Division of Robotics, Perception and Learning
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YIXI CAI

Curriculum Vitae

Work Experience

KTH Royal Institute of Technology — **Stockholm, Sweden**
Postdoctoral Fellow, Digital Future Fellowship — *Jan, 2025 – Present*
Supervisor: Prof. Patric Jensfelt and Dr. Olov Andersson

Education

University of Hong Kong — **Hong Kong SAR, China**
Ph.D., Robotics — *Sept, 2020 – Sept, 2024*
Supervisor: Prof. Fu Zhang and Prof. James Lam

Beihang University — **Beijing, China**
B.Eng, Automation — *Sept, 2016 – July, 2020*

Featured Publications

[RSS'2025] Yuhan Xie, **Yixi Cai**†, Yinqiang Zhang, Lei Yang, and Jia Pan. GauSS-MI: Gaussian splatting shannon mutual information for active 3d reconstruction. In *Robotics: Science and Systems*, 2025. (†: Project Leader) [Paper].

[TRO'2023] **Yixi Cai***, Fanze Kong*, Yunfan Ren, Fangcheng Zhu, Jiarong Lin, and Fu Zhang. Occupancy grid mapping without ray-casting for high-resolution lidar sensors. *IEEE Transactions on Robotics*, volume 40, pages 172–192, 2024. (∗: Equal Contribution) [Paper].

[TRO'2022] Wei Xu*, **Yixi Cai***, Dongjiao He, Jiarong Lin, and Fu Zhang. FAST-LIO2: Fast direct lidar-inertial odometry. *IEEE Transactions on Robotics*, volume 38, pages 2053–2073. IEEE, 2022. [Paper] **(Citation: 1335, Top 10 T-RO Popular Paper)**.

[SR'2025] Yunfan Ren, Fangcheng Zhu, Guozheng Lu, **Yixi Cai**, Longji Yin, Fanze Kong, Jiarong Lin, Nan Chen, and Fu Zhang. Safety-assured high-speed navigation for mavs. *Science Robotics*, volume 10, page eado6187, 2025. [Paper].

[TMech'2025] Yunfan Ren, **Yixi Cai**, Haotian Li, Nan Chen, Fangcheng Zhu, Longji Yin, Fanze Kong, Rundong Li, and Fu Zhang. A survey on lidar-based autonomous aerial vehicles. *IEEE/ASME Transactions on Mechatronics*, pages 1–17, 2025. [Paper].

[ICCV'2025] Ziliang Miao, Runjian Chen, **Yixi Cai**, Buwei He, Wenquan Zhao, Wenqi Shao, Bo Zhang, and Fu Zhang. Temporal overlapping prediction: A self-supervised pre-training method for lidar moving object segmentation. In *Proceedings of the IEEE/CVF International Conference on Computer Vision (ICCV)*, October 2025. [Preprint].

[IJRR'2023] Guozheng Lu, **Yixi Cai**, Nan Chen, Fanze Kong, Yunfan Ren, and Fu Zhang. Trajectory generation and tracking control for aggressive tail-sitter flights. *The International Journal of Robotics Research*, volume 43. SAGE Publications Sage UK: London, England, 2023. [Paper].

[SR'2023] Nan Chen, Fanze Kong, Wei Xu, **Yixi Cai**, Haotian Li, Dongjiao He, Youming Qin, and Fu Zhang. A self-rotating, single-actuated uav with extended sensor field of view for autonomous navigation. *Science Robotics*, volume 8, page eade4538. American Association for the Advancement of Science, 2023. [Paper].

Fellowships & Awards

Digital Future Postdoctoral Fellowship, 2025-2026
RSS Pioneer in Robotics: Science and Systems 2024 (15% Acceptance Rate)
Best Paper Award Finalist in IEEE/ASME Transactions on Mechatronics, 2023
Y S and Christabel Lung Postgraduate Scholarship for Engineering Students 2020-2021.
University Postgraduate Fellowships for the academic year 2020-21.

Academic Service

Committees
RSS Pioneer Program Committee 2025
Journal Review
Transactions on Robotics (T-RO)
Journal of Field Robotics (JFR)
Transactions on Mechatronics (T-Mech)
Robotics and Automation Letters (RA-L)
Transactions on Pattern Analysis and Machine Intelligence (T-PAMI)
Conference Review
International Conference on Robotics and Automation (ICRA) 2024-2025
International Conference on Intelligent Robots and System (IROS) 2022-2025

Teaching

MECH3433 Robotics, drones and autonomous ground vehicles — **Spring Semester** *2020-2024*

