

# KAYMIE SHIOZAWA

I am a mechanical engineer whose research lies at the intersection of controls, biomechanics, robotics, and neuroscience. My work advances mobility assessment, deepens understanding of human motor control, and drives the development of innovative devices to assist, collaborate with, restore function, and enhance abilities in individuals.

## Education

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**Massachusetts Institute of Technology (MIT)** **Cambridge, MA**  
*Doctor of Philosophy in Mechanical Engineering* March 2025

GPA: 5.0/5.0; Major: Robotics; Minor: Computation

Advisor: Prof. Neville Hogan; Thesis: Quantifying human balance performance and control to inform therapy.

**Massachusetts Institute of Technology (MIT)** **Cambridge, MA**  
*Master of Science in Mechanical Engineering* June 2021

GPA: 5.0/5.0

Advisor: Prof. Neville Hogan; Thesis: Towards the development of an adaptive rehabilitative device.

**Massachusetts Institute of Technology (MIT)** **Cambridge, MA**  
*Bachelor of Science in Mechanical Engineering* June 2019

GPA: 4.8/5.0

Advisor: Prof. Harry Asada; Thesis: Gaze tracking: seeking critical information for autonomous excavation.

## Research Experience

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**Harvard Biodesign Lab** **Boston, MA**  
*Postdoctoral Fellow*, Advisors: Prof. Conor Walsh, Prof. Terry Ellis Sept. 2025 – Present

- Directing research on a wearable soft exosuit designed to mitigate freezing of gait in Parkinson's disease, integrating biomechanics, control systems, and clinical evaluation
- Coordinating a multi-visit human subject study involving 20+ participants, with data collected both in the lab and in participants' home/community
- Leading a cross-functional, cross-institution (collaboration with Boston University) team of 3 engineer, 3 researcher, and 2 clinical members
- Mentoring early-career researchers, including a PhD student (controller development) and a research fellow (data processing, analysis, and interpretation)

**MIT Newman Lab** **Cambridge, MA**  
*Research Specialist* June – Aug. 2025

*Graduate Research Assistant*, Advisor: Prof. Neville Hogan Sept. 2019 – May 2025

- Three 1<sup>st</sup> author manuscripts published in *J Neuroengineering and Rehabilitation* and *J Neurophysiology*
- Studied human neuromotor control strategy during balance by modeling a balancing human stabilized by optimal control and validating results with unimpaired younger adults', unimpaired older adults', and post-stroke participants' data
- Developed a novel assessment method that quantifies standing balance ability and control strategy in humans
- Designed a novel algorithm to enable continuous monitoring of human balance ability using only portable motion and force sensors on-board an instrumented cane
- Conducted human subject experiments on ~30 younger and older adults to validate a custom algorithm that predicts balance ability
- Presented findings through poster and oral presentations at six national and international conferences
- Supervised three undergraduate students, two of which completed their theses that won departmental awards

## Research Experience (cont.)

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### Microsoft Research Applied Robotics Research Group

Seattle, WA

Research Intern, Advisor: Dr. Katsu Ikeuchi

June – Aug 2022

- Designed a framework and model to teach a bipedal robot to walk using reinforcement learning
- Studied the effect of curricula inspired by human neurorehabilitation on the learning outcome in simulation
- Wrote a paper and submitted it to the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)

### MIT D'Arbeloff Lab

Cambridge, MA

Undergraduate Research Assistant, Advisor: Prof. Harry Asada

Sept. 2017 – May 2019

- Employed gaze tracking to distinguish a human operator's focus points, used deep learning (CNN) to find trends
- Selected as a scholar for [SuperUROP](#), a competitive yearlong advanced research program; wrote thesis and presented in two poster sessions
- Designed and manufactured a base for a robotic excavator to add a degree of freedom through 3D modeling (CAD), material selection, and manufacturing methods such as water jetting and milling

### Pacific Northwest National Laboratory (PNNL) (U.S. Department of Energy)

Seattle, WA

Research Intern, Advisor: Dr. Sarah Newman

Jan. 2019

- Published a 2<sup>nd</sup> author paper in the *Journal of Renewable Energy*
- Contributed to the development of a (Python) software tool that sizes microgrids to facilitate off-grid operation
- Analyzed the effectiveness of the tool by measuring resiliency of sized microgrid designs

### CEA-LETI: Embedded Micro Batteries Laboratory

Grenoble, France

Research Intern, Advisor: Dr. Christophe Dubarry

June – Aug. 2016

- Determined properties of battery electrolytes using electrical impedance characterization for efficient batteries
- Presented findings to lab of 40 people; cooperated and communicated with team of 5 members in French

