineering Fellow, Singapore) & Prof. Jie Huang (IFAC Fellow & IEEE Fellow)
- **B.Eng. Degree,** Flight Vehicle Design and Engineering, Xiamen University   09/2015-06/2019
  GPA: 91.8/100 (Ranking 1st out of 46)
- **Visiting student,** University of Oxford   02/2017

Research Interests

Task and motion planning, multi-agent coordination system, optimization and control theory

Publications

(# = equal contribution, * = corresponding author)

- **Journals**

[1] V. S. Chipade, **X. Wang**, D. Panagou. IDCAIS: Inter-Defender Collision-Aware Interception Strategy against Multiple Attackers, IEEE Transactions on Control of Network Systems (TCNS), under review, 2024.

[2] **X. Wang**, L. Xi, Y. Ding, B. M. Chen. Distributed Encirclement and Capture of Multiple Pursuers with Collision Avoidance. IEEE Transactions on Industrial Electronics (TIE), 2023.

[3] C. Gao, **X. Wang***, X. Chen, B. M. Chen. A Hierarchical Multi-UAV Cooperative Framework for Infrastructure Inspection and Reconstruction. Control Theory and Technology (CTT), 2023.

[3] **X. Wang**, L. Xi, Y. Chen, S. Lai, F. Lin, B. M. Chen. Decentralized MPC-based trajectory generation for multiple quadrotors in cluttered environments. Guidance, Navigation and Control (GNC), 2021, 1(02): 2150007.

[4] C. Gao, **X. Wang**, R. Wang, Z. Zhao, Y. Zhai, X. Chen, B. M. Chen. A UAV-based explore-then-exploit system for autonomous indoor facility inspection and scene reconstruction. Automation in Construction (AIC), 2022.

[5] L. Xi, **X. Wang**, L. Jiao, S. Lai, Z. Peng, B. M. Chen. GTO-MPC-Based Target Chasing Using a Quadrotor in Cluttered Environments. IEEE Transactions on Industrial Electronics (TIE), 2021, 69(6): 6026-6035.

- **Conference papers**

[1] **X. Wang**, T. Kim, B. Hoxha, G. Fainekos, D. Panagou, Safe Navigation in Uncertain Crowded Environments Using Risk Adaptive CVaR Barrier Functions. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), under review, 2025.

[2] C. Wang, **X. Wang**, Y. Dong, L. Song, X. Guan. Multi-Constraint Safe Reinforcement Learning via Closed form Solution for Log-Sum-Exp Approximation of Control Barrier Functions. Annual Learning for Dynamics & Control Conference (L4DC), 2025.

[3] **X. Wang**, J. Xu, C. Gao, Y. Chen, J. Zhang, C. Wang and B. M. Chen, Sensor-based multi-robot search and coverage with spatial separation in unstructured environments. To be presented at the 2024 IEEE International Conference on Robotics and Automation (ICRA), Yokohama, Japan, May 2024.

[4] **X. Wang**, Y. Ding, Y. Chen, R. Han, L. Xi, B. M. Chen. OA-ECBVC: A Cooperative Collision-free Encirclement and Capture Approach in Cluttered Environments. IEEE Conference on Decision and Control (CDC), 2023.

[5] Y. Chen, R. Wang, **X. Wang***, B. M. Chen. Sampling-based path planning under temporal logic constraints with real-time adaptation. IEEE International Conference on Robotics and Automation (ICRA), 2023.

[6] **X. Wang***, C. Gao, X. Chen, B. M. Chen. Fast and secure distributed multi-agent coverage control with an application to infrastructure inspection and reconstruction. Chinese Control Conference (CCC), 2023, Guan Zhao-Zhi Award Finalist.

[7] C. Gao, **X. Wang***, X. Chen, B. M. Chen. An active search strategy with multiple unmanned aerial systems for multiple targets. International Conference on Unmanned Aircraft Systems (ICUAS), Chania, Crete, Greece, June 2024.

[8] L. Xi#, **X. Wang**#, Ding Y, Y. Wei, Z. Peng, B. M. Chen. Quadrotor trajectory planning for visibility-aware target following. IEEE International Conference on Robotics and Biomimetics (ROBIO), 2021.

[9] **X. Wang***, L. Xi, Y. Chen, S. Lai, F. Lin, B. M. Chen. Decentralized trajectory generation technique for multiple unmanned multi-copter systems in cluttered environments. The 12th International Micro Air Vehicle Conference (IMAV), 2021.

