

Mela Coffey

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Education

Boston University Ph.D., Mechanical Engineering M.S., Mechanical Engineering • Concentration: Dynamics, Systems, and Controls GPA: 3.84/4.00	Boston, MA Expected 2025 2023
Virginia Tech B.S., Engineering Science and Mechanics, <i>summa cum laude</i> • Concentration: Biomechanics Minors: Biomedical Engineering, Mathematics GPA: 3.80/4.00	Blacksburg, VA 2020

Honors and Awards

Rising Stars in ME Workshop Carnegie Mellon University	2024
NextProf Nexus Workshop University of Michigan	2024
RSS Pioneers Workshop Robotics: Science and Systems (RSS)	2024
IROS 2023 RAS Travel Grant IEEE Robotics and Automation Society (RAS)	2023
ICRA 2023 RAS Travel Grant IEEE Robotics and Automation Society (RAS)	2023
Grace Hopper Celebration Travel Award Boston University, Division of Systems Engineering and Center for Information and Systems Engineering (CISE)	2023
Best Presentation Award, CISE Graduate Student Workshop (CGSW 9.0) Boston University, Center for Information and Systems Engineering (CISE)	2023
Ford Foundation Fellowship Honorable Mention, Predoctoral Competition National Academies	2020, 2021, 2022
Distinguished Mechanical Engineering Fellowship Boston University	2020
Summer Undergraduate Research Fellowship Stanford University	2019
Boeing Scholarship Virginia Tech	2017, 2018

Research Experience

Graduate Research Assistant, Boston University Collaborative Autonomy Group, PI: Alyssa Pierson • Design adaptive control algorithms for distributed, heterogeneous multi-agent systems • Develop a novel haptic guidance control scheme for collision-free collaborative navigation • Hardware experiments with AgileX LIMO robots, SparkFun Jetbots, and Geomagic Touch haptic devices	Boston, MA Feb 2021 - Present
Graduate Research Assistant, Boston University Collaborative and Integrative Robotics Lab, PI: Rebecca Khurshid • Developed haptic modules of various modalities for rapid prototyping of haptic displays • Created a reusable, skin-safe silicone adhesive used to adhere modules to skin	Boston, MA Aug 2020 - Feb 2021
Undergraduate Research Assistant, Virginia Tech Socha Lab, PI: Jake Socha • Analyzed videos, still images, and motion-capture data for the gap-crossing of flying snakes • Collected morphological and locomotor data of jumping snakes in Australia's Daintree Rainforest	Blacksburg, VA Oct 2017 - Mar 2020
Undergraduate Research Fellow, Stanford University Biomimetics and Dexterous Manipulation Lab, PI: Mark Cutkosky • Designed and constructed an MRI-compatible surgical drive-by wire system for liver biopsies • Engineered a phantom mold box for optical transparency required during data collection	Stanford, CA Jun 2019 - Aug 2019

Research Intern, George Mason University
Biomedical Imaging Lab, PI: Siddhartha Sikdar

Fairfax, VA
May 2018 - Jun 2019

- Prototyped and evaluated a skin stretch device for haptic feedback in prostheses
- Quantified the motion of upper-limb prostheses using inertial measurement units (IMU)

Journal Publications

- [J2] **M. Coffey** and A. Pierson, “Persistent multi-resource coverage with heterogeneous multi-robot teams,” *Advanced Intelligent Systems*, Under Review
- [J1] S. Frishman, A. Kight, I. Pirozzi, **M. C. Coffey**., B. Daniel, and M. Cutkosky, “Enabling In-Bore MRI-Guided Biopsies with Force Feedback,” *IEEE Transactions on Haptics*, vol. 13, no. 1, 2020

