

Guanrui Li

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Education

- 2019-present **Ph.D. in Electrical and Computer Engineering**, *New York University*, NY, USA, GPA-**3.9/4.0**
Advisor: Giuseppe Loianno
- 2016-2018 **Master of Science and Engineering in Robotics**, *University of Pennsylvania*, PA, USA, GPA-**4.0/4.0**
Advisor: Mark Yim, Vijay Kumar
- 2012-2016 **Bachelor of Engineering in Theoretical and Applied Mechanics**, *Sun Yat-sen University*, China, GPA-**3.9/4.0**
Advisor: Jianliang Huang, Yun Bao

Awards and Recognitions

- 2023 **NSF CPS Rising Stars**
A selective academic workshop (34 out of 117 applicants) sponsored by the Natural Science Foundation (NSF) Cyber-Physical System (CPS) program, which aims to identify and mentor outstanding Ph.D. students and postdocs who are interested in pursuing academic careers in CPS-related areas.
- 2022 **Outstanding Deployed System Paper Award Finalist at IEEE ICRA**
For the paper "Learning Model Predictive Control for Quadrotors".
- 2022 **Dante Youla Award for Graduate Research Excellence at NYU Tandon**
Research Award for outstanding Graduate at NYU Tandon School of Engineering.
- 2021 **Microsoft Research PhD Fellowship Finalist**
One of two students nominated by the ECE department at NYU.
- 2019 **Dean's PhD Fellowship at NYU**
Two-year fellowship with annual stipend of \$36000 and an additional bonus award of \$3000 for research.
- 2016 **Honors Undergraduates at SYSU**
Honors Undergraduate students with the strongest academic records at the Sun Yat-sen university.
- 2016 **Outstanding Undergraduate Thesis paper**
One of the two undergraduate theses awarded by the theoretical and applied mechanics department at SYSU.
- 2016 **Fung's Scholarship**
A HK\$5000 scholarship sponsored by Victor and William Fung Foundation for undergraduates from Mainland China selected to exchange at the University of Hong Kong.

Journal Articles

- under review **Safety-Aware Human-Robot Collaborative Manipulation of a Cable Suspended Payload with Multiple MAVs**
preprint link
video link **Guanrui Li***, Xinyang Liu*, and Giuseppe Loianno (* equal contribution).
submitted to the IEEE Transactions on Robotics, (T-RO), 2023.
- Conditionally Accepted **RotorTM: A Flexible Simulator for Aerial Transportation and Manipulation**
preprint link **Guanrui Li**, Xinyang Liu, and Giuseppe Loianno
video link *submitted to IEEE Transactions on Robotics, (T-RO), 2023*
Also presented as an oral presentation at [aerial robotics workshop](#) (ICRA, 2022) and [New Frontiers in Parallel Robotics workshop](#) (ICRA, 2022).
- paper link **Physics-Inspired Temporal Learning of Quadrotor Dynamics for Accurate Model Predictive Trajectory Tracking**
video link Alessandro Saviolo, **Guanrui Li**, and Giuseppe Loianno
IEEE Robotics and Automation Letters, (RA-L), 2022
Presented as an oral presentation at the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2022.
- paper link **Cooperative Transportation of Cable Suspended Payloads with MAVs using Monocular Vision and Inertial Sensing**
video link **Guanrui Li**, Rundong Ge, Giuseppe Loianno
IEEE Robotics and Automation Letters (RA-L), 2021
Presented as an oral presentation at the IEEE Conference on Robotics and Automation (ICRA), 2021.

Conference Publications

- paper link **Nonlinear Model Predictive Control for Cooperative Transportation and Manipulation of Cable Suspended Payloads with Multiple Quadrotors**
video link **Guanrui Li**, Giuseppe Loianno
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2023
- paper link **Geometric Fault-Tolerant Control of Quadrotors in Case of Rotor Failures: An Attitude Based Comparative Study**
video link Jennifer Yeom, **Guanrui Li**, and Giuseppe Loianno
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2023
- paper link **Vision-based Detection and Tracking for Relative Localization of Aerial Swarms**
video link Rundong Ge*, Moonyoung Lee*, Vivek Radhakrishnan, Yang Zhou, **Guanrui Li**, Giuseppe Loianno
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2022
- paper link **Learning Model Predictive Control for Quadrotors**
video link **Guanrui Li***, Alex Tunchez*, Giuseppe Loianno (* equal contribution)
IEEE International Conference on Robotics and Automation (ICRA), 2022
Outstanding Deployed System Paper Award Finalist
- paper link **Aggressive Visual Perching with Quadrotors on Inclined Surfaces**
video link Jeffrey Mao, **Guanrui Li**, Stephen Nogar, Christopher Kroninger, and Giuseppe Loianno
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2021

