Mela Coffey

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Education

Boston University — Boston, MA
Ph.D., Mechanical Engineering — Expected 2025
M.S., Mechanical Engineering — 2023
- Concentration: Dynamics, Systems, and Controls | GPA: 3.84/4.00

Virginia Tech — Blacksburg, VA
B.S., Engineering Science and Mechanics, *summa cum laude* — 2020
- Concentration: Biomechanics | Minors: Biomedical Engineering, Mathematics | GPA: 3.80/4.00

Honors and Awards

RSS Pioneers Workshop — 2024
Robotics: Science and Systems (RSS)

IROS 2023 RAS Travel Grant — 2023
IEEE Robotics and Automation Society (RAS)

ICRA 2023 RAS Travel Grant — 2023
IEEE Robotics and Automation Society (RAS)

Grace Hopper Celebration Travel Award — 2023
Boston University, Division of Systems Engineering and Center for Information and Systems Engineering (CISE)

Best Presentation Award, CISE Graduate Student Workshop (CGSW 9.0) — 2023
Boston University, Center for Information and Systems Engineering (CISE)

Ford Foundation Fellowship Honorable Mention, Predoctoral Competition — 2020, 2021, 2022
National Academies

Distinguished Mechanical Engineering Fellowship — 2020
Boston University

Summer Undergraduate Research Fellowship — 2019
Stanford University

Boeing Scholarship — 2017, 2018
Virginia Tech

Research Experience

Graduate Research Assistant, Boston University — Boston, MA
Collaborative Autonomy Group, PI: Alyssa Pierson — Feb 2021 - Present
- 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

Graduate Research Assistant, Boston University — Boston, MA
Collaborative and Integrative Robotics Lab, PI: Rebecca Khurshid — Aug 2020 - Feb 2021
- 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

Undergraduate Research Assistant, Virginia Tech — Blacksburg, VA
Socha Lab, PI: Jake Socha — Oct 2017 - Mar 2020
- 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

Undergraduate Research Fellow, Stanford University — Stanford, CA
Biomimetics and Dexterous Manipulation Lab, PI: Mark Cutkosky — Jun 2019 - Aug 2019
- 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

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

[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** 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, Montbèliard, 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

- 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

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

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 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 Seattle, WA
Amazon 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 Blacksburg, VA
Virginia Tech, Senior Design 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