Peer-Reviewed Conference Publications

- [C9] **M. Coffey**, A. Chaudhry[†], and A. Pierson, “Maximizing reputation for serving time-constrained tasks with distributed heterogeneous teams,” in *2025 IEEE International Conference on Robotics and Automation (ICRA)*, Submitted
- [C8] D. Zhang, **M. Coffey**, and R. Tron, “Learning from haptics: Tuning control barrier functions in haptic teleoperation,” in *2025 IEEE International Conference on Robotics and Automation (ICRA)*, Submitted
- [C7] **M. Coffey** and A. Pierson, “Assessing reputation to improve team performance in heterogeneous multi-robot coverage,” in *2024 IEEE International Conference on Robotics and Automation (ICRA)*, pp. 2571–2577, 2024
- [C6] K. Vakil, **M. Coffey**, and A. Pierson, “Partial belief space planning for scaling stochastic dynamic games,” in *2024 IEEE International Conference on Robotics and Automation (ICRA)*, pp. 7222–7228, 2024
- [C5] **M. Coffey** and A. Pierson, “Covering Dynamic Demand with Multi-Resource Heterogeneous Teams,” in *2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 11127–11134, 2023
- [C4] **M. Coffey**^{*}, D. Zhang^{*}, R. Tron, and A. Pierson, “Reactive and Safe Co-Navigation with Haptic Guidance,” in *2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 213–220, 2023
- [C3] **M. Coffey** and A. Pierson, “Heterogeneous Coverage and Multi-Resource Allocation in Supply-Constrained Teams,” in *2023 IEEE International Conference on Robotics and Automation (ICRA)*, pp. 3447–3453, 2023
- [C2] **M. Coffey** and A. Pierson, “Collaborative Teleoperation with Haptic Feedback for Collision-Free Navigation of Ground Robots,” in *2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 8141–8148, 2022
- [C1] R. Cruz^{*}, **M. C. Coffey**^{*}, A. Sawaya, and R. Khurshid, “Modular Haptic Feedback for Rapid Prototyping of Tactile Displays,” in *2021 IEEE World Haptics Conference, WHC 2021*, 2021

Workshops and Poster Sessions

- **M. Coffey**, A. P. Chaudhry, and A. Pierson, “Maximizing Reputation for Serving Time-Constrained Tasks with Distributed Heterogeneous Teams,” *Northeast Robotics Colloquium (NERC) 2024*, Sep 28, 2024, Amherst, MA, USA.
- **M. Coffey** and A. Pierson, “Assessing Reputation to Improve Team Performance in Heterogeneous Multi-Robot Coverage,” *CISE Graduate Student Workshop 2024 (CGSW 10.0)*, Jan 26, 2024, Boston University.
- **M. Coffey** and A. Pierson, “Heterogeneous Coverage and Multi-Resource Allocation in Supply-Constrained Teams,” *CISE Graduate Student Workshop 2023 (CGSW 9.0)*, Jan 27, 2023, Boston University. **Awarded Best Presentation.**
- **M. Coffey** and A. Pierson, “Heterogeneous Coverage and Multi-Resource Allocation in Supply-Constrained Teams,” poster session in *The 16th International Symposium on Distributed Autonomous Robotic Systems (DARS) 2022*, Nov 28-30, 2022, Montbéliard, France.
- **M. Coffey** and A. Pierson, “Collaborative Teleoperation with Haptic Feedback for Collision-Free Navigation of Ground Robots,” poster session in *Northeast Robotics Colloquium (NERC) 2022*, Oct 8, 2022, Lowell, MA, USA.
- C. Meduri, A. Simon, L. De Koninck, **M. Coffey**, E. Claros, M. Velazquez, P. G. Brolinson, B. McCrady, E. Vlaisavljevich, V. Wang, “Design of a Focused Ultrasound System for the Non-invasive Treatment of Injured Tendons,” poster in *BMES 2020 Virtual Annual Meeting*, Oct 14-17, 2020.
- **M. Coffey**, S. Frishman, M. Cutkosky, “Teleoperator for MRI-Guided Procedures,” poster session in *Summer Undergraduate Research Fellowship*, Aug 15, 2019, Stanford, CA, USA.
- **M. Coffey**, B. Mukherjee, A. Dhawan, S. Patwardhan, S. Sikdar, “Evaluation of a Skin Stretch Device for Haptic Feedback in Prosthetic Limbs,” poster session in *Aspiring Scientists Summer Internship Program*, Aug 10, 2018, Fairfax, VA, USA.

