Maegan Tucker

www.maegantucker.com | +1 617-417-4211 | mtucker@caltech.edu

EDUCATION

California Institute of Technology

PH.D. IN MECHANICAL ENGINEERING — 2017-2023(anticipated)

- Academic Advisor: Dr. Aaron D. Ames

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

RESEARCH

Research Interests

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

Publications

[A.1] Cosner, R., **Tucker, M.**, et al. "Safety-Aware Preference-Based Learning for Safety-Critical Control." *To appear at 4th Annual Learning for Dynamics & Control Conference (L4DC)*, 2022. [Preprint]

[A.2] Li, K., **Tucker, M.**, et al. "Natural Multicontact Walking for Robotic Assistive Devices via Musculoskeletal Models and Hybrid Zero Dynamics." *IEEE Robotics and Automation Letters (RA-L), 7(2), pp. 4283-4290.* 2022. [Preprint]

[A.3] Csomay-Shanklin, N., **Tucker, M.**, et al. "Learning Controller Gains on Bipedal Walking Robots via User Preferences." *In 2022 IEEE International Conference on Robotics and Automation (ICRA)*, 2022. [Preprint]

[A.4] Kerdraon, J., Previnaire, J.G., **Tucker, M.**, et al. "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* 7.1 (2021): 1-8. [Shareable Link]

[A.5] **Tucker, M.**, Csomay-Shanklin, N., Ma, W., & Ames, A. D. "Preference-based learning for user-guided hzd gait generation on bipedal walking robots." *In 2021 IEEE International Conference on Robotics and Automation (ICRA)*, 2021. [Preprint]

[A.6] Li, K., **Tucker, M.**, et al. "ROIAL: Region of Interest Active Learning for Characterizing Exoskeleton Gait Preference Landscapes." *In 2021 IEEE International Conference on Robotics and Automation (ICRA)*, 2021. [Preprint]

[A.7] **Tucker, M.**, et al. "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.* 2020. [Paper]

[A.8] **Tucker, M.***, Novoseller, E.*, et al. "Preference-Based Learning for Exoskeleton Gait Optimization." *In 2020 IEEE International Conference on Robotics and Automation (ICRA)*, 2020. (*Denotes equal contribution) [Paper]

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

[A.9] Gurriet, T., **Tucker, M.**, Duburcq, A., Boeris, G., & Ames, A. D. "Towards Variable Assistance for Lower Body Exoskeletons." *IEEE Robotics and Automation Letters, 5(1), pp. 266-273.* 2019. [Paper]

Working Papers

[B.1] **Tucker, M.**, et al. "Learning User-Preferred Exoskeleton Walking for People with Complete Paraplegia."

Posters

[C.1] "Preference-Based Learning for Dynamic Bipedal Locomotion." at Dynamic Walking 2021. Abstract, Poster

[C.2] "Evaluating the Mechanical Design of a Transfemoral Powered Prosthesis through Metabolic Cost." at the Georgia Tech S.U.R.E. Symposium, 2016. Poster

Patents

[D.1] Provisional patient (full patent in progress): A Front-Leg Assistive Exoskeleton (CIT 8777-P)

[D.2] Filed Patent: Real-Time Feedback Module For Assistive Gait Training, Improved Proprioception, And Fall Prevention (US20210027877A1)

Presentations

[E.1] Preference-Based Learning and Control: Realizing Dynamic Locomotion on Bipedal Robots and Exoskeletons
39th Southern California Control Workshop, April 2022.

[E.2] Stable and Robust Bipedal Locomotion for Lower-Body Assistive Devices
University of Illinois at Urbana-Champaign (UIUC), December 2021.

[E.3] Preference-Based Learning for Exoskeleton Gait Optimization
Wandercraft Webinar, Paris (virtually), November 2021.

[E.4] Enabling Bipedal Locomotion with Robotic Assistive Devices through Learning and Control
Decision and Control Laboratory Seminar, Georgia Tech, October 2021.

