

Fei Gao

CONTACT INFORMATION Robotics Institute,
Department of Electronic and Computer Engineering,
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RESEARCH INTERESTS Aerial Robotics, Autonomous Navigation, Motion Planning, Optimal Control, Applied Convex Optimization

EDUCATION **Hong Kong University of Science and Technology**, Kowloon, Hong Kong

Ph.D., Dept. of Electronic and Computer Engineering,
Expected Thesis Defense Date: Summer 2019

- Thesis Topic: *Quadrotor Online Motion Planning and Fast Autonomous Navigation*
- Supervisor: Shaojie Shen, Ph.D.
- CGA (Cumulative Grade Average): 4.18/4.3

Zhejiang University, Hangzhou, Zhejiang Province, P.R. China

B.Eng., Dept. of Control Science and Engineering, June 2015

- Final Year Project: Research on Digital Control of Power Electronics
- GPA (Grade Point Average): 3.92/4.0

PUBLICATIONS **Journal Papers**

1. **Fei Gao**, Boyu Zhou, Luqi Wang, Shaojie Shen, "A Complete Planning System for Autonomous Quadrotor Teach-and-Repeat." *IEEE Transactions on Robotics* (TRO), 2019, working paper.
2. Boyu Zhou, **Fei Gao***, Luqi Wang, Shaojie Shen, "Robust and Efficient Trajectory Replanning for Fast Autonomous Flight." *IEEE Robotics and Automation Letters* (RA-L), joint with IROS, 2019, under review. * corresponding author.
3. **Fei Gao**, Luqi Wang, Kaixuan Wang, William Wu, Boyu Zhou, Luxin Han, Shaojie Shen, "Optimal Trajectory Generation for Quadrotor Teach-and-Repeat." *IEEE Robotics and Automation Letters* (RA-L), accepted, 2019.
4. **Fei Gao**, William Wu, Wenliang Gao, Shaojie Shen, "Flying on Point Clouds: Online Trajectory Generation and Autonomous Navigation for Quadrotor in Cluttered Environments." *Journal of Field Robotics* (JFR), accepted, 2018, early view: <https://onlinelibrary.wiley.com/doi/abs/10.1002/rob.21842>.
5. Yi Lin*, **Fei Gao***, Tong Qin*, Wenliang Gao*, Tianbo Liu, William Wu, Zhenfei Yang, Shaojie Shen, "Autonomous Aerial Navigation Using Monocular Visual-Inertial Fusion." *Journal of Field Robotics* (JFR), 35(1), 23-51, 2017. * equally contributed authors.

Conference Papers

1. Luxin Han, **Fei Gao***, Boyu Zhou, Shaojie Shen, "FIESTA: A Fast Incremental Euclidean Distance Fields for Online Quadrotor Motion Planning." *IEEE/RSJ International Conference on Intelligent Robots and Systems* (IROS), 2019, under review. * corresponding author.

