

Maegan Tucker

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APPOINTMENTS

Georgia Institute of Technology

ASSISTANT PROFESSOR OF ELECTRICAL AND COMPUTER ENGINEERING AND MECHANICAL ENGINEERING 2024-Present

EDUCATION

California Institute of Technology

PH.D. IN MECHANICAL ENGINEERING 2017-2023

- Academic Advisor: Dr. Aaron D. Ames
- Dissertation: [“Enabling Robust and User-Customized Bipedal Locomotion on Lower-Body Assistive Devices via Hybrid System Theory and Preference-Based Learning”](#)

M.S. IN MECHANICAL ENGINEERING 2017-2019

- Overall GPA: 4.0/4.0

Georgia Institute of Technology

B.S. IN MECHANICAL ENGINEERING 2012-2017

- Overall GPA: 3.8/4.0, Major GPA: 3.88/4.0

PUBLICATIONS

Research Interests

- Robotic assistive devices, bipedal robotic locomotion, human-robot interaction, preference-based learning

Peer-Reviewed Conference Proceedings

- [A.1] A. K. Schulz, A. G. Ahmad, and M. Tucker, “Materials matter: Investigating functional advantages of bio-inspired materials via simulated robotic hopping,” *Submitted to ICRA, 2024* ([preprint](#))
- [A.2] M. Tucker, K. Li, and A. D. Ames, “Synthesizing robust walking gaits via discrete-time barrier functions with application to multi-contact exoskeleton locomotion,” in *2024 IEEE International Conference on Robotics and Automation (ICRA)*, pp. 1136–1142, IEEE, 2024 ([preprint](#))
- [A.3] A. B. Ghansah, J. Kim, M. Tucker, and A. D. Ames, “Humanoid robot co-design: Coupling hardware design with gait generation via hybrid zero dynamics,” in *2023 62nd IEEE Conference on Decision and Control (CDC)*, pp. 1879–1885, IEEE, 2023 ([preprint](#))
- [A.4] P. Culbertson, R. K. Cosner, M. Tucker, and A. D. Ames, “Input-to-state stability in probability,” in *2023 62nd IEEE Conference on Decision and Control (CDC)*, pp. 5796–5803, IEEE, 2023 ([preprint](#))
- [A.5] M. Tucker, N. Csomay-Shanklin, and A. D. Ames, “Robust bipedal locomotion: Leveraging saltation matrices for gait optimization,” in *2023 IEEE International Conference on Robotics and Automation (ICRA)*, pp. 12218–12225, IEEE, 2023 ([preprint](#))
- [A.6] R. Cosner, M. Tucker, A. Taylor, K. Li, T. Molnar, W. Ubelacker, A. Alan, G. Orosz, Y. Yue, and A. Ames, “Safety-aware preference-based learning for safety-critical control,” in *Learning for dynamics and control conference*, pp. 1020–1033, PMLR, 2022 ([paper](#))
- [A.7] N. Csomay-Shanklin, M. Tucker, M. Dai, J. Reher, and A. D. Ames, “Learning controller gains on bipedal walking robots via user preferences,” in *2022 International Conference on Robotics and Automation (ICRA)*, pp. 10405–10411, IEEE, 2022 ([preprint](#))
- [A.8] M. Tucker, N. Csomay-Shanklin, W.-L. Ma, and A. D. Ames, “Preference-based learning for user-guided hzd gait generation on bipedal walking robots,” in *2021 IEEE International Conference on Robotics and Automation (ICRA)*, pp. 2804–2810, IEEE, 2021 ([preprint](#))

- [A.9] K. Li, M. Tucker, E. Biyik, E. Novoseller, J. W. Burdick, Y. Sui, D. Sadigh, Y. Yue, and A. D. Ames, “Roial: Region of interest active learning for characterizing exoskeleton gait preference landscapes,” in *2021 IEEE International Conference on Robotics and Automation (ICRA)*, pp. 3212–3218, IEEE, 2021 ([preprint](#))
- [A.10] M. Tucker, M. Cheng, E. Novoseller, R. Cheng, Y. Yue, J. W. Burdick, and A. D. Ames, “Human preference-based learning for high-dimensional optimization of exoskeleton walking gaits,” in *2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 3423–3430, IEEE, 2020 ([paper](#))
- [A.11] M. Tucker, E. Novoseller, C. Kann, Y. Sui, Y. Yue, J. W. Burdick, and A. D. Ames, “Preference-based learning for exoskeleton gait optimization,” in *2020 IEEE international conference on robotics and automation (ICRA)*, pp. 2351–2357, IEEE, 2020 ([paper](#))

<p>Best Overall Paper Award (of 3,512 submissions) at ICRA 2020. Best Paper in Human-Robot Interaction Award at ICRA 2020.</p>