## Peer-Reviewed Journal and Conference Publications \*Corresponding Author

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1. **Shiozawa, K.** <sup>†</sup>, Tessari, F. <sup>\*†</sup>, Sugimoto-Dimitrova, R., Hogan, N., "Quiet Standing: A Simple Motor Task but a Hard Modeling Challenge," *Progress in Biomedical Engineering*, submitted. <sup>†</sup>Equal Contribution
2. Burns, M., **Shiozawa, K.** <sup>\*</sup>, Hogan, N., 2025 "Multi-Linear Regressor for Static Posturography Estimation through an Instrumented Cane," *IEEE International Conference on Rehabilitation Robotics* [[Link](#)].
3. **Shiozawa, K.** <sup>\*</sup>, Sugimoto-Dimitrova, R., Gruben, K. G., and Hogan, N., 2024, "Human Foot Force Suggests Different Balance Control between Younger and Older Adults," *Journal of Neurophysiology* [[Link](#)].
4. **Shiozawa, K.**, Russo, M. <sup>\*</sup>, Lee, J., Hogan, N., and Sternad, D., 2024, "Human Foot Force Informs Balance Control Strategies when Standing on a Narrow Beam," *Journal of Neurophysiology* [[Link](#)].
5. Sugimoto-Dimitrova, R. <sup>\*</sup>, **Shiozawa, K.**, Gruben, K. G., and Hogan, N., 2024, "Frequency-Domain Patterns in Foot-Force Line-Of-Action: An Emergent Property of Standing Balance Control," *Journal of Neurophysiology* [[Link](#)].
6. **Shiozawa, K.**, Lee, J. <sup>\*</sup>, Russo, M., Sternad, D., and Hogan, N., 2021, "Frequency-Dependent Force Direction Elucidates Neural Control of Balance," *Journal of Neuroengineering and Rehabilitation* [[Link](#)].
7. Newman, S. <sup>\*</sup>, **Shiozawa, K.**, Follum, J., Barrett, E., Douville, T., Hardy, T., and Solana, A., 2020, "A Comparison of PV Resource Modeling for Sizing Microgrid Components," *Renewable Energy* [[Link](#)].

## Conference Presentations

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1. **Shiozawa, K.**, Sugimoto-Dimitrova, R., Gruben, K. G., and Hogan, N., 2024, “Human Foot Force Reveals Different Balance Strategies between Healthy Younger and Older Adults.” Poster presentation at the *2024 MIT Mechanical Engineering De Florez Award Competition*, Cambridge, MA.
2. **Shiozawa, K.**, Sugimoto-Dimitrova, R., Gruben, K. G., and Hogan, N., 2024, “Human Foot Force Reveals Different Balance Control Strategies between Healthy Younger and Older Adults,” Poster presentation at the *2024 Neural Control of Movement Conference*, Dubrovnik, Croatia.
3. **Shiozawa, K.**, Russo, M., Lee, J., Hogan, N., and Sternad, D., 2023, “Foot Force Informs Neural Control Strategies of Different Quiet Balance Conditions.” Poster presentation at the *2023 Society for Neuroscience Conference*, Washington D.C.
4. **Shiozawa, K.**, Hogan, N., 2023, “Altered Ground Reaction Force Following Stroke Informs Neural Control of Quiet Balance.” Poster presentation at the *2023 MIT Mechanical Engineering Research Exhibition*, Cambridge, MA.
5. **Shiozawa, K.**, Russo, M., Lee, J., Hogan, N., and Sternad, D., 2023, “Foot Force Informs Neural Control Strategies of Quiet Balance.” PowerPoint and poster presentation at the *2023 Neural Control of Movement Conference*, Victoria, BC, Canada.
6. **Shiozawa, K.**, Lee, J., Russo, M., Sternad, D., and Hogan, N., 2021, “Foot Force Informs Neural Control Strategies of Quiet Balance.” Poster presentation at the *2021 MIT Mechanical Engineering Research Exhibition*, Cambridge, MA.
7. **Shiozawa, K.**, Lee, J., Russo, M., Sternad, D., and Hogan, N., 2021, “Frequency-Dependent Force Direction Elucidates Neural Control of Balance.” Poster presentation at the *2021 Neural Control of Movement Conference*, Virtual.
8. **Shiozawa, K.**, Lee, J., Russo, M., Sternad, D., and Hogan, N., 2021, “Frequency-Dependent Force Direction Elucidates Neural Control of Balance.” Poster presentation at the *CRA-WP Grad Cohort for Women Conference*, Virtual.
9. **Shiozawa, K.**, Lee, J., Russo, M., Sternad, D., and Hogan, N., 2020, “Modeling Frequency-Dependent Human Balance.” Poster presentation at the *2020 MIT Mechanical Engineering Research Exhibition*, Virtual.
10. **Shiozawa, K.**, Lee, J., Russo, M., Sternad, D., and Hogan, N., 2020, “Frequency-Dependent Force Direction Elucidates Neural Control of Balance.” PowerPoint presentation at the *2020 Neuromatch Conference*, Virtual [[Link](#)].

