

Laura Katherine Treers

ASSISTANT PROFESSOR · DEPARTMENT OF MECHANICAL ENGINEERING · UNIVERSITY OF VERMONT

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Education

University of California, Berkeley

Berkeley, CA

PHD, MECHANICAL ENGINEERING

2018-2023

- Advisor: Prof. Hannah Stuart, Lab: Embodied Dexterity Group (edg.berkeley.edu)
- Concentration in dynamics with minors in design & integrative biology

Massachusetts Institute of Technology

Cambridge, MA

B.S. MECHANICAL ENGINEERING

2014 - 2018

Research Experience

University of Vermont - Innovation in Terramechanics, Experimental Robotics, and Complex Terrains (INTERACT) Lab

Burlington, VT

PRINCIPAL INVESTIGATOR

2024 -

- Building a new robotics lab at UVM focused on better understanding and enhancing robotic capability in difficult terrains

Georgia Institute of Technology - Complex Rheology & Biomechanics (CRAB) Lab

Atlanta, GA

POSTDOCTORAL SCIENTIST (ADVISORS: PROF. DANIEL GOLDMAN & PROF. MICHAEL GOODISMAN)

2023 - 2024

- Working in the Schools of Biological Sciences & Physics to explore ideas in insect sociality and collaborative robotics
- Focusing on testing robotic prototypes for manipulating, transporting, and building structures of geometrically entangled granular media

University of California, Berkeley - Embodied Dexterity Group

Berkeley, CA

GRADUATE STUDENT (ADVISOR: PROF. HANNAH STUART)

2018 - 2023

- Developed a mole-crab inspired burrowing robot, in collaboration with the Polypedal Lab (Dept. of Integrative Biology), led by Prof. Robert Full.
- Explored the amplification of attachment forces through tether-environment contact, for remote tethered robotic teams.
- Developed a three-dimensional implementation of Granular Resistive Force Theory (3D RFT)

Massachusetts Institute of Technology - Hatsopoulos Microfluids Lab

Cambridge, MA

UNDERGRADUATE THESIS (ADVISOR: PROF. ANETTE HOSOI)

2017-2018

- Thesis: "Investigating a non-invasive method for determining muscle fiber composition"
- Developed a method for non-invasive determination of human muscle fiber composition (slow twitch vs. fast twitch) using a biomechanical model for muscle contraction

Massachusetts Institute of Technology - d'Arbeloff Lab

Cambridge, MA

ADVISOR: PROF. HARUHIKO ASADA

2015-2017

- Conference Paper: "Design and Control of Lightweight Supernumerary Robotic Limbs for Sitting/Standing Assistance"
- Explored the applications of wearable Supernumerary Robotic Limbs (SRLs) to rehabilitation and manufacturing settings
- Designed SRL control algorithms to provide optimal joint assistance and balance support for users

École Polytechnique- Laboratoire d'Hydrodynamique (LadHyX)

Palaiseau, France

ADVISORS: PROF. CHRISTOPHE CLANET, DR. CAROLINE COHEN

Jan-Feb 2018

- Collaborated with sports physics researchers on various biomechanics projects as part of a visiting scholars program.

Massachusetts Institute of Technology - Biomechatronics Lab

Cambridge, MA

ADVISORS: DR. RONALD RISO, PROF. HUGH HERR

2015-2016

- Built and implemented a system to test neural interface electronics under the conditions typically seen inside the human body, in order to ensure their functionality within real muscle tissue.
- Contributed to a larger project aiming to develop peripheral neural interface systems for advanced prostheses.

Awards, Fellowships, & Honors

- 2023 **Outstanding Graduate Student Instructor Award**, University of California
- 2022 **Graduate Division Block Grant**, University of California
- 2019 **National Defense Science & Engineering Graduate Fellowship**, Office of Naval Research
- 2018 **UC Berkeley Fellowship for Graduate Study**, University of California
Thomas Sheridan Prize for Creativity in Man-Machine Integration, MIT

