James Zhu

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Education

PhD, Mechanical Engineering
Carnegie Mellon University — *September 2024*
Thesis: Navigating a Complex World: Improving Robot Outcomes Through Social, Regulatory, and Control Theoretic Approaches

MS, Mechanical Engineering
Carnegie Mellon University — *December 2022*

BE, Mechanical Engineering and Mathematics
Vanderbilt University — *May 2020*
Cum Laude

Work Experience

Postdoctoral Researcher — Toulouse, France
French National Centre for Scientific Research — *January 2025 – Current*
Supervisor: Thierry Simeon

Graduate Research Assistant — Pittsburgh, Pennsylvania
Carnegie Mellon University — *May 2020 – September 2024*
Advisor: Aaron Johnson

Robots, Ethics, & Society Research Intern — Boston, Massachusetts
The AI Institute — *January 2024 – June 2024*
Supervisor: Kate Darling

Undergraduate Research Assistant — Nashville,Tennessee
Vanderbilt University — *September 2017 – May 2020*
Advisors: Nilanjan Sarkar & Robert Webster

High Contrast Imaging Intern — Pasadena, California
Jet Propulsion Laboratory — *May 2019 – July 2019*
Supervisor: Stuart Shaklan

Engineering and Operations Intern — Atlanta, Georgia
AT&T — *May 2018 – August 2018*

Teaching

Teaching Consultant Fellow: CMU Eberly Center — *September 2022 – December 2023*
Advisory Board Member: CMU Teaching & Learning Summit — *September 2023*
Teaching Assistant: Dynamics — *Spring 2022 and Spring 2023*
Teaching Assistant: Intro to Robotics — *Spring 2019*
Teaching Assistant: Probability and Statistical Inference — *Spring 2019*

Publications

Journal Papers

The Effect of Gait Parameters on Safe Quadrupedal Robot Locomotion
James Zhu, *David Ologan, Selvin Garcia Gonzalez, Ardalan Tajbakhsh, and Aaron M Johnson*
In Preparation: IEEE Robotics and Automation Letters

Scalable and Safe Motion Planning in Presence of Uncertain Multi-Modal Agents
Ardalan Tajbakhsh, Siddarth Nair, David Ologan, Amey Shah, ***James Zhu****, Lorenz T Biegler, and Aaron M Johnson*
In Preparation: IEEE Robotics and Automation Letters

Hybrid Iterative Linear Quadratic Estimation: Optimal Estimation for Hybrid Systems
J Joe Payne, ***James Zhu****, Nathan J Kong, and Aaron M Johnson*
2025 IEEE Robotics and Automation Letters

Saltation Matrices: The Essential Tool for Linearizing Hybrid Dynamical Systems
*Nathan J Kong, J Joe Payne, **James Zhu**, and Aaron M Johnson*
2024 Proceedings of the IEEE

Conference Papers

Safe Kinodynamic RRT* for Navigating Friction Transitions
*Joshua Ramos, **James Zhu**, Paul Nadan, and Aaron M Johnson*
In Preparation

Robot Behaviors Inspired by Human-Horse Interaction: A User Study
*Arihant Yadav, Pedro Reynolds-Cuéllar, Nozomi Nakajima, **James Zhu**, Eakta Jain, and Kate Darling*
In Preparation

Convergent iLQR for Safe Trajectory Planning and Control of Legged Robots
***James Zhu**, J Joe Payne, and Aaron M Johnson*
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 Rassle: 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

Other Papers

Improving Equity in Robot Deployment: A Study of Food Pantry Patrons
James Zhu
2024 Thesis Chapter

Double-Anonymous Review for Robotics
*Justin K Yim, Paul Nadan, **James Zhu**, Alexandra Stutt, J Joe Payne, Catherine Pavlov, Aaron M Johnson*
2022 Technical Report: arXiv:2406.10059

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

Conferences, Workshops, & Seminars

Presentations

Title Forthcoming
Laboratory for Analysis and Architecture of Systems Robotics Workshop *March 2025*
Invited Talk

Improving Equity in Robot Deployment
University of Tennessee Center for Biomedical Informatics Seminar *September 2024*
Invited Talk

Designing Safe Quadrupedal Gaits
ICRA Advancements in Trajectory Optimization and MPC for Legged Systems Workshop *May 2024*
Invited Talk

Navigating a Complex World: How to Bring Robots Into the Wild
New York University Dynamical Systems Lab Seminar *April 2024*
Invited Talk

An Engineering Perspective on Legislation Challenges for Autonomous Delivery Robots
Georgia Tech Solving for X Workshop *February 2024*
Invited Talk

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
Carnegie Mellon Mechanical Engineering 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

Organization

Georgia Tech Solving for X Workshop *February 2024*
Session Organizer

Additional Conferences

Ethical and Legal Dilemmas of Autonomous Weapons in War and National Security Conference *April 2024*
Invited Participant

WeRobot *September 2022*
Participant

Certifications & Training

Inclusive STEM Teaching Certificate *April 2023*
Tech Stewardship Practice Program Certificate *December 2022*

Leadership, Honors, and Additional Experience

Co-Founder & Chief Flavor Architect: Cup of Wontons *February 2023 – December 2023*
Equity Researcher: Equitable and Just Greater Pittsburgh *December 2022 – December 2023*
Organizer: Gwen's Girls Robotics Outreach 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*
Attraction Operations Specialist: EnterTRAINment Junction *June 2017 – January 2018*
Adult Literacy Program Volunteer: Nashville Public Library *January 2017 – May 2017*