

YUNFAN REN

Ph.D. in Robotics

 [Google Scholar](#)

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EDUCATION

- 10/2021 - 6/2025 **Ph.D. in Robotics** **Mechatronics and Robotic Systems (MaRS) Laboratory**
Advisor: Prof. Fu Zhang **The University of Hong Kong**
Research Interests: Autonomous Navigation; Aerial Robots; Swarm Intelligence; Optimization; Optimal Control; Reinforcement Learning.
- 9/2017 - 7/2021 **B.E. in Automation** **Harbin Institute of Technology**
Three times *Academic scholarships*
Thesis: LiDAR-based Autonomous Navigation for MAV, **Outstanding Thesis Award**.
Semester exchange student in University of California, Berkeley, USA (2020 Spring).

PROFESSIONAL EXPERIENCE

- 09/2025 - Present **Postdoctoral Researcher** **Robotics and Perception Group (RPG)**
Advisor: Prof. Davide Scaramuzza **University of Zurich and ETH Zurich**
Research Interests: Event Vision; Reinforcement Learning; Generative AI for Robotics.
- 8/2021 - 10/2022 **Navigation System Engineer** **Dajiang Innovations (DJI)**
Advisor: Yi Lin, Yanzhao Li
Research Interests: LiDAR-based Perception; Autonomous Navigation for Agile Drone Flight; Swarm Navigation for MAVs.

AWARDS

- Awards **RSS Pioneer Award (14.6% acceptance rate)** **6/2025**
Robotics: Science and Systems (RSS) [Link](#)
Paper title: LiDAR-Centric Aerial Robots: From Advanced Navigation to Swarm Intelligence
Yunfan REN
- Paper Awards **Best Overall and Best Student Paper - Finalist** **10/2023**
International Conference on Intelligent Robots and Systems (IROS) 2023.
Paper title: Decentralized Swarm Trajectory Generation for LiDAR-based Aerial Tracking in Cluttered Environments
Longji Yin*, Fangcheng Zhu*, **Yunfan REN***, Fanze Kong, Fu Zhang (* Co-first authors)
- Paper Awards **Outstanding Navigation Paper - Finalist** **5/2023**
International Conference on Robotics and Automation (ICRA) 2023
Paper title: Online whole-body motion planning for quadrotor using multi-resolution search.
Yunfan REN*, Siqi Liang*, Fangcheng Zhu, Guozheng Lu, Fu Zhang

PUBLICATIONS

- Journal Article [J1] **Safety-assured High-speed Navigation for MAVs**
Yunfan REN*, Fangcheng Zhu*, Guozheng Lu, Yixi Cai, Longji Yin, Fanze Kong, Jiarong Lin, Nan Chen, Fu Zhang.
AAAS, **Science Robotics** 2025 [[Paper](#)], [[Code](#)] [[Media](#)]
- Journal Article [J2] **A Survey on LiDAR-based Autonomous Aerial Vehicles**
Yunfan REN, Yixi Cai, Haotian Li, Nan Chen, Fangcheng Zhu, Longji Yin, Fanze Kong, Rundong Li, Fu Zhang
IEEE Transactions on Mechatronics (T-Mech)
- Journal Article [J3] **Slope inspection under dense vegetation using LiDAR-based quadrotors**
Wenyi Liu, **Yunfan REN**, Rui Guo, Vickie W. W. Kong, Anthony S. P. Hung, Fangcheng Zhu, Yixi Cai, Huajie Wu, Yuying Zou, Fu Zhang.
Springer, nature communications [[Paper](#)] [[Media](#)]
- Journal Article (Under Review) [J4] **An autonomous single-actuator UAV with omnidirectional field of view, high agility, and collision resistance**
Nan Chen, Haotian Li, **Yunfan REN**, Guozheng Lu, Fangcheng Zhu, Jiarong Lin, Fu Zhang.
Springer, nature communications
- Journal Article [J5] **Autonomous Tail-Sitter Flights in Unknown Environments**
Guozheng Lu*, **Yunfan REN***, Fangcheng Zhu, Haotian Li, Ruize Xue, Yixi Cai, Ximin Lyu, Fu Zhang (* Co-first authors)
IEEE Transactions on Robotics (T-RO) [[Paper](#)], [[Media](#)]