## Invited Talks

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### Lab Presentations:

1. “Quantifying Human Quiet Balance Control and Performance to Inform Therapy”
  - Mobile Robotics Laboratory (Prof. Jun Ota), University of Tokyo, August 19, 2025.
  - CYBERDYNE, Inc. (Prof. Yoshiyuki Sankai), August 8, 2025.
  - Artificial Intelligence Laboratory (Prof. Kenji Suzuki), University of Tsukuba, August 8, 2025.
  - Shepherd Lab: Robotics – Rehabilitation – Locomotion (Prof. Max Shepherd), Northeastern University, July 9, 2025.
  - Sensorimotor Learning Group (Prof. Daniel Wolpert), Columbia University, June 11, 2025.
  - Wearable Robotic Systems Lab (Prof. Damiano Zanotto), Stevens Institute of Technology, June 6, 2025.
  - Robotic Manipulation and Mobility Lab (Prof. Matei Ciocarlie), Columbia University, June 4, 2025.
  - Harvard Biodesign Lab (Prof. Conor Walsh), Harvard University, May 20, 2025.
  - Robotics and Rehabilitation Lab (Prof. Sunil Agrawal), Columbia University, February 19, 2025.
  - Neuromechanics Lab (Prof. Lena Ting), Emory University and Georgia Institute of Technology, June 28, 2024 [[Link](#)].
2. “Human Foot Force Informs Neural Control Strategies of Quiet Balance,” Mechanical Systems Control Lab (Prof. Masayoshi Tomizuka), U.C. Berkeley, October 6, 2023.

### Seminars:

3. “Quantifying Human Quiet Balance Control and Performance to Inform Therapy”
  - Robotics Community Council Speaker Series, Harvard University, October 15, 2025.
  - Multimedia Communication Laboratories, NTT Inc., August 20, 2025.
  - Department of Mechanical Engineering, Tohoku University, August 7, 2025.
  - Research Institute on Human and Societal Augmentation, National Institute of Advanced Industrial Science and Technology, August 5, 2025.
  - Movement Recovery Seminar, Columbia University Weinberg Family Cerebral Palsy Center, May 16, 2025.
4. “Understanding Human Neuromotor Control: All Models are Wrong, Simple Models are Useful,” Neurobionics Engineering Club, Camplus College, May 4, 2023 [[Link](#)].
5. “Towards the Development of An Adaptive Balance Rehabilitation Device,” MIT SENSE.nano Symposium, December 1, 2021 [[Link](#)].
6. “Converging Healthcare, Robotics, and AI,” Accenture, April 29, 2021.

## Patents

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1. **Shiozawa, K.**, Burns, M., and Hogan, N., 2024, “Systems and Methods to Quantify Balance Ability,” US 19/198,562. Patent pending.
2. Jeffords, C. et al., **Shiozawa, K.**, 2022, “Anomaly-Based Mitigation of Access Request Risk,” US20220345457A1 [[Link](#)].

## Awards, Honors, and Fellowships

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Society for Neuroscience Trainee Professional Development Award	2025
MIT Graduate Student Council Conference Grant	2024, 2025
Kaufman Teaching Certificate	2024
MIT Meredith Kamm Memorial Award for Excellence in a Woman Graduate Student	2024
MIT School of Engineering: Mathworks Mechanical Engineering Fellowship	2023
MIT School of Engineering: Charles M. Vest Grand Challenges for Engineering Fellowship	2023
MIT Office of Graduate Education: Hugh Hampton Young Memorial Fund Fellowship	2022
Runner-Up Presentation: MIT Mechanical Engineering Research Exhibition	2021
MIT School of Engineering: Inaugural Accenture Fellowship	2020
Runner-Up Presentation: MIT Mechanical Engineering Research Exhibition	2020
John and Miyoko Davey Foundation Merit Scholarship	2018
Most Valuable Engineer: 2.12 Introduction to Robotics Competition	2017
2 <sup>nd</sup> Place Team: 2.12 Introduction to Robotics Competition	2017
Quarterfinalist (160 participants): 2.007 Manufacturing and Design Robotics Competition	2017
Two Sigma Prize for Innovative Design: MIT Autonomous Robotics Competition	2016
2 <sup>nd</sup> Place Team: MIT Autonomous Robotics Competition	2016

