Emily Kamienski

PhD

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RESEARCH INTERESTS

My research interests include enabling dynamic human robot interaction through estimation and modeling of the human, as well as control paradigms that assist and intervene only when necessary. I want to enable robots to safely perform more dynamic tasks around and in-coordination with humans.

EDUCATION

2025 **Ph.D. Mechanical Engineering**
Massachusetts Institute of Technology (MIT)
Major: Robot Control & Design Minor: Artificial Intelligence
Advisor: Harry Asada
Committee: Neville Hogan and Sang Bae Kim
GPA: 5.0/5.0

2021 **M.S. Mechanical Engineering**
Massachusetts Institute of Technology (MIT)
GPA: 5.0/5.0

2019 **B.S. Mechanical Engineering**
Georgia Institute of Technology (GT)
Minor: Computer Science
GPA: 3.96/4.0

RESEARCH EXPERIENCE

2019-2025 **MIT d'Arbeloff Robotics Lab**

Ph.D. Research
Advisor: Harry Asada

- Control & design of a novel dual arm mobile robot with articulated back structure to provide dynamic physical support to users at risk of falling while walking. Control policy developed via imitation learning of physical therapist demonstrations.
- Optimization of dual arm mobile manipulator motion to achieve ready-to-support configurations
- Constructed linear model of human walking dynamics using lifted linearization with learned basis functions for analyzing gait dynamics

Masters Research
Advisor: Harry Asada

- Created data driven fall prediction algorithm using machine learning to control reconfigurable mobility aid
- Conducted human subject tests at MIT clinical research center to obtain dynamic and kinematic data during loss of balance
- Incorporated feedback controller into a growing robot to improve positioning accuracy

2017-2019 **GT Intelligent Robotics & Emergent Automation Lab**

Undergraduate Research

Advisor: Jonathan Rogers

- Created prototype UAV docking mechanism to independently attach/detach from moving ground vehicle
- Designed & control of prototype robot to drive on cable through tree canopy at Morton Arboretum to collect data on vegetation growth
- Worked on serial communication protocol for test involving the use of multiple rotor vehicles to lift a payload

Fall 2016 **GT Advanced Mechanical Bipedal Experimental Robotics Lab**

Undergraduate Research

- Worked in a team to build automated safety cart that would track the DURUS robot as it walks on a treadmill
- Machined multiple parts for the safety cart using a milling machine and a lathe

INDUSTRY EXPERIENCE

Summer 2019 **Controls Engineering Intern**

Northrop Grumman Flight Controls Technology - *Redondo Beach, CA*

- Modeled IMU gimbal table and developed PID control laws in Simulink
- Autogenerated C++ code and tested controller on physical system and verified it met requirements

Summer 2018 **Test Engineering Intern**

Northrop Grumman Advanced Manufacturing Technology & Innovation - *El Segundo, CA*

- Technical lead on development effort in support of out-of-autoclave curing for a closed/confidential program
- Project deliverables have an expected savings on the order of $1 million USD
- Collaborated on 5 activities in support of a $10 million NCTA portfolio

Summer 2017 **Structural Mechanics Analyst Intern**

United Technologies Aerospace Systems - *Windsor Locks, CT*

- Performed structural analysis using Patran FEA on ORION Multi-Purpose Crew Vehicle components
- Identified peak stresses and average weld stresses developed on a pump, accumulator, and heat exchangers

2014, 2015, 2016 **Engineering Intern**

Naval Surface Warfare Center Carderock Division **-** *Carderock, Maryland*

- Supported ship model tow tests and data collection, 3D modeled & fabricated floats for aircraft model

OTHER TECHNICAL EXPERIENCE

2015 – 2018 **Formula SAE -** Georgia Tech Motor Sports

Helped prep car for different events in annual competition at Michigan Int'l Speedway in Brooklyn, Michigan & participated in design reviews

Controls Subsystem

- Redesigned cable driven throttle to drive-by wire with electric throttle control
- Design & fabrication work on pedals, steering, & clutch using SolidWorks; composite layups

Manufacturing Director

- Organized training sessions for ~20 team members to get trained on manual and CNC mills
- Created parts on CNC mill & lathe, organized team machine training
- Designed and welded mobile work table to support car

Powertrain Subsystem

- Constructed improved fuel tank correcting previous years faults. Pump sizing, abiding by rulebook, interfacing with other subsystems (powertrain & chassis mounts). Introduced baffling to reduce slosh and fuel starvation during cornering

PUBLICATIONS

Journal & Conference Publications

E. Kamienski, Roberto Bolli Jr., Vealy Lai, and H. Asada, "A Mobility Support Robot Demonstrating Contactless Supervision and Fall Prevention Imitated from a Physical Therapist," in IEEE Transactions on Robotics. *In Preparation.*

E. Kamienski, S. Donahue, M. Major, and H. Harry Asada. "Koopman Modeling of Human Gait Dynamics for Global Modal Analysis Using Periodic Motion Regularization", *2025 American Control Conference (ACC).*

E. A. Kamienski and H. Harry Asada, "Model Free Method of Screening Training Data for Adversarial Datapoints through Local Lipschitz Quotient Analysis," in *IEEE Robotics and Automation Letters,* September 2024.

A. Stewart-Height, R. Bolli, **E. Kamienski**, and H. H. Asada, " Design and Experimental Validation of Woodwork-Inspired Soft Pneumatic Grippers". *2025 IEEE International Conference on Robotics and Automation (ICRA)*.

I. Nozawa, **E. Kamienski**, C. O'Neill and H.H. Asada, "A Monte Carlo Approach to Koopman Direct Encoding and Its Application to the Learning of Neural-Network Observables", *in IEEE Robotics and Automation Letters*, vol. 9, no. 3, pp. 2264-2271, March 2024, doi 10.1109/LRA.2024.3354612.