Publications

REFEREED JOURNAL PUBLICATIONS

- S. Kim, **L. K. Treers**, T. Myung Huh, H. S. Stuart, "Efficient Reciprocating Burrowing with Anisotropic Origami Feet". *Frontiers in Robotics and AI*, Vol 10, p. 1214160, 2023
- J. J. Page*, **L. K. Treers***, S. J. Jorgensen, R. S. Fearing, H. S. Stuart, "The Robustness of Tether Friction in Non-idealized Terrains", *IEEE Robotics and Automation Letters*, Vol 8 (1), p. 424-431, 2022
- L. K. Treers**, B. McInroe, R. J. Full, H. S. Stuart, "Mole crab-inspired vertical self-burrowing". *Frontiers in Robotics and AI*, p. 263, 2022
- A. Martinez, J. DeJong, I. Akin, A. Aleali, C. Arson, J. Atkinson, P. Bandini, T. Baser, R. Borela, R. Boulanger, M. Burrall, Y. Chen, C. Collins, D. Cortes, S. Dai, T. DeJong, E. Del Dottore, K. Dorgan, R. Fragaszy, J. D. Frost, R. Full, M. Ghayoomi, D. I. Goldman, N. Gravish, I. L. Guzman, J. Hambleton, E. Hawkes, M. Helms, D. Hu, L. Huang, S. Huang, C. Hunt, D. Irschick, H. Thomas Lin, B. Lingwall, A. Marr, B. Mazzolai, B. McInroe, T. Murthy, K. O'Hara, M. Porter, S. Sadek, M. Sanchez, C. Santamarina, L. Shao, J. Sharp, H. Stuart, H. H. Stutz, A. Summers, J. Tao, M. Tolley, **L. K. Treers**, K. Turnbull, R. Valdes, L. van Paassen, G. Viggiani, D. Wilson, W. Wu, X. Yu, and J. Zheng, "Bio-inspired geotechnical engineering: Principles, current work, opportunities and challenges." *Geotechnique*, Vol. 72 (8) p. 687-705, 2022.
- L. K. Treers**, C. Cao, H. S. Stuart, "Granular Resistive Force Theory Implementation for Three-Dimensional Trajectories." *IEEE Robotics and Automation Letters*, Vol 6 (2), p. 1887-1894, 2021

* **co -first authorship**

CONFERENCE PROCEEDINGS & ABSTRACTS

- L. K. Treers**, D. Soto, J. Hwang, M. D. Goodisman, D. I. Goldman, "Robot Excavation and Manipulation of Geometrically Cohesive Media" *IEEE International Conference on Robotics & Automation 2025* (Under Review)
- J. Hwang, **L. K. Treers**, D. Soto, M. D. Goodisman, D. I. Goldman, "Material Disturbance during Collective Construction with Soft Matter" *Bulletin of the American Physical Society*, Annual Meeting 2024, Abstract F38.00003
- A. Young, **L. K. Treers**, H. S. Stuart, "Gait switching enables body pitch modulation during legged burrowing in granular media" *Bulletin of the American Physical Society*, Annual Meeting 2024, Abstract G38. 00004
- L. K. Treers**, D. Soto, M. D. Goodisman, D. I. Goldman, "Tunnel remodeling in fire ant (*S. invicta*) collectives" *Bulletin of the American Physical Society*, Annual Meeting 2024, Abstract F36.00009
- L. K. Treers**, D. Soto, M. D. Goodisman, D. I. Goldman, "Substrate deposition and tunnel remodeling in fire ants *S. invicta*" *Integrative & Comparative Biology*, Annual Conference 2024
- L. K. Treers**, J. J. Page, S. Jorgensen, R. S. Fearing, H. S. Stuart, "Characterizing Tether Friction on Natural Objects for Robotic Teams." *Bulletin of the American Physical Society*, Annual Meeting 2023., Abstract N00.00377
- L. K. Treers**, B. McInroe, R. J. Full, H. S. Stuart, "EMBUR (EMerita Burrowing Robot): A Robophysical Exploration of Mole Crab Burrowing." *Bulletin of the American Physical Society*, Annual Meeting 2023., Abstract S10.00008
- L. K. Treers**, and H. S. Stuart, "The Effect of Shell Shape on Burrowing Dynamics in Granular Media." *Integrative & Comparative Biology* Annual Conference, vol. 60 p. E431, 2020.
- L. K. Treers**, R. Lo, M. Cheung, A. Guy, J. Guggenheim, F. Parietti, and H. Asada, "Design and Control of Lightweight Super-numerary Robotic Limbs for Sitting/Standing Assistance." *International Symposium for Experimental Robotics*, 2016.

THESES

- L. K. Treers**, “Models and Mechanisms for Robotic Mobility in Granular Media” University of California, Berkeley, 2023.
- L. K. Treers**, “Investigating a non-invasive method for determining muscle fiber composition.” Massachusetts Institute of Technology Thesis (MIT D-Space), 2018.