[E.5] Research in Lower-Body Exoskeleton Technology
Hanger Clinic (virtually), September 2021

[E.6] Preference-Based Learning for User-Guided HZD Gait Generation on Bipedal Walking Robots
ICRA, May 2021

[E.7] Human Preference-Based Learning for High-Dimensional Optimization of Exoskeleton Walking Gaits
IROS, October 2020

[E.8] Whats Next in Motion? From Robot Sherpas to Exoskeletons
DFCon, October 2020

[E.9] Lower-Body Exoskeleton Locomotion
Yue Lab Group Meeting Presentation, August 2020

[E.10] Human Preference-Based Learning for Optimization of Exoskeleton Walking Gaits
GoogleX (virtually), April 2020.

[E.11] Preference-Based Learning for Exoskeleton Gait Optimization
ICRA, May 2020

[E.12] Haptic Cane Module
Rancho Los Amigos National Rehabilitation Center, January 2020

Funding and Grants

- NSF Graduate Research Fellowship (Awarded 2019): one of 2,000 awarded of 13,000 applicants. Fellowship consists of three-year annual stipend of $34,000 along with a $12,000 cost of education allowance for tuition and fees (paid to the institution)
- Caltech Mechanical and Civil Engineering Department *Big Ideas Fund*: One year grant for research focused on developing a soft ankle exoskeleton
- Theodore Y. Wu Graduate Fellowship: Graduate Tuition and Stipend for the 2017 Academic year.
- Presidents Undergraduate Research Salary (PURA) Award: $1500 undergraduate research stipend awarded for the Spring 2017 academic semester.

Teaching Experiences and Workshops

- Caltech Rise Program Workshop: Creating Math Skills Worksheets (January 29, 2020)
- STEMulate Learning Workshop: Closing the Gaps in Mathematics (October 6, 2020)
- Teaching Assistant for Caltech course "CDS 131: Linear Systems Theory" (Fall 2018)
- Shell Tutor for Georgia Tech course "COE 3001: Mechanics of Deformable Bodies" (Fall 2016)

Academic Workshops

- ME Rising Stars Workshop (hosted by Berkeley), October 2, 2020

Undergraduate Advising

- Ozioma Ozor-Ilo (WAVE student, Summer 2021)
- Neil Janwani (SURF student, Summer 2021)
- Toussaint Pegues (SURF student, Summer 2020 and 2021)
- Lorenzo Shaikewitz (SURF student, Summer 2020)
- Myra Cheng (Fall 2019 and Winter 2020)
- Sofia Kwok (SURF student, Summer 2019)
- Paulina Ridland (SURF student, Summer 2019)
- Allison Cheng (SURF student, Summer 2019)
- Diana Frias Franco (FSRI student, Summer 2019)
- Annabel Gomez (Caltech Freshman Summer Research Institute (FSRI) student, Summer 2019)
- Jesus Hernandez (Caltech Summer Undergraduate Research Fellowship (SURF) student, Summer 2018)

Media Mentions

Personal:

- 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

Honors and Awards

- **Recipient of 2021-2022 Simoudis Discovery Prize:** This prize is 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.
- **Best Paper Awards (ICRA 2020):** Awarded both the Best Conference Paper Award and the Best Paper Award on Human-Robot Interaction at ICRA 2020.
- **NSF Graduate Research Fellowship Program:** Awarded 2019
- **NSF Graduate Research Fellowship Program:** Honorable Mention 2017
- **Presidents Undergraduate Research Salary Award (Spring 2017):** $1500 student research stipend
- **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).

Industry Experience

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.

DEI Efforts

- 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-Current)
- 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-Current)
- 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)

Community Outreach

- Visiting speaker for the Hanger Clinic: Presented and discussed my research involving lower-body exoskeletons for the Hanger Amputee Support Group. (September 28, 2021)
- Muir High School Engineering Week Panelist: Presented my research journey to a group of 12 high-school students pursuing careers in STEM, followed by a 30 minute QA session. (February 17, 2021)

Skills

- Programming Languages: MATLAB, Simulink, C++, Python, Bash, HTML, Markdown
- Modeling Software: Solidworks, AutoCad, Inventor, ProEngineer (Creo)
- Graphical Software: Inkscape, Adobe After Effects, Adobe Premier
- Machining: Certified to operate the Caltech and Georgia Tech Machine Shops (CNC Milling, Lathe, Waterjet, Vertical Band Saw, etc.)
- Languages: Native - English, Proficient - French