

# Yuhan Zhao

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<https://yuhan16.github.io/>

## EDUCATION

### New York University

New York, NY

*Ph.D. Candidate in Electrical and Computer Engineering (ECE)*

*Sept. 2019 - Jun. 2024 (Expected)*

Supervisor: Quanyan Zhu | GPA: 3.95/4.00

### University of Pennsylvania

Philadelphia, PA

*Robotics Master of Science in Engineering (GRASP Lab)*

*Sept. 2017 - Jun. 2019*

Supervisor: Michael Posa | GPA: 3.95/4.00

### Beijing Institute of Technology

Beijing, China

*Bachelor of Science in Automation*

*Sept 2013 - Jun. 2017*

Supervisor: Hongbin Ma | GPA: 3.93/4.00

**Research Interests:** Game-theoretic control and learning in robotics, multi-agent control and optimization, human-robot interaction, learning for control

## PUBLICATIONS

- [1] **Y. Zhao**, B. Huang, J. Yu, and Q. Zhu, "Stackelberg Strategic Guidance for Heterogeneous Robots Collaboration," *2022 International Conference on Robotics and Automation (ICRA)*, 2022.
- [2] T. Li, **Y. Zhao**, and Q. Zhu, "The Role of Information Structures in Game-Theoretic Multi-Agent Learning," *Annual Reviews in Control*, 2022.
- [3] **Y. Zhao** and Q. Zhu, "Distributed and Resilient Planning-Control for Optimal LEO Satellite Constellation Coverage," *American Control Conference (ACC)*, 2022.
- [4] S. Liu, Y. Zhao, and Q. Zhu, "Understanding the Interplay Between Herd Behaviors and Epidemic Spreading Using Federated Evolutionary Games," *American Control Conference (ACC)*, 2022.
- [5] S. Liu, **Y. Zhao**, and Q. Zhu, "Herd Behaviors in Epidemics: A Dynamics-Coupled Evolutionary Games Approach," *Dynamic Games and Applications*, 2022.
- [6] **Y. Zhao**, Y. Ge, and Q. Zhu, "Combating Ransomware in Internet of Things: A Games-in-Games Approach for Cross-Layer Cyber Defense and Security Investment," *International Conference on Decision and Game Theory for Security (GameSec)*, 2021.
- [7] **Y. Zhao** and Q. Zhu, "Combating Online Counterfeits: A Game-Theoretic Analysis of Cyber Supply Chain Ecosystem," *International Conference on Decision and Game Theory for Security (GameSec)*, 2020.

## RESEARCH EXPERIENCE

### Meta-Learning in Cooperative Stackelberg Games

New York University

*Laboratory for Agile and Resilient Complex Systems, Prof. Quanyan Zhu*

*Jul. 2022 - Present*

- Use Dynamic Stackelberg games to characterize leader-follower type of cooperative in multi-robot systems
- Leverage Meta-learning to find online adaptation control strategies for different cooperative tasks
- Two submissions under review for ICRA 2023 and IFAC World Congress 2023

### Heterogeneous Robots Collaboration with Stackelberg Games [1]

New York University

*Laboratory for Agile and Resilient Complex Systems, Prof. Quanyan Zhu*

*Jul. 2022 - Present*

- Use Stochastic Stackelberg games to characterize collaboration between two heterogeneous robots
- Develop collaborative algorithm with feedback Stackelberg equilibrium and mixed integer linear programming
- Evaluate the collaborative algorithm in the application of multi-object rearrangement tasks

### **Distributed Multi-Satellite Coverage Control in Adversarial Environments [3]**

New York University

*Laboratory for Agile and Resilient Complex Systems, Prof. Quanyan Zhu*

*Jul. 2021 - Feb. 2022*

- Model multi-satellite coverage control problem as a potential game
- Develop distributed planning algorithms and MPC control strategies to achieve resilient coverage control in different adversarial space environments
- One submission under review for IEEE Transactions on Control Systems Technology

### **Security Games in IoT and Supply Chains [6,7]**

New York University

*Laboratory for Agile and Resilient Complex Systems, Prof. Quanyan Zhu*

*Jan. 2020 - Sept. 2021*

- Assess adversarial ransomware attacks in IoT networks with Markov games and develop ransom-payment strategy for cyber mitigation and security-investment strategy for cyber prevention
- Model counterfeit attack in supply chain with Stackelberg games and assess the impact of counterfeit

### **Local Optimization Methods on Robot Contact Problems**

University of Pennsylvania

*Dynamic Autonomy and Intelligent Robotics Lab, Prof. Michael Posa*

*May. 2018 - May. 2019*

- Investigate various numerical optimization methods to solve non-smooth dynamics of contact
- Establish an optimal control model for robot contact problem using time-stepping methods
- Develop C++/MATLAB code to solve the model by implementing alternating direction method of multipliers (ADMM), penalty interior-point method and sequential quadratic programming method

### **HONORS AND AWARDS**

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|--|---------------------------------------|
| • ACC 2022 Student Travel Grant                | National Science Foundation, 2022     |
| • Dean's Scholarship                           | New York University, 2019-2020        |
| • Outstanding Graduate Representative          | Beijing Institute of Technology, 2017 |
| • Scholarship for Academic Excellence (Top 5%) | Beijing Institute of Technology, 2017 |

### **INDUSTRY EXPERIENCE**

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#### **Software Engineer**

Beijing, China

*Kuangbaobao Network Technology Co. Ltd.*

*Jul. 2016 - Sept. 2016*

- Design user interface of "Kuangbaobao" App with Java in Eclipse
- Achieve data transmission between mobile phone and server with C++

### **PROFESSIONAL ACTIVITIES**

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#### **Conference/Journal Reviewer**

- IEEE International Conference on Robotics and Automation (ICRA)
- IEEE Conference on Decision and Control (CDC)
- IEEE Conference on Control Technology and Applications (CCTA)
- Annual Reviews in Control

### **TECHNICAL SKILLS**

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**Programming:** Python, MATLAB, C/C++, Julia

**Research Software:** PyTorch, ROS, Gurobi, IPOPT, YALMIP, Raspberry Pi, LaTeX, Linux