- paper link **PCMPC: Perception-Constrained Model Predictive Control for**
video link **Quadrotors with Suspended Loads using a Single Camera and IMU**
Guanrui Li*, Alex Tunchez*, Giuseppe Loianno (*: equal contribution)
IEEE International Conference on Robotics and Automation (ICRA), 2021
- paper link **Design and Experimental Evaluation of Distributed Cooperative**
video link **Transportation of Cable Suspended Payloads with Micro Aerial Vehicles**
Guanrui Li, Giuseppe Loianno
17th International Symposium on Experimental Robotics (ISER), 2020
- paper link **Efficient Trajectory Library Filtering for Quadrotor Flight in Un-**
video link **known Environments**
Vaibhav Viswanathan, Eric Dexheimer, **Guanrui Li**, Giuseppe Loianno, Michael Kaess, and Sebastian Scherer
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2020
- paper link **ModQuad-DoF: A Novel Yaw Actuation for Modular Quadrotors**
video link Bruno Gabrich, **Guanrui Li** and Mark Yim
IEEE International Conference on Robotics and Automation (ICRA), 2020
- paper link **ModQuad-Vi: A Vision-Based Self-Assembling Modular Quadrotor**
video link **Guanrui Li**, Bruno Gabrich, David Saldaña, Jnaneshwar Das, Vijay Kumar and Mark Yim
IEEE International Conference on Robotics and Automation (ICRA), 2019
- paper link **ModQuad: The Flying Modular Structure that Self-Assembles in**
video link **Midair**
David Saldaña, Bruno Gabrich, **Guanrui Li**, Mark Yim, and Vijay Kumar
IEEE International Conference on Robotics and Automation (ICRA), 2018

Workshop Publications

Observability-Aware Trajectories for Geometric and Inertial Self-Calibration

Christoph Bohm, **Guanrui Li**, Giuseppe Loianno, and Stephan Weiss
Power-On-and-Go Robots: 'Out-of-the-Box' Systems for Real-World Applications Workshop, Robotics: Science and Systems (RSS) Conference, 2020

Work Experience

- Spring, 2019 **CMU Robotics Institute Field Robotics Center** *Pittsburgh, PA*
Research Associate, under Prof. Sebastian Scherer
- Developed a fast and lightweight planning method for a quadrotor navigating through a dense forest.
 - Published a paper in IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2020
- 2017-2018 **University of Pennsylvania GRASP Lab** *Philadelphia, PA*
Research Assistant, under Prof. Mark Yim
- Worked on mechanical design and manufacture of the robots for the ModQuad project.
 - Developed geometric controller for assembled modular quadrotor structure.

- Developed visual servo control method for quadrotor docking using camera and IMU.
- Published three papers in IEEE International Conference on Robotics and Automation (ICRA), 2018, 2019, 2020 respectively.

Media Coverage

- 2022 **Learning Model Predictive Control for Quadrotors**
The research video of my paper “Learning Model Predictive Control for Quadrotors” is featured in [IEEE robotics blog post](#).
- 2021 **Low-Cost Drones Learn Precise Control Over Suspended Loads**
[IEEE news article](#) reported my research paper “PCMPC: Perception-Constrained Model Predictive Control for Quadrotors with Suspended Loads using a Single Camera and IMU”. [DroneDJ](#), [NYU Tandon News](#) followed up with this article as well.
- 2021 **Cooperative Transportation of Cable Suspended Payloads with MAVs**
The research video of my paper “Cooperative Transportation of Cable Suspended Payloads with MAVs” is featured in [IEEE robotics blog post](#).
- 2021 **ModQuad: The Flying Modular Structure that Self-Assembles in Midair**
[Wevolver](#) featured the ModQuad research project video on their blog posts.
- 2018 **These Drones Stick Together: Daily Planet**
[Discovery Channel](#) reported the ModQuad project on their Daily Planet Program.

Research Mentorship

- 2021-2022 **Xinyang Liu (now Master student at Stanford University)**
- 2020-2021 **Alex Tunchez (now Software Engineer at CANVAS)**
- 2019-2020 **Rundong Ge (now Software Engineer at TuSimple)**
- 2019-2020 **Jueun Kwon (Now Undergraduate at Cornell University)**
- 2020-2021 **Kelsey Fontenot (Now Undergraduate at MIT)**

Academic Services

Conference Organization

- 2022 Aerial Robotics IV Session Chair, ICRA

Reviews

- 2020-2023 IEEE Robotics and Automation Letters (RA-L)
- 2021-2023 IEEE Transactions on Robotics (T-RO)
- 2019-2023 IEEE International Conference on Robotics and Automation (ICRA)
- 2020-2023 IEEE/RSJ Conference on Intelligent Robots and Systems (IROS)
- 2022 International Conference on Unmanned Aircraft Systems (ICUAS)
- 2020-2021 IEEE International Symposium on Safety and Rescue Robotics (SSRR)

Teaching Experience

- Fall 2019 **ROB 6003: Foundation of Robotics**

NYU

Guest Lecturer

Instructor: Prof. Giuseppe Loianno

Gave 1-2 lectures on dynamic model of a manipulator, using Lagrange approach and Newton-Euler approach.

Fall 2017 **MEAM 510: Design of Mechatronic Systems**

UPenn

Graduate Teaching Assistant

Instructor: Prof. Mark Yim and Prof. Paul Stegall

Held regular office hour and answered students questions on basic electronics and microprocessor. Modified a radio-controlled toy excavator to a WiFi-controlled robot for final project prototyping. Coached a 16-student team to win the first robot MOBA competition in the course.

Summer **edX: Robotics: Dynamics and control**

UPenn

2017 **Graduate Teaching Assistant**

Instructor: Prof. Ani Heish and Prof. Vijay Kumar

Moderated discussion forums and answered students questions on the lab assignments. Checked and fixed the course slides on linear and nonlinear control.