Peer-Reviewed Journal Publications

- [B.1] K. A. Ingraham, M. Tucker, A. D. Ames, E. J. Rouse, and M. K. Shepherd, “Leveraging user preference in the design and evaluation of lower-limb exoskeletons and prostheses,” *Current Opinion in Biomedical Engineering*, p. 100487, 2023 ([paper](#))
- [B.2] M. Tucker and A. D. Ames, “An input-to-state stability perspective on robust locomotion,” *IEEE Control Systems Letters*, vol. 7, pp. 2599–2604, 2023 ([preprint](#))
- [B.3] R. Gehlhar, M. Tucker, A. J. Young, and A. D. Ames, “A review of current state-of-the-art control methods for lower-limb powered prostheses,” *Annual reviews in control*, vol. 55, pp. 142–164, 2023 ([paper](#))
- [B.4] K. Li, M. Tucker, R. Gehlhar, Y. Yue, and A. D. Ames, “Natural multicontact walking for robotic assistive devices via musculoskeletal models and hybrid zero dynamics,” *IEEE Robotics and Automation Letters*, vol. 7, no. 2, pp. 4283–4290, 2022 ([preprint](#))
- [B.5] J. Kerdraon, J. G. Previnaire, M. Tucker, P. Coignard, W. Allegrè, E. Knappen, and A. Ames, “Evaluation of safety and performance of the self balancing walking system atalante in patients with complete motor spinal cord injury,” *Spinal Cord Series and Cases*, vol. 7, no. 1, pp. 1–8, 2021 ([shareable link](#))
- [B.6] T. Gurriet, M. Tucker, A. Duburcq, G. Boeris, and A. D. Ames, “Towards variable assistance for lower body exoskeletons,” *IEEE Robotics and Automation Letters*, vol. 5, no. 1, pp. 266–273, 2019 ([paper](#))

Patents

- [C.1] Filed: A Front-Leg Assistive Exoskeleton (US20240245569A1)
- [C.2] Awarded: Real-Time Feedback Module For Assistive Gait Training, Improved Proprioception, And Fall Prevention (US12131814B2)

INVITED TALKS

- [D.1] Invited talk for the ICRA 2024 Workshop Emerging Technologies in Smart Exoskeleton Systems
- [D.2] Invited talk for the ICRA 2024 Workshop Humanoid Whole-body Control: From human motion understanding to humanoid locomotion
- [D.3] Seminar speaker for the GT ME Shaping the World Seminar Series

EDUCATIONAL ACTIVITIES

Teaching

- Instructor, [Introduction to Automation and Robotics \(ECE 4560\)](#). Undergraduate level course, Georgia Tech, Fall 2024. Course description: “Fundamental disciplines of modern robotics: mechanics, control, and computing. Analysis, design, and control of mobile robots and manipulators. Course may contain team projects and hands-on labs.”
- Instructor, [Nonlinear Control Systems \(ME 6402\)](#). Graduate level course, Georgia Tech, Spring 2025. Course Description: “Analysis of nonlinear systems, geometric control, variable structure control, adaptive control, optimal control, applications”.

HONORS AND AWARDS

- **2023 Centennial Prize for Best Thesis in Mechanical and Civil Engineering:** \$10,000 discretionary award given annually to a Caltech Ph.D. candidate in applied mechanics, civil engineering, or mechanical engineering, whose doctoral thesis is judged to be the most original and significant by a faculty committee.
- **2021-2022 Simoudis Discovery Prize:** Awarded to a Caltech student or postdoc conducting emerging research at the intersection of big data, machine learning, and autonomy. The recipient selected by a committee of faculty from the Department of Computer and Mathematical Sciences.
- **2020 ICRA Best Paper Awards:** Awarded both the Best Conference Paper Award and the Best Paper Award on Human-Robot Interaction at ICRA 2020.
- **2020 ME Rising Star:** Participated in the ME Rising Stars Workshop (hosted by Berkeley), 2020.
- **2020 Caltech Big Ideas Fund:** Recipient of the Caltech Mechanical and Civil Engineering Department *Big Ideas Fund* (one year research grant).
- **NSF Graduate Research Fellowship Program:** Awarded 2019 (one of 2,000 awarded of 13,000 applicants).
- **NSF Graduate Research Fellowship Program:** Honorable Mention 2017.
- **2017 Theodore Y. Wu Graduate Fellowship:** Graduate Tuition and Stipend for the 2017 Academic year
- **Presidents Undergraduate Research Salary Award (Spring 2017):** \$1500 undergraduate research stipend awarded for the Spring 2017 academic semester.
- **First Place for Overall Presentation:** Awarded based on poster and oral presentation among 40 students in Georgia Techs S.U.R.E. REU program (Summer 2016).
- **Society of Women Engineers Award:** Award given to high school students for excellence in math and science. (2012).
- **John and Abigail Adams Scholarship:** Merit-based scholarship awarded to high school students who receive advanced scores on the Massachusetts Comprehensive Assessment System (MCAS) test and who rank in the top 25% in their school district. (2012)