## Supervision and Mentorship Experience

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**Max Burns** Sept. 2022 – Jun. 2024

Department of Mechanical Engineering, MIT

- Supervised student to design and conduct human subject experiments, develop and validate a predictive algorithm for a balance performance measure, and analyze human experimental results
- **Burns, M.**, Shiozawa, K.\*, Hogan, N., 2025, “Evaluation of Quiet Standing with an Instrumented Cane,” *IEEE International Conference on Rehabilitation Robotics*. \*Corresponding Author
- Student selected for SuperUROP (Advanced Undergraduate Research Opportunities Program)
- Student selected for the Prince Innovation Prize for filing a patent

**Billal Iqbal** Jan. 2022

Departments of Mechanical Engineering and Electrical Engineering and Computer Science, MIT

- Supervised student to design and conduct human subject experiments

**Emily Skilling** Sept. 2019 – Aug. 2020

Department of Mechanical Engineering, MIT

- Supervised student to design and conduct human subject experiments, instrument a cane with force and motion sensors, characterize the sensors, and analyze human experimental data
- Student selected for SuperUROP (Advanced Undergraduate Research Opportunities Program)
- **Skilling, E.**, 2020, “Instrumentation System for Balance Device Design Validation,” Undergraduate Thesis.
- Student won the John C. and Elizabeth J. Chato (Excellence in Bioengineering) Award

## Teaching Experience

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### Teaching Assistant

Feb. – May 2025

*Massachusetts Institute of Technology, 2.671 Measurement and Instrumentation*

- Supported a visually impaired student to attend lectures, conduct experiments in labs, and complete homework assignments and the independent project

### Kaufman Teaching Certificate Program

Sept. – Dec. 2024

*Massachusetts Institute of Technology, Teaching + Learning Lab*

- Developed foundational skills in course design, focusing on student-centered teaching and active learning
- Applied evidence-based pedagogical strategies to create inclusive and engaging learning environments
- Designed assessments and delivering constructive feedback that promotes student growth
- Practiced techniques for facilitating critical thinking and problem-solving in engineering courses

### Grader

2016 – 2020

*Massachusetts Institute of Technology,*

*2.001 Mechanics & Materials I, 2.003 Dynamics & Controls I, 2.12 Intro to Robotics*

### Lab Assistant

Feb. – May 2019

*Massachusetts Institute of Technology, 2.00b Toy Product Design*

- Mentored a team of freshmen for the design of a new toy, guiding them in ideation, prototyping, and building
- Provided hands-on support with design tools and techniques, including CAD, 3D printing, electronics and software programming, and material selection
- Fostered a collaborative learning environment, encouraging creative problem-solving and iterative design
- Assisted students in preparing a final presentation and product showcase

### English Teacher

Sept. 2014 – May 2015

*Teaching and Sharing Skills to Enrich Lives (TASSEL)*

- Taught English to a group of 30+ children in rural Cambodia

## Industry Experience

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### Microsoft Corporation

Seattle, WA

*Program Manager Intern*

June – Aug. 2019

- Filed patent and drove adoption for anomaly detection in Azure cloud access management product
- Organized meetings with key users to create a specification for the product tailored to the users' needs
- Presented to senior leadership and won best presentation display

### Lockheed Martin Advanced Technology Center

Palo Alto, CA

*Mechanical Structural/Robotics Engineer Intern*

June – Aug. 2018

- Conducted vibration analysis verifying the integrity of 3 high value PCBs to withstand spacecraft launch
- Implemented code to remotely control waypoint-navigating robots; designed 3D printed processor board mounts consisting of a clip, removing the need for fasteners
- Presented findings to 30+ executives and colleagues

### Haemonetics Corporation (Medical Devices)

Braintree, MA

*Mechanical Design Engineer Intern*

June – Aug. 2017

- Devised optical sensor components to improve blood separation; worked in the blood-lab to test and characterize
- Collaborated with software, mechanical, and systems engineering teams to explore costs and manufacturability of various sensing techniques, while gaining hands-on experience in rapid prototyping
- Presented to 20 company executives, project managers, and colleagues