Co-supervisory

Bingyang Zhou — **Master of Philosophy**
University of Hong Kong — *2023-2025*

Ziliang Miao — **Master of Philosophy**
University of Hong Kong — *2023-2025*

Ajinkya Khoche — **Doctor of Philosophy**
KTH Royal Institute of Technology — *2025-Present*

Waqas Ali — **Doctor of Philosophy**
KTH Royal Institute of Technology — *2025-Present*

Alejandro Sánchez Roncero — **Doctor of Philosophy**
KTH Royal Institute of Technology — *2025-Present*

Full Publication Lists

[RAL'2025] Bingyang Zhou, Chunran Zheng, Ziming Wang, Fangcheng Zhu, **Yixi Cai**, and Fu Zhang. Fast-livo2 on resource-constrained platforms: Lidar-inertial-visual odometry with efficient memory and computation. *IEEE Robotics and Automation Letters*, volume 10, pages 7931–7938, 2025. [Paper].

[RSS'2025] Yuhan Xie, **Yixi Cai**†, Yinqiang Zhang, Lei Yang, and Jia Pan. GauSS-MI: Gaussian splatting shannon mutual information for active 3d reconstruction. In *Robotics: Science and Systems*, 2025. (†: Project Leader) [Paper].

[RAL'2025] Hairuo Wei, Rundong Li, **Yixi Cai**, Chongjian Yuan, Yunfan Ren, Zuhao Zou, Huajie Wu, Chunran Zheng, Shunbo Zhou, Kaiwen Xue, and Fu Zhang. Large-scale multi-session point-cloud map merging. *IEEE Robotics and Automation Letters*, volume 10, pages 88–95, 2025. [Paper].

[SR'2025] Yunfan Ren, Fangcheng Zhu, Guozheng Lu, **Yixi Cai**, Longji Yin, Fanze Kong, Jiarong Lin, Nan Chen, and Fu Zhang. Safety-assured high-speed navigation for mavs. *Science Robotics*, volume 10, page eado6187, 2025. [Paper].

[TMech'2025] Yunfan Ren, **Yixi Cai**, Haotian Li, Nan Chen, Fangcheng Zhu, Longji Yin, Fanze Kong, Rundong Li, and Fu Zhang. A survey on lidar-based autonomous aerial vehicles. *IEEE/ASME Transactions on Mechatronics*, pages 1–17, 2025. [Paper].

[ICCV'2025] Ziliang Miao, Runjian Chen, **Yixi Cai**, Buwei He, Wenquan Zhao, Wenqi Shao, Bo Zhang, and Fu Zhang. Temporal overlapping prediction: A self-supervised pre-training method for lidar moving object segmentation. In *Proceedings of the IEEE/CVF International Conference on Computer Vision (ICCV)*, October 2025. [Preprint].

[NC'2025] Wenyi Liu, Yunfan Ren, Rui Guo, Vickie WW Kong, Anthony SP Hung, Fangcheng Zhu, **Yixi Cai**, Huajie Wu, Yuying Zou, and Fu Zhang. Slope inspection under dense vegetation using lidar-based quadrotors. *Nature Communications*, volume 16, page 7411. Nature Publishing Group UK London, 2025. [Paper].

[ICRA'2025] Jianheng Liu, Chunran Zheng, Yunfei Wan, Bowen Wang, **Yixi Cai**, and Fu Zhang. Neural surface reconstruction and rendering for lidar-visual systems. *International Conference on Robotics and Automation (ICRA)*. IEEE, 2025. [Preprint].

[IROS'2025] Yisheng Li, Longji Yin, **Yixi Cai**, Jianheng Liu, Haotian Li, and Fu Zhang. Efficient swept volume-based trajectory generation for arbitrary-shaped ground robot navigation. In *2025 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. IEEE, 2025. [Preprint].

[TRO'2025] Song Li, Songnan Bai, Ruihan Jia, **Yixi Cai**, Runze Ding, Yu Shi, Fu Zhang, and Pakpong Chirarattananon. A high-payload robotic hopper powered by bidirectional thrusters. *IEEE Transactions on Robotics*. IEEE, 2025. [Paper].

[ICRA'2025] Rundong Li, Xiyuan Liu, Haotian Li, Zheng Liu, Jiarong Lin, **Yixi Cai**, and Fu Zhang. Lvba: Lidar-visual bundle adjustment for rgb point cloud mapping. *International Conference on Robotics and Automation (ICRA)*. IEEE, 2025. [Preprint].

[TRO'2024] Fangcheng Zhu, Yunfan Ren, Longji Yin, Fanze Kong, Qingbo Liu, Ruize Xue, Wenyi Liu, **Yixi Cai**, Guozheng Lu, Haotian Li, et al. Swarm-lio2: Decentralized, efficient lidar-inertial odometry for uav swarms. *IEEE Transactions on Robotics*. IEEE, 2024. [Paper].