Journal Article	[J6] Swarm-LIO2: Decentralized, Efficient LiDAR-inertial Odometry for UAV Swarms Fangcheng Zhu*, Yunfan REN* , Longji Yin*, Fanze Kong, Qingbo Liu, Ruize Xue, Wenyi Liu, Yixi Cai, Guozheng Lu, Haotian Li, Fu Zhang (* Co-first authors) IEEE Transactions on Robotics (T-RO) [Paper] , [Code] [Media]
Journal Article	[J7] Fast-livo2: Fast, direct lidar-inertial-visual odometry Chunran Zheng, Wei Xu, Zuhao Zou, Tong Hua, Chongjian Yuan, Dongjiao He, Bingyang Zhou, Zheng Liu, Jiarong Lin, Fangcheng Zhu, Yunfan REN , Rong Wang, Fanle Meng, Fu Zhang IEEE Transactions on Robotics (T-RO) [Paper] , [Code] [Media]
Journal Article	[J8] Immesh: An immediate lidar localization and meshing framework Jiarong Lin, Chongjian Yuan, Yixi Cai, Haotian Li, Yunfan REN , Yuying Zou, Xiaoping Hong, Fu Zhang IEEE Transactions on Robotics (T-RO) [Paper] , [Code] [Media]
Journal Article	[J9] Occupancy grid mapping without ray-casting for high-resolution LiDAR sensors Yixi Cai, Fanze Kong, Yunfan REN , Fangcheng Zhu, Jiarong Lin, Fu Zhang. IEEE Transactions on Robotics (T-RO) [Paper] , [Code] [Media]
Journal Article	[J10] Trajectory Generation and Tracking Control for Aggressive Tail-Sitter Flights Guozheng Lu, Yixi Cai, Nan Chen, Fanze Kong, Yunfan REN , Fu Zhang. International Journal of Robotics Research (IJRR) [Paper] , [Media]
Journal Article	[J11] Integrated Planning and Control for Quadrotor Navigation in Presence of Suddenly Appearing Objects and Disturbances Wenqi Liu*, Yunfan REN* , Fu Zhang IEEE Robotics and Automation Letters (RA-L) (Co-first author) [Paper] , [Code] , [Media]
Journal Article	[J12] Large-Scale Multi-Session Point-Cloud Map Merging Hairuo Wei, Rundong Li, Yixi Cai, Chongjian Yuan, Yunfan REN , Zuhao Zou, Huajie Wu, Chunran Zheng, Shunbo Zhou, Kaiwen Xue, Fu Zhang IEEE Robotics and Automation Letters (RA-L) [Paper] , [Code] , [Media]
Journal Article	[J13] MARSIM: A light-weight point-realistic simulator for LiDAR-based UAVs Fanze Kong, Xiyuan Liu, Benxu Tang, Jiarong Lin, Yunfan REN , Yixi Cai, Fangcheng Zhu, Nan Chen, Fu Zhang IEEE Robotics and Automation Letters (RA-L) [Paper] , [Code] , [Media]
Conference Paper	[C1] Online whole-body motion planning for quadrotor using multi-resolution search Yunfan REN* , Siqi Liang*, Fangcheng Zhu, Guozheng Lu, Fu Zhang IEEE International Conference on Robotics and Automation (ICRA) 2023 Outstanding Navigation Paper Finalist [Paper] , [Media]
Conference Paper	[C2] ROG-Map: An Efficient Robocentric Occupancy Grid Map for Large-scene and High-resolution LiDAR-based Motion Planning Yunfan REN , Yixi Cai, Fangcheng Zhu, Siqi Liang, Fu Zhang IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2024 [Paper] , [Code] , [Media]
Conference Paper	[C3] Bubble planner: Planning high-speed smooth quadrotor trajectories using receding corridors Yunfan REN* , Fangcheng Zhu*, Wenqi Liu, Zhepei Wang, Yi Lin, Fei Gao, Fu Zhang IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2022 [Paper] , [Media]
Conference Paper	[C4] Decentralized Swarm Trajectory Generation for LiDAR-based Aerial Tracking in Cluttered Environments Longji Yin*, Fangcheng Zhu*, Yunfan REN* , Fanze Kong, Fu Zhang IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2023 [Paper] , [Media] Best Overall and Best Student Paper Finalist
Conference Paper	[C5] Real-time Bandwidth-efficient Occupancy Grid Map Synchronization for Multi-Robot Systems Liuyu Shi, Longji Yin, Fanze Kong, Yunfan REN , Fangcheng Zhu, Benxu Tang, Fu Zhang IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2024 [Paper] , [Media]
Conference Paper	[C6] Bubble explorer: Fast UAV exploration in large-scale and cluttered 3D-environments using occlusion-free spheres Benxu Tang*, Yunfan REN* , Fangcheng Zhu, Rui He, Siqi Liang, Fanze Kong, Fu Zhang IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2023 [Paper] , [Media]
Conference Paper	[C7] Robust real-time lidar-inertial initialization Fangcheng Zhu*, Yunfan REN* , Fu Zhang IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2022 [Paper] , [Code] , [Media]
Conference Paper	[C8] Swarm-LIO: Decentralized Swarm LiDAR-inertial Odometry Fangcheng Zhu*, Yunfan REN* , Fanze Kong, Huajie Wu, Siqi Liang, Nan Chen, Wei Xu, Fu Zhang IEEE International Conference on Robotics and Automation (ICRA) 2023 [Paper] , [Media]