STUDENT ADVISING

Current Graduate Students

- [Ayah Ahmad](#) (PhD student, Fall 2024 - present), *IRIM Presidential Fellow*
- [Neil Janwani](#) (PhD student, Fall 2024 - present), *NSF Fellow, IRIM Fellow*
- Varun Madabushi (PhD student, Fall 2024 - present),

Undergraduate Student Researchers and Mentorship

- Hyeonjae Park (Georgia Tech 2024-2025)
- Keshav Anand (Georgia Tech 2024-2025)
- Snehil Mathur (Georgia Tech 2024-2025)
- [Neil Janwani](#) (Caltech 2021-2024 — awarded NSF GFRP 2024)
- Sara Frunzi (Caltech 2023 — now a PhD student at Drexel University)
- Yash Mhaskar (Caltech 2022 — now a PhD student at Georgia Tech, awarded NSF GFRP 2024)
- [Lorenzo Shaikewitz](#) (Caltech 2020-2022 – now a PhD student at MIT, awarded NSF GFRP 2023)
- Ozioma Ozor-Ilo (Caltech 2021 — now a PhD student at MIT)
- Toussaint Pegues (Caltech 2020-2021 — now at Whirlpool Corporation)
- [Myra Cheng](#) (Caltech 2019-2020 — now a PhD student at Stanford, awarded NSF GFRP 2022)
- [Sofia Kwok](#) (Caltech 2019 — now a PhD student at Carnegie Mellon)

- Paulina Ridland (Caltech 2019 — now at AeroVironment)
- [Allie Cheng](#) (Caltech 2019 — now at Boston Dynamics)
- Diana Frias Franco (Caltech 2019 — now a PhD student at Carnegie Mellon)
- Annabel Gomez (Caltech 2019 — now at JPL)

MEDIA MENTIONS

Personal

- Georgia Tech Faculty Spotlight, Accessed Aug 15, 2024: [link](#)
- Georgia Tech Campus and Community Piece, Accessed Oct 19 2023: [link](#)
- Caltech Graduate Admissions Page, “Meet our Students!”, Accessed July 4 2021: [link](#)
- The Caltech Breakthrough Campaign, “The Math of Human + Machine”, Nov 18 2019: [link](#)
- Women Doing Science, Oct 14 2019: [Facebook link](#) [Instagram Link](#)

Research

- CNBC, “How robots are replacing wheelchairs to help people with disabilities walk again”, May 30 2020: [link](#)
- IEEE Spectrum, “Caltechs Brain-Controlled Exoskeleton Will Help Paraplegics Walk”, Jan 6 2020: [link](#)

INDUSTRY EXPERIENCE

LEASED CONTRACTOR AT DISNEY RESEARCH

(September 2023 - December 2024)

- Conducted research with Disney Research Los Angeles on cutting-edge technology. Due to NDA restrictions, specific project details cannot be disclosed.

MECHANICAL ENGINEERING CO-OP AT NCR CORPORATION

(Fall 2014, Summer 2015, Spring 2016)

- Completed 3 full-time semester rotations working closely with a 5-person hardware engineering team.
- Contributed to the design, testing, manufacturing and release of 3 new Point of Sale (POS) terminals.

COMMUNITY BUILDING

- Engineering and Applied Sciences (EAS) Graduate Student Council (GSC) Member: Division-wide student council comprised of 2-3 peer-nominated student leaders from each EAS department. The council meets once per quarter and is tasked with providing a communication channel from the student body to the EAS leadership. (2021-2023)
- FUTURE Ignited: One of six graduate students selected to participate in the Future Ignited event for the Caltech Mechanical and Civil Engineering (MCE) department. The event was a online/virtual conference for underrepresented students, aimed at providing insight into the life of a graduate student.
- Sustainable Strategy for Enhancing Existing Diversity (SEED) Committee Member: One of five members assigned to construct an actionable long-term plan for enhancing and supporting diversity with the Mechanical and Civil Engineering Department of Caltech. The proposed plan is published in our [\[Report\]](#).
- Outreach Chair for Caltech Department of Mechanical and Civil Engineering (2020-2023)
- Freshman Summer Research Institute (FSRI): Constructed and led a 5-week research project for two incoming undergraduate student women interested in controls/robotics. (Summer 2019)
- Caltech Rise Tutor: Weekly (for two hours each week) volunteer for the Rise Program, an afterschool math and science-focused tutoring program serving public schools students. (2017-2021)
- Robogals member: Member of the Georgia Tech “Robogals” which focused on developing teaching modules and experiences for young women to interact and be introduced to robotics. (2017)