

# Guanrui Li

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## Education

- 2019-2023 **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.

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## Journal Articles

- under review **Human-Aware Human-Robot Collaborative Manipulation of a Cable Suspended Payload with Multiple MAVs**  
preprint link **Guanrui Li\***, Xinyang Liu\*, Giuseppe Loianno (\* equal contribution).  
video link *IEEE Transactions on Robotics, (T-RO)*, 2023.  
(under review)
- preprint link **RotorTM: A Flexible Simulator for Aerial Transportation and Manipulation**  
video link **Guanrui Li**, Xinyang Liu, Giuseppe Loianno  
*IEEE Transactions on Robotics, (T-RO)*, 2023  
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**, 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.

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## Conference Publications

- Enhancing Human-Drone Spatial Awareness with a Mixed Reality Interface for Drone Assisted Interactive Navigation**  
Sanket A. Salunkhe\*, Pranav Nedunghat\*, Luca Morando, **Guanrui Li**, Giuseppe Loianno  
*IEEE International Conference on Robotics and Automation (ICRA)*, 2024.  
(under review)
- 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**, 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, Giuseppe Loianno  
*IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2021*
- paper link **PCMP: 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, 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**, 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, 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, Vijay Kumar  
*IEEE International Conference on Robotics and Automation (ICRA), 2018*

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## Workshop Publications

### Observability-Aware Trajectories for Geometric and Inertial Self-Calibration

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

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## 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 “PCMP: 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

### Ph.D. Student

- 2023-present Mrunal Sarvaiya  
Project: Hybrid MPC and reinforcement learning for aerial transportation
- 2022-present Jennifer Yeom  
Project: Geometric fault-tolerant control of quadrotors in case of rotor failures
- 2021-2022 Jonas Eschmann  
Project: PCMP: for outdoor aerial transportation
- 2020-2021 Alesssandro Saviolo  
Project: Physics-inspired temporal learning of quadrotor dynamics

### Master Student

- 2020-2021 Alex Tunchez (Now Software Engineer at CANVAS)  
Project: PCMP: for aerial transportation, Learning MPC for quadrotors.

2019-2020 Rundong Ge (Now Software Engineer at TuSimple)  
Project: Cooperative transportation with multiple quadrotors using onboard vision and inertia sensing.

#### Undergraduate Student

2021-2022 Xinyang Liu (Now Master at Stanford University)  
Project: Human-aerial-robots collaborative transportation

2021-2023 Devansh Agarwal  
Project: Sensor and actuation designs for collaborative transportation using quadrotors

2020-2022 Daniel Tang  
Project: Mechanical design of micro agile quadrotor

#### High School student

2022-2023 Jimmy Lee (Now Undergraduate at UIUC)

2020-2021 Kelsey Fontenot (Now Undergraduate at MIT)

2019-2020 Jueun Kwon (Now Undergraduate at Cornell University)

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### 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)

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### Teaching Experience

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

- Fall 2022 **Guest Lecturer**

Instructor: Prof. Giuseppe Loianno

Gave 1-2 lectures every Fall semester on dynamic model of a robot arm, using the 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.