[TRO'2023] **Yixi Cai***, Fanze Kong*, Yunfan Ren, Fangcheng Zhu, Jiarong Lin, and Fu Zhang. Occupancy grid mapping without ray-casting for high-resolution lidar sensors. *IEEE Transactions on Robotics*, volume 40, pages 172–192, 2024. [Paper].

[IROS'2024] Yunfan Ren, **Yixi Cai**, Fangcheng Zhu, Siqi Liang, and Fu Zhang. Rog-map: An efficient robocentric occupancy grid map for large-scene and high-resolution lidar-based motion planning. In *2024 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pages 8119–8125. IEEE, 2024. [Paper].

[TRO'2024] Guozheng Lu, Yunfan Ren, Fangcheng Zhu, Haotian Li, Ruize Xue, **Yixi Cai**, Ximin Lyu, and Fu Zhang. Autonomous tail-sitter flights in unknown environments. *IEEE Transactions on Robotics*. IEEE, 2024. [Paper].

[IJRR'2024] Haotian Li, Yuying Zou, Nan Chen, Jiarong Lin, Xiyuan Liu, Wei Xu, Chunran Zheng, Rundong Li, Dongjiao He, Fanze Kong, **Yixi Cai**, et al. Mars-lvig dataset: A multi-sensor aerial robots slam dataset for lidar-visual-inertial-gnss fusion. *The International Journal of Robotics Research*. SAGE Publications Sage UK: London, England, 2024. [Paper].

[CASE'2023] Yuying Zou, Haotian Li, Yunfan Ren, Wei Xu, Yihang Li, **Yixi Cai**, Shenji Zhou, and Fu Zhang. Perch a quadrotor on planes by the ceiling effect. In *2023 IEEE 19th International Conference on Automation Science and Engineering (CASE)*, pages 1–7. IEEE, 2023. [Paper].

[IJRR'2023] Guozheng Lu, **Yixi Cai**, Nan Chen, Fanze Kong, Yunfan Ren, and Fu Zhang. Trajectory generation and tracking control for aggressive tail-sitter flights. *The International Journal of Robotics Research*, volume 43. SAGE Publications Sage UK: London, England, 2023. [Paper].

[TRO'2023] Jiarong Lin, Chongjian Yuan, **Yixi Cai**, Haotian Li, Yunfan Ren, Yuying Zou, Xiaoping Hong, and Fu Zhang. Immesh: An immediate lidar localization and meshing framework. *IEEE Transactions on Robotics*, volume 39, pages 4312–4331, 2023. [Paper].

[RAL'2023] Fanze Kong, Xiyuan Liu, Benxu Tang, Jiarong Lin, Yunfan Ren, **Yixi Cai**, Fangcheng Zhu, Nan Chen, and Fu Zhang. Marsim: A light-weight point-realistic simulator for lidar-based uavs. *IEEE Robotics and Automation Letters*, volume 8, pages 2954–2961. IEEE, 2023. [Paper].

[SR'2023] Nan Chen, Fanze Kong, Wei Xu, **Yixi Cai**, Haotian Li, Dongjiao He, Youming Qin, and Fu Zhang. A self-rotating, single-actuated uav with extended sensor field of view for autonomous navigation. *Science Robotics*, volume 8, page eade4538. American Association for the Advancement of Science, 2023. [Paper].

[TRO'2022] Wei Xu*, **Yixi Cai***, Dongjiao He, Jiarong Lin, and Fu Zhang. FAST-LIO2: Fast direct lidar-inertial odometry. *IEEE Transactions on Robotics*, volume 38, pages 2053–2073. IEEE, 2022. [Paper].

[TCST'2022] Wei Xu, Dongjiao He, **Yixi Cai**, and Fu Zhang. Robots' state estimation and observability analysis based on statistical motion models. *IEEE Transactions on Control Systems Technology*, volume 30, pages 2030–2045. IEEE, 2022. [Paper].

[TMECH'2022] Youming Qin, Nan Chen, **Yixi Cai**, Wei Xu, and Fu Zhang. Gemini ii: Design, modeling, and control of a compact yet efficient servoless bi-copter. *IEEE/ASME Transactions on Mechatronics*, volume 27, pages 4304–4315. IEEE, 2022. ***Best Paper Award Finalist*** [Paper].

[RAL'2021] Fanze Kong, Wei Xu, **Yixi Cai**, and Fu Zhang. Avoiding dynamic small obstacles with onboard sensing and computation on aerial robots. *IEEE Robotics and Automation Letters*, volume 6, pages 7869–7876. IEEE, 2021. [Paper].