[10] Y. Chen, **X. Wang**, R. Wang, Z. Guo, S. Lai, B. M. Chen. An Interactive System for Multiple-task Linear Temporal Logic Path Planning. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2023.

[11] R. Wang, Z. Guo, Y. Chen, **X. Wang** and B. M. Chen, Air bumper: A collision detection and reaction framework for autonomous MAV navigation. To be presented at the 2024 IEEE International Conference on Robotics and Automation (ICRA), Yokohama, Japan, May 2024.

- **Patents**

[1] B. M. Chen, Y. Chen, R. Wang, **X. Wang**, Xi Chen. A Human-in-the-Loop System for Mobile Robot Task Planning. Patent of the United States, No. 63/450,314, Mar. 6, 2023.

Research Grants

- **Collaborative Research: CPS: Medium: Enabling Autonomous, Persistent, and Adaptive Mobile Observational Networks Through Energy-Aware Dynamic Coverage.** National Science Foundation (NSF), 2022-2025. **Core Member.**

- **Socially-Aware Safe Navigation for Heterogeneous Multi-Agent Systems**. Toyota Research North America, 2023-2025. **Core Member.**

- **Aerial-Marine Collaborative Heterogeneous Multi-Agent Systems with Digital Twin Technology for Smart Oceans.** General Research Fund, Hong Kong, 2025–2027. **Write proposal & Co-I.**

- **Collaborative Task Assignment of Multi-Agent Unmanned Systems for Infrastructure Inspection.** General Research Fund, Hong Kong, 2024–2026. **Write proposal & Core Member.**

- **Collaborative Search and Pursuit-evasion for Unmanned Systems in Cluttered Environments.** General Research Fund, Hong Kong, 2023-2025. **Write proposal & Core Member.**

- **Advanced Motion Planning Techniques for the Cooperation of Multi-agent Systems**. General Research Fund, Hong Kong, 2022–2024. **Core Member.**

- **Development of an Integrated Autonomous Building Inspection and Information Management.** InnoHK Center for Logistics Robotics, Hong Kong, 2020–2025. **Core Member.**

Internships

- **Peng Cheng Laboratory & Shenzhen Weixi Technology Co., Ltd**   05/2020-09/2020
Construct Navigation System of Four-wheel Skid-Steering Vehicle in a Park Environment with Pedestrians.
Design MPC-based local planner and test real-time lane line path following and point to point delivery mission using lidar module with dynamic obstacles.

Technical Skills

- Experienced in C/C++, Python, MATLAB, LaTex, Git, Robot Operating System (ROS), Gazebo, Pytorch

Courses & Teaching Experience

- IERG 5350 Reinforcement Learning, instructed by Professor Bolei Zhou.
- ENGG 5501 Foundations of Optimization, instructed by Professor Anthony Man-Cho So.
- ELEG 5491 Introduction to Deep Learning, instructed by Professor Hongsheng Li.

Teaching Assistant:

- MAEG 3080 Fundamentals of Machine Intelligence, instructed by Professor Juan Luis.
- ENGG 5402 - Advanced Robotics, instructed by Professor Fei Chen.

Awards & Honors

Postdoctoral Scholarship, the Innovation and Technology Fund of Hong Kong	10/2023-09/2024
Professor Charles K. Ko Student Creativity Award, CUHK	06/2023
Research Postgraduate Studentship, CUHK	2019-2023
Outstanding Graduates, XMU (Top 2%)	06/2019
Merit Student, XMU (Twice, Top 8%)	12/2016 &12/2017
Third Prize in RoboMaster 2017 (The 16th National College Students Robotics Contest)	08/2017
Xiamen International Bank Scholarship, XMU (Top 4%)	04/2017

Academic Services

- **Reviewer of Journals**

- IEEE Transactions on Robotics (TRO)
- IEEE Transactions on Automatic Control (TAC)
- IEEE Transactions on Cybernetics
- IEEE Robotics and Automation Letters (RA-L)
- IEEE Transactions on Intelligent Transportation Systems (T-ITS)
- International Journal of Robust and Nonlinear Control

- **Reviewer of Conferences**

- Associate Editor of IEEE International Conference on Control and Automation (ICCA)
- Robotics: Science and Systems (RSS)
- IEEE International Conference on Robotics on Automation (ICRA)
- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)
- IEEE Conference on Decision and Control (CDC)
- IEEE International Conference on Unmanned Aircraft Systems (ICUAS)