Presentations

* *presenting author*; + *mentored undergraduate*

- L. K. Treers***. 2024. “Robotic Excavation and Construction with Entangled Granular Media” Invited Talk, Northeast Robotics Colloquium, University of Massachusetts, Amherst, MA
- L. K. Treers***. 2023. “Models and Mechanisms for Robotic Mobility in Granular Media.” Robotics Seminar, University of Illinois Urbana-Champaign (UIUC), Champaign, IL.
- L. K. Treers***, H. S. Stuart. 2019. “Decapod-Inspired Burrowing Strategies.” Poster presentation: Bay Area Robotics Symposium (BARS), Berkeley, CA.
- L. K. Treers***, B. McInroe, R. J. Full, H. S. Stuart. 2019. “Decapod-Inspired Mechanisms for Penetration Force Reduction.” Poster Presentation: First International Workshop on Bio-Inspired Geotechnics, Monterey, CA.
- M. Norville** , **L. K. Treers**, H. S. Stuart, 2021. “Leg Design & Analysis for Bio-Inspired Burrowing Robot.” Poster & Oral Presentation: Amgen Scholars Program Research Showcase, Berkeley, CA

Industry Experience

GE Renewable Energy, Onshore Wind

Niskayuna, NY

MECHANICAL ENGINEERING INTERN

May 2017 - August 2017

- Mechanical component design and structural analysis for onshore wind turbine drive trains

NextDroid, LLC

Cambridge, MA

MECHANICAL ENGINEERING INTERN

May 2016- September 2016

- Worked on design of an autonomous underwater vehicle (AUV) for deployment at 300 meter depth as part of a small startup company team

Teaching Experience

ME3320A – Control Systems

University of Vermont

INSTRUCTOR

Fall 2024

- Instructing 3 credit ME elective course on linear control theory

ME 102B – Mechatronics Design

UC Berkeley

GRADUATE STUDENT INSTRUCTOR

2022

- Assisted faculty with teaching UC Berkeley’s 4 credit senior undergraduate capstone design course.
- Worked with a teaching team on curriculum development, including laboratory assignments and in-lecture demos.

Mentoring

2023 - 2024 **INTERACT Lab, University of Vermont**

- Currently advising one graduate student (Chhayank Srivastava) and three undergraduates (Jack Donovan, Boaz Lovich, Nathaniel Weitzel-King) in new research lab at UVM.

2023 - 2024 **Joonha Hwang, Georgia Tech CRABLab**

- Advising a final year undergraduate through the development and testing of robotic prototypes for swarm construction.

2022 - 2023 **Masters of Engineering (MEng) Capstone Project Team, UC Berkeley**

- Managed a team of 3 MEng students through the completion of a year-long research project
- Supervised the team’s redesign of a mole crab-inspired burrowing robot

- 2021 **Malyka Norville, Howard University Amgen Scholars Program**
- Mentored a visiting student through the completion of a summer research exchange program.
 - Taught prototyping and data analysis skills, for application to a project on characterization of robot legs.

- 2019 - 2021 **Embodied Dexterity Group, UC Berkeley**
- Advised multiple undergraduate researchers: Kristin Yamane (2019-2021), Krish Nayar (2020-2021), Wenny Miao (2019)

Outreach & Professional Development

SERVICE AND OUTREACH

- 2020-2024 **FIRST Robotics Competition, Mentor** *Burlington, VT*
- Active mentoring for 3 FIRST Teams over the past 4 years, including local FRC Team Green Mountain Robotics 9101, Atlanta's G3 Robotics 1648, and the all-girls team Roses and Rivets 16148 based out of Piedmont, CA
 - Teaching mechanical design and mechatronics skills to students and guiding the competition robot design and fabrication.
- 2024 - 2025 **IEEE ICRA 2025, Workshop Organizer** *Atlanta, GA*
- Co-organizing two workshops for the International Conference on Robotics & Automation in 2025 in Atlanta, GA
 - Workshop topics include "Mechanical Intelligence in Robotics" and "Soft Machines Break Hard Ground"
- 2021-2022 **Graduate Women in Engineering, Outreach Chair** *Berkeley, CA*
- Organized community outreach events for the members of GWE, including a family science night at a local elementary school and a volunteer day at a local park.
- 2020 **Expanding Your Horizons (EYH), Workshop coordinator** *Berkeley, CA*
- Organized a hands-on workshop on bio-inspired robotics concepts for middle school girls.
 - Workshop part of a larger day-long event focused on introducing traditionally underrepresented students to STEM fields.
- 2020-2021 **Future Cities Competition, Volunteer Judge** *Albany, NY*

DEVELOPMENT

- 2022 **NextProf Nexus, Workshop Attendee** *Berkeley, CA*
- Participated in a 3-day workshop aiming to diversify the next generation of academic leaders in engineering.
 - Workshop aims to help traditionally underrepresented groups in STEM explore and prepare for careers in academia.

PROFESSIONAL SOCIETIES

- 2019-2024 **Society of Integrative & Comparative Biology (SICB), Member**
- Member of Division of Comparative Biomechanics and Division of Animal Behavior
- 2022-2024 **American Physical Society (APS), Member**
- 2020-2024 **Institute of Electrical and Electronics Engineers (IEEE), Member**
- Active member of the IEEE Robotics and Automation Society (RAS)