

Kenghou Hoi

M.S. Student at Zhejiang University · Macao SAR, China
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Research Interests

Aerial manipulation; tactile sensing; robot perception and control; motion planning; reinforcement learning; autonomous aerial systems.

Education

Zhejiang University, College of Control Science and Engineering Sep. 2024–Present
M.S. in Control Science and Engineering, advised by Prof. Fei Gao
Research focus: aerial manipulation, UAV motion planning and control, and reinforcement learning.

Beijing University of Posts and Telecommunications, School of Information and Sep. 2020–Jun. 2024
Communication Engineering
B.Eng. in Communication Engineering.

Publications

- [1] **Kenghou Hoi**, Xinqi Liu, Hongliang Huang, Junjie Wang, Anke Zhao, Jiarui Zhang, Si Liu, Juncai Long, Xin Zhou, Jialiang Hou, Yuze Wu, and Fei Gao. “Learning Robust Aerial Grasping from Monocular RGB Vision via Reinforcement Learning.” *IEEE Transactions on Robotics (T-RO)*, under review.
- [2] **Kenghou Hoi***, Yuze Wu*, Annan Ding*, Junjie Wang, Anke Zhao, Chengqian Zhang, and Fei Gao. “A Precise Real-Time Force-Aware Grasping System for Robust Aerial Manipulation.” *IEEE International Conference on Robotics and Automation (ICRA)*, 2026.
- [3] Junjie Wang*, **Kenghou Hoi***, Yuze Wu*, Tianyu Zhao, Jialiang Hou, and Fei Gao. “A Fully Onboard Integrated Aerial Grasping System for Moving Targets in Cluttered Environments.” *IEEE/ASME Transactions on Mechatronics (T-MECH)*, under review.
- [4] Anke Zhao, Yuhang Zhong, **Kenghou Hoi**, Junyu Mou, Junjie Wang, Lijie Wang, Jialiang Hou, and Fei Gao. “Agile Fall Recovery for Quadrotors with Bidirectional Thrust via Reinforcement Learning.” *IEEE Robotics and Automation Letters (RA-L)*.
- [5] Yuhang Zhong*, Anke Zhao*, **Kenghou Hoi**, Mingli Zhu, Long Xu, Jialiang Hou, and Fei Gao. “Learning LiDAR-Based Dynamic Obstacle Avoidance via Time-to-Collision Supervision.” *IEEE Transactions on Automation Science and Engineering (T-ASE)*, under review.
- [6] Ruibin Zhang, Lun Pan, **Kenghou Hoi**, Zelong Xia, Jialiang Hou, and Fei Gao. “DPNet: Efficient Dead-End Prediction and Avoidance for Vision-Based UAV Navigation.” *IEEE Robotics and Automation Letters (RA-L)*, under review.
- [7] Jiarui Zhang, Chengyong Lei, Chengjiang Dai, **Kenghou Hoi**, Lijie Wang, Zhichao Han, and Fei Gao. “High-Speed Vision-Based Flight in Clutter with Safety-Shielded Reinforcement Learning.” *IEEE Robotics and Automation Letters (RA-L)*.

*Equal contribution.

Research Experience

Robust Aerial Grasping from Monocular RGB Vision Oct. 2025–Present
Zhejiang University

- Developed a recurrent end-to-end reinforcement-learning policy that jointly commands UAV motion and gripper actuation using RGB-derived monocular depth, persistent 2D point tracks, and proprioceptive and action histories.
- Designed a sim-to-real strategy combining contact-aware reward shaping, external-force and center-of-gravity randomization, and L_1 adaptive control for robust grasping under perception and interaction uncertainties.
- Achieved 87.1% real-world grasping success on unseen static objects and 80.0% on moving targets; physical-domain randomization improved success from 33.3% to 86.7%.

Fully Onboard Aerial Grasping of Moving Targets in Cluttered Environments

Feb. 2025–Jan. 2026

Zhejiang University

- Co-developed a fully onboard aerial grasping system integrating visual-inertial localization, depth-based mapping, RGB target detection, target-state estimation, trajectory planning, and control on an RK3588 platform.
- Developed a two-stage pursuit-and-capture path-search front end with short-horizon target prediction and a trajectory optimizer jointly enforcing visibility, collision avoidance, dynamic feasibility, grasp distance, and grasp direction.
- Achieved a 71% success rate over 100 real-world trials and grasped targets moving at a peak speed of 1.03 m/s, with onboard replanning at 20 Hz.

Real-Time Force-Aware Aerial Manipulation

Jan. 2025–Sep. 2025

Zhejiang University

- Integrated six lightweight magnetic soft tactile sensors into a 556 g deformable quadrotor, providing real-time three-dimensional force sensing at 50 Hz with an error below 0.05 N.
- Developed a reference-Hall-sensor compensation method for geomagnetic interference and an admittance-control framework for vehicle motion and closed-loop grasp-force regulation.
- Demonstrated fully autonomous operation without external motion capture, including fragile balloon grasping, real-time weight measurement, and stable manipulation under approximately 180 g of dynamic load variation.

Tactile Sensor Reproduction and Calibration

Jul. 2024–Jan. 2025

Zhejiang University

- Reproduced the 9DTact vision-based tactile sensor and the “Split-Type Magnetic Soft Tactile Sensor with 3D Force Decoupling,” covering sensor assembly, electronics, and data-acquisition software.
- Built calibration and signal-processing pipelines to convert raw visual and magnetic measurements into contact information and three-dimensional force estimates, and evaluated sensing repeatability and cross-axis decoupling.
- Established a reproducible visuotactile sensing workflow for contact-rich manipulation experiments, providing the sensing foundation for subsequent force-aware aerial grasping research.

Selected Honors and Awards

First Prize, RoboMaster 2023 University League (Heilongjiang), Infantry Combat	2023
Second Prize, 6th National Cyberspace Security Technology Competition	2021
Excellence in Engineering Award and Fourth Place, FIRST Robotics Competition Shenzhen Regional, Team 5831	2018

Leadership and Activities

- **Hongyan RoboMaster Team, BUPT:** Electrical and control team lead for two years.
- **Tianshu CTF Team, BUPT:** Competed in cybersecurity contests and organized technical seminars.
- **VEX/FRC and FTC Robotics Teams, Pui Ching Middle School, Macao:** Built competition robots and worked with rapid-prototyping tools including 3D printers and laser cutters.
- Member, Macau Cybersecurity and Capture-the-Flag Association.

Technical Skills

Programming	C, C++, Python, Rust, Verilog, MATLAB
Robotics and systems	ROS/ROS 2, Linux, embedded systems, PCB design, SolidWorks, computer vision, reinforcement learning, NVIDIA Isaac Lab
Development tools	Git, CMake, Vim, IDA Pro, L ^A T _E X
Languages	Chinese (native; Mandarin and Cantonese), English (IELTS 6.5)