2. Jiarong Lin, **Fei Gao**, Luqi Wang, Shaojie Shen, Fu Zhang, “Flying Through A Narrow Gap Using Neural Network: An End-to-end Planning And Control Approach.” *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2019, under review.
3. Kaixuan Wang, **Fei Gao**, Shaojie Shen, “Real-Time Scalable Dense Surfel Mapping.” *IEEE International Conference on Robotics and Automation (ICRA)*, accepted, 2019.
4. **Fei Gao**, Luqi Wang, Kaixuan Wang, William Wu, Boyu Zhou, Luxin Han, Shaojie Shen, “Optimal Trajectory Generation for Quadrotor Teach-and-Repeat.” *IEEE International Conference on Robotics and Automation (ICRA)*, joint with RA-L, accepted, 2019.
5. Luqi Wang, **Fei Gao**, Fengyu Cai, Shaojie Shen, “CRASH: A Collaborative Aerial-Ground Exploration System Using Hybrid-Frontier Method.” *IEEE International Conference on Robotics and Biomimetics (ROBIO)*, 2018.
6. **Fei Gao**, William Wu, Jie Pan, Boyu Zhou, Shaojie Shen, “Optimal Time Allocation for Quadrotor Trajectory Generation.” *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2018.
7. Luqi Wang*, Daqian Cheng*, **Fei Gao**, Fengyu Cai, Jixin Guo, Mengxiang Lin, Shaojie Shen, “A Collaborative Aerial-Ground Robotic System for Fast Exploration.” *International Symposium on Experimental Robotics (ISER)*, 2018.
8. **Fei Gao**, William Wu, Yi Lin, Shaojie Shen, “Online Safe Trajectory Generation For Quadrotors Using Fast Marching Method and Bernstein Basis Polynomial.” *IEEE International Conference on Robotics and Automation (ICRA)*, 2018.
9. Chong Huang, **Fei Gao**, Jie Pan, Shaojie Shen, Kwang-Ting (Tim) Cheng, et al, “ACT: An Autonomous Drone Cinematography System for Action Scenes.” *IEEE International Conference on Robotics and Automation (ICRA)*, 2018.
10. Changsheng Shen, Yuanzhao Zhang, Zimo Li, **Fei Gao**, Shaojie Shen, “Collaborative Air-Ground Target Searching in Complex Environments.” *IEEE International Symposium on Safety, Security, and Rescue Robotics (SSRR)*, 2017.
11. **Fei Gao**, Yi Lin, Shaojie Shen, “Gradient-Based Online Safe Trajectory Generation for Quadrotor Flight in Complex Environments.” *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2017.
12. **Fei Gao**, Shaojie Shen, “Quadrotor Trajectory Generation in Dynamic Environments Using Semi-definite Relaxation on Nonconvex QCQP.” *IEEE International Conference on Robotics and Automation (ICRA)*, 2017.
13. Zhenfei Yang, **Fei Gao**, Shaojie Shen, “Real-time Monocular Dense Mapping on Aerial Robots Using Visual-Inertial Fusion.” *IEEE International Conference on Robotics and Automation (ICRA)*, 2017.
14. **Fei Gao**, Shaojie Shen, “Online Quadrotor Trajectory Generation and Autonomous Navigation on Point Clouds.” *IEEE International Symposium on Safety, Security, and Rescue Robotics (SSRR)*, 2016.

AWARDS

SENG Top RPg Award 2017-18, *Top R(earch) P(ost)-g(raduate) Award, School of Engineering, HKUST* Jun 2018

Best Conference Paper Award, *IEEE International Symposium on Safety, Security, and Rescue Robotics (SSRR)*, 2016. Oct 2016

Best Dynamic Control & Best Technical Paper Award, *AUVSI Foundation's International Aerial Robotics Competition (IARC)*, 2016. Sep 2016

First Prize, *AUVSI Foundation's International Aerial Robotics Competition (IARC)*, 2015. Oct 2015

COMMUNITY
ACTIVITIES

Referee Services

- Multimedia Systems Journal (MMSJ), 2019.
- IEEE Robotics and Automation Letters (RA-L), 2019.
- IEEE Transactions on Robotics (TRO), 2019.
- EUCA European Control Conference (ECC), 2019.
- Journal of Field Robotics (JFR), 2018.
- IEEE Transactions on Automation Science and Engineering (TASE), 2018
- IEEE International Conference on Robotics and Automation (ICRA), 2018-2019.
- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2017-2018.

Oral Presentations

- IROS 2018, Madrid, Spain Oct 2018
- ICRA 2018, Brisbane, Australia May 2018
- SSRR 2017, Shanghai, China Oct 2017
- IROS 2017, Vancouver, Canada Sep 2017
- ICRA 2017, Singapore May 2017
- CSE Robotics Forum, Zhejiang University, Hangzhou, China Nov 2016
- SSRR 2016, Lausanne, Switzerland Oct 2016

TEACHING
EXPERIENCE

Teaching Assistant Fall 2016–17

ELEC 6910P - Introduction to Aerial Robotics
Instructor: Shaojie Shen, Ph.D.
Department of Electronic and Computer Engineering,
Hong Kong University of Science and Technology

Teaching Assistant Spring 2015–16, Spring 2016–17

ELEC 1110 - Introduction to Electro-Robot Design
Instructor: Shaojie Shen, Ph.D. and Shenghui Song, Ph.D.
Department of Electronic and Computer Engineering,
Hong Kong University of Science and Technology

STUDENT
MENTORING

Undergraduate Students

- Luqi Wang (Final year project, gap year internship) (lwangax.wordpress.com)
- Daqian Cheng (Internship, from Beijing University of Aeronautics and Astronautics)
- Zimo Li, Yuanzhao Zhang, Changsheng Shen (Final year project)

Graduate Students

- Boyu Zhou (Ph.D. student)
- Luxin Han (M.Phil. student)

Language:

- Chinese (native), English (TOFEL 102)

REFERENCES

Shaojie Shen Ph.D.

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