Patent Applications

- [P1] US Provisional Patent Application No 63/651,894, “Methods and Systems for Automated and Requirements-Driven Prompt Engineering and Tuning of a Large Language Model”

^{*}Co-first author

[†]Mentored student

Professional Activities

Teaching Roles

Graduate Teaching Assistant, Engineering Mechanics II Jan 2022 - May 2022
Boston University, Course No. ENG ME 302

- Prepared practice problems for and led the two weekly discussion sessions
- Constructed quiz and exam problems
- Graded homeworks and quizzes
- Received an overall student rating of 4.83/5

Graduate Teaching Assistant, Intro to Programming for Engineers Aug 2021 - Dec 2021
Boston University, Course No. ENG EK 125

- Led weekly discussion sessions to review material and answer any questions
- Assisted in lecture and lab sections to answer students' questions as they work through programming problems
- Graded homeworks, projects, and quizzes
- Received an overall student rating of 4.27/5

Professional Service

Committee on Inclusion & Diversity, Graduate Student Member Dec 2021 - Present
College of Engineering, Boston University

Volunteer STEM Instructor Aug 2020 - May 2021
Graduate Women In Science and Engineering (GWISE), Boston University

Professional Honors

Rising Stars in ME Workshop 2024
Carnegie Mellon University

NextProf Nexus Workshop Aug 26-29, 2024
University of Michigan

RSS Pioneers Workshop Jul 14-19, 2024
Robotics: Science and Systems (RSS), Delft Netherlands

NextProf Pathfinder Workshop Oct 17-19, 2021
University of Michigan

Voices from the Field Panelist Oct 16, 2021
National GEM Consortium

Leadership Roles

Co-founder and Peer Mentor Boston, MA
HUGE PhD Success, Boston University Jun 2021 - May 2022

- Worked with the BU College of Engineering Office of Inclusion and Outreach to develop the Historically Underrepresented Groups in Engineering (HUGE) PhD Success
- Mentored a first-year PhD student in mechanical engineering to help them navigate their first year of graduate school
- Recruited participants, mentors, and mentees to the program
- Helped plan events and gatherings for the semester

Peer Leader Blacksburg, VA
Center for the Enhancement of Engineering Diversity, Virginia Tech Nov 2017 - May 2020

- Coordinated events focused on aiding freshman engineering students' transition to college
- Interviewed, selected, and trained new and returning mentors
- Managed a group of 12-13 upper-class mentors
- Recruited mentors and mentees through presentations and booths at events such as open house

Professional Memberships

IEEE Robotics and Automation Technical Committee on Multi-Robot Systems (MRS TC) · IEEE Robotics & Automation Society (RAS) · Women in Robotics · IEEE Student Member · IEEE Women in Engineering · IEEE Young Professionals

Reviewer for

IEEE Transactions on Robotics (T-RO) · IEEE Robotics and Automation Letters (RA-L) · IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)

Mentoring

Undergraduates at BU: Arnav Chaudhry, Jared Pratt, Kyle Karr, Berkely Wachtmann, Arnab Vijayakar

Additional Work and Project Experience

Product Design Engineer Intern

Amazon

Seattle, WA

June 2021 - Aug 2021

- Designed mechanical parts of entry/exit hardware to be deployed in Amazon Go stores in the U.S. and U.K.
- Programmed and tested alternative sensing technology for exit hardware
- Communicated with vendors about product specifications and manufacturing

Design of a Focused Ultrasound Device for Tendon Regeneration

Virginia Tech, Senior Design

Blacksburg, VA

Aug 2019 - May 2020

Orthopedic Mechanobiology Lab, PI: Vincent Wang

Therapeutic Ultrasound and Noninvasive Therapies Lab, PI: Eli Vlaisavljevich

- Constructed electronic components of devices such as the ultrasonic transducer elements and power amplifier
- Team lead; ran meetings, ensured each member was making active contributions, and communicated with advisors
- Managed project budget and ordering of materials

Skills

Programming Languages

Python (fluent), MATLAB (fluent), C/C++ (proficient)

Software

ROS, SolidWorks, Creo, OnShape, Autodesk Inventor, LaTeX

Lab Techniques

3D printing, laser cutting, soldering

Lab Equipment

Motion capture, band saw, cold saw, miter saw, drill press