## Skills

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**Programming:** Python, MATLAB, Swift, Arduino, HTML, C++, Machine Learning, Drake

**Hardware Prototyping:** Lathe, Mill, Welding, Laser Cutting, Water Jetting, 3D Printing

**Software:** SolidWorks, Fusion360, GitHub, Latex, Adobe Photoshop & Illustrator, Visual Studio, Microsoft Office

**Spoken Languages:** English (fluent), Japanese (fluent), French (business), Mandarin Chinese (basic)

## Leadership and Community Service

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### MIT Women's Technology Program in Mechanical Engineering

Jul. 2024, 2025

*Mentor*

- Mentored high school students on their poster presentations analyzing real-world engineering problems

### MIT Institute Committee: Community Service Fund Board

Aug. 2020 – May. 2024

- Nominated by the Graduate Student Council; selecting charitable organizations that MIT supports financially with an annual budget of ~\$70,000

### Assistive Technology MIT

Sept. 2023 – May. 2024

*Mentor*

- Mentored an undergraduate student team developing a robotic feeder alongside a user that has limited mobility

### MIT MEGAWomen (Mechanical Engineering Graduate Women)

Feb. 2021 – Apr. 2024

*Executive Co-Chair, Media & Publicity Co-Chair (previously)*

- Applied for and managed a fund of ~\$6,000
- Organized collaboration across social, professional development, and diversity & inclusion sub-committees

### MIT Shotokan Karate Club

Feb. 2016 – Feb. 2021

*President*

- Organized club events and practices and collaborated with instructors and mentors using a budget of \$2000/year
- Placed 1<sup>st</sup> in the Harvard-MIT Shotokan Cup; Top 8 in Japan Nationals; Placed 3<sup>rd</sup> in All-Tokyo Regionals
- Obtained black belt

### MIT Mechanical Engineering Diversity, Equity, and Inclusion Working Group

June 2020 – Aug. 2020

- Collaborated with students and administration to create a proposal on how the department could improve in diversity, equity, and inclusion

### Pi Tau Sigma: National Mechanical Engineering Honor Society

Mar. 2018 – May 2019

*Professional Development Coordinator*

- Organized information sessions on graduate school and student-faculty lunches using a budget of \$10,000+

### Japanese Society of Undergraduates

Aug. 2016 – Jan. 2019

*Treasurer*

- Organized cultural activities using a budget of \$700/semester to garner interest in Japanese culture
- Designed new website [[Link](#)]

### Freshman Pre-Orientation Program: Discover Product Design at MIT

Aug. 2016 – 2018

*Co-coordinator & Mentor*

- Managed a budget of \$7,000 as coordinator and collaborated with MIT faculty to organize the entire program that hosts 20 incoming freshmen and ~15 mentors
- Mentored incoming students in a weeklong program introducing them to ideation, prototyping, and CAD

## Professional Service

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### Conference Paper Review

- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)
- IEEE International Conference on Robotics and Automation (ICRA)

### Journal Paper Review

- IOPScience Physiological Measurement
- IEEE Transactions on Neural Systems & Rehabilitation Engineering (TNSRE)
- IEEE Robotics and Automation Letters (RA-L), Young Reviewer
- Journal of Biomechanics, Assisted Prof. Hogan with review

## Professional Development

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MIT Grant Writing Training Certificate, Cambridge, MA	2025
Rising Stars in Mechanical Engineering, Berkeley, CA	2023
MIT Path of Professorship, Cambridge, MA	2021
Computing Research Association Grad Cohort for Women, Virtual	2021
Biomedical Science Careers Student Conference, Virtual	2021
MIT Women in Innovation and STEM Database (WISDM)	2020
Pi Tau Sigma National Mechanical Engineering Honor Society	2018
• Top 25% of class eligible for membership	

## In the News

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“From counting blood cells to motion capture, sensors drive patient-centered research,” MIT News, Dec. 15, 2021 [[Link](#)].

“Advancing industry convergence through technology and innovation,” MIT News, July 30, 2021 [[Link](#)].

“MIT wins spring 2017 International Karate Shotokan Cup,” The Tech, Apr. 27, 2017 [[Link](#)].

“Imbalance in Japan’s economy,” The Japan Times, Mar. 29, 2012 [[Link](#)].