Conference Paper

[C9] **Vision-encoder-based Payload State Estimation for Autonomous MAV With a Suspended Payload Yunfan REN^{*}**, Jianheng Liu^{*}, Haoyao Chen, Yunhui Liu (^{*} Co-first authors)
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2021 [Paper], [Code], [Media]

Conference Paper

[C10] **Perch a quadrotor on planes by the ceiling effect**
Yuying Zou, Haotian Li, **Yunfan REN**, Wei Xu, Yihang Li, Yixi Cai, Shenji Zhou, Fu Zhang
IEEE/RSJ International Conference on Automation Science and Engineering (CASE) 2023 [Paper], [Media]

IMPACT

Media Exposure: Transformed complex research into compelling videos, amassing over **150,000** views on platforms including Bilibili and YouTube. Research featured in over 50 international media outlets, including Reuters and others.

Open-Source Contributions: Authored open-source projects on GitHub, collectively earning over **4,000** stars for innovative and impactful code.

SERVICE

Reviewer	Journal Reviewer IEEE Transactions on Robotics (T-RO), The International Journal of Robotics Research (IJRR), IEEE Transactions on Mechatronics (T-Mech), IEEE Robotics and Automation Letters (RA-L), IEEE Transactions on Instrumentation and Measurement (TIM)
Reviewer	Conference Reviewer IEEE International Conference on Robotics and Automation (ICRA), IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), IEEE International Conference on Automation Science and Engineering (CASE)
Teaching	Teaching Assistant ME 3418 (Dynamics and Control), IDAT 7213 (UAV Design, Navigation, and Control)
Mentoring	Mentored Students Mentored undergraduate and early-stage PhD students: <ul style="list-style-type: none">Wenyi Liu: Undergraduate to PhD in HKUBenxu Tang: Undergraduate to PhD in HKUSiqi Liang: Undergraduate to PhD in HKULiuyu Shi: PhD in HKUHairuo Wei: Undergraduate to MPhil in HKU <div>Published Paper: [J3,J11]</div> <div>Published Paper: [C6]</div> <div>Published Paper: [C1]</div> <div>Published Paper: [C5]</div> <div>Published Paper: [J12]</div> Mentored MSc students in Dept. Mechanical Engineering, HKU: <ul style="list-style-type: none">Wendi Dong: MSc student to BYDQingbo Liu: MSc student to PhD in HKURuize Xue: MSc student to Insta360Mingpu Ma: MSc student to AppleMinghe Chen: MSc student to Goertek <div>(2022-2023)</div> <div>(2022-2023)</div> <div>(2023-2024)</div> <div>(2023-2024)</div> <div>(2023-2024)</div>

LANGUAGES

English - fluent, **Chinese** - native