

# James Zhu

jameszhu@andrew.cmu.edu • jameswzhu.github.io

## Education

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### Carnegie Mellon University

*PhD in Mechanical Engineering*

*Fall 2024*

Thesis: Navigating a Complex World: Improving Robot Outcomes Through Social, Regulatory, and Control Theoretic Approaches

### Carnegie Mellon University

*Master of Science in Mechanical Engineering*

*December 2022*

### Vanderbilt University

*Bachelor of Engineering in Mechanical Engineering and Mathematics*

*May 2020*

Cum Laude

## Experience

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### Robomechanics Lab at CMU

*Graduate Research Assistant*

Advisor: Aaron Johnson

**Pittsburgh, PA**  
*May 2020 – Current*

### The AI Institute

*Robots, Ethics, & Society Research Intern*

Supervisor: Kate Darling

**Boston, MA**  
*January 2024 – Current*

### Medical Engineering and Discovery Lab at Vanderbilt

*Undergraduate Research Assistant*

Advisor: Robert Webster

**Nashville, TN**  
*August 2018 – May 2020*

### Jet Propulsion Laboratory

*High Contrast Imaging Intern*

Supervisor: Stuart Shaklan

**Pasadena, CA**  
*May 2019 – July 2019*

### Robotics and Autonomous Systems Lab at Vanderbilt

*Undergraduate Research Assistant*

Advisor: Nilanjan Sarkar

**Nashville, TN**  
*September 2017 – May 2018*

## Teaching

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Graduate Teaching Fellow: CMU Eberly Center

*September 2022 – December 2023*

Advisory Board Member: CMU Teaching & Learning Summit

*September 2023*

Inclusive STEM Teaching Certificate

*April 2023*

Teaching Assistant: Dynamics

*Spring 2022 and Spring 2023*

Teaching Assistant: Intro to Robotics

*Spring 2019*

Teaching Assistant: Probability and Statistical Inference

*Spring 2019*

## Leadership and Honors

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Co-Founder: Cup of Wontons

*February 2023 – December 2023*

Equity Researcher: Equitable and Just Greater Pittsburgh

*December 2022 – December 2023*

Tech Stewardship Practice Program Certificate

*December 2022*

Organizer: Robotics Outreach for Gwen's Girls after-school program

*Fall 2020 – Fall 2022*

Featured in CMU Engineering Magazine article

Co-chair: Mechanical Engineering DEI Outreach Subcommittee

*January 2021 – May 2022*

Carolyn Commer Graduate Student Involvement Award

*May 2021*

Student Mentor: Carnegie Mellon Tartan Scholars Program

*August 2020 – May 2021*

Schiff Family Scholarship

*2018–2020*

## Publications

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### Journal Papers

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#### **Saltation Matrices: The Essential Tool for Linearizing Hybrid Dynamical Systems**

*Nathan J Kong, J Joe Payne, James Zhu, and Aaron M Johnson*

Under Review: Proceedings of the IEEE

### Conference Papers

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#### **Convergent iLQR for Safe Trajectory Planning and Control of Legged Robots**

*James Zhu, J Joe Payne, and Aaron M Johnson*

To Appear: 2024 IEEE International Conference on Robotics and Automation

#### **Grounding Robot Navigation in Self-Defense Law**

*James Zhu, Anoushka Shrivastava, and Aaron M Johnson*

2023 IEEE International Conference on Robot and Human Interactive Communication

#### **Hybrid Event Shaping to Stabilize Periodic Hybrid Orbits**

*James Zhu, Nathan J Kong, George Council, and Aaron M Johnson*

2022 IEEE International Conference on Robotics and Automation

#### **Design and System Validation of Rassel: A Novel Active Social Assistive Robot with a User Interface for Elderly with Dementia**

*Zhaobo K Zheng, James Zhu, Jing Fan, and Nilanjan Sarkar*

2018 IEEE International Symposium on Robot and Human Interactive Communication

### Workshop Papers

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#### **By Air or by Land: How Locomotion Methods Dictate Drone Ethics**

*James Zhu and Aaron M Johnson*

2022 ICRA Workshop on Addressing Ethical and Technical Challenges in the Development, Use and Governance of Lethal Autonomous Weapons Systems

### Presentations

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#### **Designing Safe Quadrupedal Gaits**

*ICRA Advancements in Trajectory Optimization and MPC for Legged Systems Workshop*

*May 2024*

Poster

#### **An Engineering Perspective on Legislation Challenges for Autonomous Delivery Robots**

*Solving for X*

*February 2024*

Session Organizer

#### **Grounding Robot Navigation in Self-Defense Law**

*WeRobot*

*October 2023*

Poster

#### **Convergent Planning and Control of Legged Robots**

*IEEE RAS TC on Model-Based Optimization for Robotics Poster Session*

*July 2023*

Poster

#### **Convergent Planning and Control of Legged Robots**

*CMU MechE PhD Symposium*

*March 2023*

Poster

#### **Convergent iLQR for Underactuated Hybrid Dynamical Systems**

*RSS Risk Aware Decision Making Workshop*

*June 2022*

Lightning Talk

#### **Hybrid Event Shaping to Generate Stable Robotic Gaits**

*Carnegie Mellon Locomotion Seminar*

*March 2022*

Invited Talk

### Additional Conferences

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Ethical and Legal Dilemmas of Autonomous Weapons in War and National Security Conference

*April 2024*

Invited Participant

WeRobot

*September 2022*

Participant

## Students Mentored

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Selvin Garcia Gonzalez MS in Mechanical Engineering, CMU	<i>February 2024 - Present</i>
Joshua Ramos BS in Electrical Eneengineering, CMU	<i>February 2022 - Present</i>
Karla Soto Cuevas MS in Mechanical Engineering, CMU	<i>September 2023 - December 2023</i>
Sasha Kroman BS in Mechanical Engineering, CMU	<i>September 2023 - December 2023</i>
Nikhil Chinnalapatti Gopinath MS in Mechanical Engineering, CMU	<i>June 2023 - December 2023</i>
Anoushka Srivastava BS in Artificial Intelligence, CMU	<i>January 2023 - May 2023</i>