E. A. Kamienski, P. Bonato and H. H. Asada, "Time-Critical Fall Prediction Based on Lipschitz Data Analysis and Design of a Reconfigurable Walker for Preventing Fall Injuries," in *IEEE Access*, vol. 12, pp. 1822-1838, 2024, doi: 10.1109/ACCESS.2023.3347263.

J. Bell, **E. Kamienski**, S. Teshigawara, H. Itagaki and H. H. Asada, "Gear Ratio Optimization of a Multifunctional Walker Robot Using Dual-Motor Actuation," *2021 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2021, pp. 9339-9346, doi: 10.1109/IROS51168.2021.9636482.

Patents

E. Kamienski and H. H. Asada, “Robotic systems and methods for assisting with user posture,” World Intellectual Property Organization, WO 2025 122728 A1, 12 Jun. 2025.

E. Kamienski and H. H. Asada, "Transformer Stand to Sit Robot". US Patent 63/709382, Filed Oct. 18, 2024. (Provisional)

E. Kamienski and H. H. Asada, "Pants with Embedded Harness for Daily Use". US Patent 63/342601, Filed May 16, 2022.

E. Kamienski and H. H. Asada, "A Reconfigurable Walker for Predicting and Preventing Fall of Patients". US Patent 63/252367, Filed May 10, 2021. (Provisional)

Workshop Presentations

E. Kamienski. “Human Gait Modeling and Analysis using Koopman Operators”. Invited Talk at “Koopman Operators in Robotics” Workshop. *Robotics: Science & Systems 2024.* Delft, Netherlands. July 15, 2024. https://sites.google.com/yale.edu/rss-2024-koopman-operators/home

News

“Flexible yet sturdy robot is designed to “grow” like a plant”. Jennifer Chu. *MIT News Office*. Nov. 7, 2019. https://news.mit.edu/2019/robot-grow-like-plant-1107

TEACHING EXPERIENCE

2021, 2022 **Teaching Assistant**

MIT Robotics Class - 2.12

- Designed significant part of final project for 2 semesters. Set up framework for students to remotely teleoperate UR robot during pandemic. Provided template instructions for programming Universal Robot 5e in Python using ROS to perform pick and place tasks guided by computer vision.
- Helped prepare labs and create new lab content during pandemic
- Provided one-on-one instruction and helped debug code for ~25 graduate and undergraduate students in 2 different lab sessions through weekly hands-on lab assignments

LEADERSHIP & OUTREACH

May 2023 – present **Graduate Women in Robotics Professional Development Chair, MIT**

- Organized visits to Medtronic, Boston Dynamics, Toyota Research Institute, Amazon Robotics, and the AI Institute with an average of 15+ members in attendance at each visit

May 2022 – May 2024 **Executive-Chair of Mechanical Engineering Graduate Association of Women,** MIT

- Coordinated regular social events and professional talks with other exec. board members and ran engagement events for incoming students
- Managed ~$6000 annual budget
- Planned semester schedule and coordinated events

Aug. 2022 – June 2023 **Treasurer of Maker Workshop, MIT**

- Managed budget exceeding $50,00
- Procured orders weekly for members and organized receipts filing
- Maintained stocks of consumables

Aug. 2021 – June 2023 **Mentor at Maker Workshop, MIT**

- Ran weekly Maker Mondays for a semester where I introduced groups of ~15 people to the shop policies, gave a tour of the shop and hand tools training
- Offered weekly 1 hour training sessions to students on benchtop tools
- Managed the shop for 2 hours during weekly shifts, assisting students with machine usage and ideating on part creation

Aug. 2018 – May 2019 **Tau Beta Pi Corporate Relations Officer, GT**

- Organized corporate dinner for ~40 student members with ~7 companies in attendance

Aug. 2017 – May 2018 **Manufacturing Director of GT Motorsports, GT**

2022 – 2024 **Grader for 2.160 Identification, Estimation, & Learning**

2019 – present **d'Arbeloff Lab 3D printer chair**

- Order filament and other parts
- Replace worn parts on machines
- Procured $20,000 Stratasys printer for the lab

2023 – 2024 **d'Arbeloff Lab Journal club organizer**

- Scheduled leaders for each weekly paper discussion

2024 **Reviewer ICRA**

MENTORSHIP

Supervised Undergraduate Students

- Vealy Lai, Undergraduate Research Opportunities Program 2024
- Karen Chen, Undergraduate Thesis 2022
- Rebecca Slater, Undergraduate Research Opportunities Program 2021

HONORS AND AWARDS

MIT Thomas Sheridan Award in Man-Machine Integration - 2025

MIT Sandbox fund recipient - 2024

MIT Graduate Student Council Travel Grant Recipient - 2024

Mechanical Engineering Research Exhibition Honorable Mention, *MIT* – 2021

MIT Intro to Robotics 2.12 Outstanding TA Award – 2021, 2022

George Woodruff Mechanical Engineering School Chair's Award, *GT* – 2019

Astronaut Scholarship, awarded by Astronaut Scholarship Foundation, *GT* – 2018

Ford Blue Oval Vehicle Team Scholarship, *GT* – 2016

Capitol Hill Maker Faire Presenter, Washington DC - 2015

SKILLS

Programming: Python, C++, Pytorch, Tensorflow, Matlab, Simulink, HTML, LaTex

Software: ROS, Drake, OpenCV, Git, MS Visual Studio, Adobe Premiere Pro, SolidWorks

Robotics: Machine Learning, Jetson Nano, Raspberry Pi, Arduino, Odrives, Mocap, Universal Robots

Prototyping: Manual/CNC mill & lathe, water jet, composite layups, 3D printing, soldering, welding

Experiments: IRB proposals, human subject tests