Calder N. Robbins

(413) 992-8113 | robbins.cal@northeastern.edu | linkedin.com/in/calder-robbins | github.com/cnrobbins

Summary | Dedicated and passionate engineering student with a primary interest in biomechanics and assistive devices.

Education

Northeastern University
PhD in Mechanical Engineering
University of Massachusetts Amherst
Master of Science in Mechanical Engineering — *GPA: 3.9*
Bachelor of Science in Biomedical Engineering | Cum laude — *GPA: 3.8*

Skills

Coding Python, MATLAB, Arduino
Modeling SolidWorks, AutoCAD
Testing OpenSim, Qualisys Tracking, BlueHill Universal
Design Adobe Suite

Research Experience

NeuMove Laboratory **Aug 2024 – Present**
Graduate Research Assistant
- Implemented ankle exoskeleton in Myosuite environment for simulation-based assistance optimization during walking.
- Established reinforcement learning framework for modulating simulated locomotion speed.

UMass Integrative Locomotion Laboratory **Feb 2020 – Aug 2024**
Research Assistant

Publications

- Robbins, C., et al. *Effects of steep slopes and bending stiffness on walking kinematics*. Manuscript in preparation.

Uphill Biomechanics

- Designed and built specialized uphill treadmill.
- Designed and ran study on effects of bending stiffness on biomechanics of inclined walking.
- Utilized Qualisys Tracking and OpenSim to analyze gait parameters.
- Wrote custom MATLAB and Python scripts for data processing and analysis
- Presented preliminary findings at the 2024 *American Society of Biomechanics* meeting.

General

- Completed MATLAB data analysis for Asymmetrical footwear and split-belt running study of gait and balance for stroke and neuromuscular disease patient rehabilitation.
- Assisted with metabolic and biomechanics data collection for various studies.
- Completed and presented literature reviews.
- Designed lab logo and branding guide.

Human Robot Systems Laboratory **Feb 2022 – Aug 2024**
Research Assistant

Publications

- Price, M., et al. *Variable Stiffness Robotic Footwear*. Manuscript in preparation.

Variable Stiffness Shoes

- Designed and manufactured novel adjustable air pocket for sneaker outsole.
- Performed Instron testing and data analysis on air pocket performance.
- Ran a study on the effects of outsole compliance on ground reaction forces.

General

- Assisted with a study on exoskeleton assistance entrainment.
- Wrote air pocket manufacturing guides and best practices.

Work Experience

Beaver-Visitec International (BVI Medical) **Summer 2023**
Research and Development Intern
- Gained expertise in Medical Device Regulation (MDR) Technical Documentation and DHF remediation for various devices, including Cannulas, Handheld instruments, and Electrosurgery tools, ensuring compliance with industry standards and regulatory requirements, such as ISO standard, FDA guidelines, and EU MDR.

- Completed design reviews and all supporting documentation (User Needs, Product Requirements, Product Requirement Derivation, Design Verification Master Plan and Protocol, and Test Methods) for multiple devices.
- Completed both User Failure Mode and Effects Analysis (UFMEA) and Design Failure Mode and Effects Analysis (DFMEA) for cannula files.
- Demonstrated strong organizational skills by maintaining detailed records, updating documents, and managing engineering changes (ECOs).
- Utilized 3D printing (FDM and SLS) to create fixtures and prototypes for device testing.
- Presented findings and project updates to cross-functional teams and senior management.

Pleasant Bay Community Boating **2019-2022**

Sailing and Adaptive Sailing Coordinator

- Accessible sailboat research, design, and construction for individuals with disabilities or limited mobility.
- Wrote sailing curriculum for a wide range of ages and skill levels.
- Managed a team of 20 sailing instructors.

Relevant Course Work

Musculoskeletal Modeling and Simulation **Spring 2024**

- Simulated ankle exoskeleton in OpenSim Moco to assess the impact of post-stroke plantar flexion weakness on optimal assistance.

Senior Design **2022-2023**

Continuous Blood Pressure Monitoring for Fall Risk Detection

- Led the development of a wearable continuous blood pressure monitoring device from initial concept to beta prototype.
- Successfully incorporated pulse sensors and implemented code to collect heart rate data, pulse transit time, and blood pressure calculations.
- Compared device readings with traditional blood pressure measurement methods and heart rate data.
- Collaborated with a multidisciplinary team to achieve project goals and ensure device accuracy and reliability.

Human Robot Systems **Fall 2022**

- Simulated hip exoskeleton using OpenSim Moco to assess the impact of ground angle on optimal hip torque profiles during walking.
- Completed projects on optimal control, multi-DOF control and coordination, and impedance control.

Organizations

Biomedical Engineering Diversity, Equity, and Inclusion Committee | Member **2021-2023**

- Help organize and plan community building and outreach events for the BME department.
- Awarded the *Biomedical Engineering Departmental Impact Award*.

UMass Fencing | President **2019-2021**

- Organized and managed team activities, practices, and finances.
- Wrote yearly budget requests and allocated funds accordingly.

UMass Club Sports Executive Board | President **2020-2021**

- Advised all of UMass club sports on finances, scheduling, and general conflicts.
- Attended both Student Government and Student Leadership meetings with campus leaders.