

# KATHERINE H. ALLEN (KAT)

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## Research Overview

My work breaks down barriers to make **informal engineering education** (such as makerspaces) more accessible, so that everyone can build what they imagine. I build **collaborative robots** that work **interdependently** with humans to do what neither could do alone. My research draws from the areas of robotics, control systems, machine learning, and cognitive science, as well as disability justice and culturally-responsive education.

**Key words:** Accessible makerspaces, assistive robotics, human-robot interaction, collaborative manipulation, intent recognition, nonverbal behavior, user-centered design, disability justice

## Education

<b>Ph.D. Candidate</b> est. 2027	Tufts University Mechanical Engineering and Human Robot Interaction Advisors: Elaine Short and Chris Rogers Area of study: Robotics and Accessible Makerspaces
<b>M.S.</b> 2024	Tufts University Mechanical Engineering and Human Robot Interaction
<b>S.B.</b> 2005	Massachusetts Institute of Technology Aerospace Engineering with Information Technology Capstone: <i>Self-assembling Wireless Autonomously-Reconfigurable Modules (SWARM)</i>

## Publications

### Peer-Reviewed Conference Full Papers

- C3** Allen, K., Balaska, A. K., Aronson, R. M., Rogers, C., and Short, E. S. (2023). Barriers and Benefits: The Path to Accessible Makerspaces. In *The 25th International ACM SIGACCESS Conference on Computers and Accessibility, ASSETS '23*, New York, NY, USA. Association for Computing Machinery  
**Nominee: Best Student Paper** Acceptance rate: 26%
- C2** Yu, H., Aronson, R., Allen, K., and Short, E. S. (2023). From “Thumbs Up” to “10 Out of 10”: Reconsidering Scalar Feedback in Interactive Reinforcement Learning. In *2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*
- C1** Dong, S., Allen, K., Bauer, P., Bethke, B., Brzezinski, A., Coffee, T., Chambers, R.-D., Flores, M., Gallagher-Rodgers, A., Head, J., Heiman, M., Hoff, N., Horin, C., Horvath, M., Jordan, E., Keesee, J., Kim, S.-M., Kong, E., Koscielniak, A., Lawrence, S., Marquiss, J., McQuin, C., McRae, J., Miller, D., Modisette, J., Moghbeli, J., Nolet, S., Schaffer, A., and Yesil, C. (2005). Self-assembling Wireless Autonomous Reconfigurable Modules (SWARM). In *56th International Astronautical Congress of the International Astronautical Federation, the International Academy of Astronautics, and the International Institute of Space Law*

## Organized Workshops and Outreach Events

- O2** Accessible Assistive Robotics for Girl Scouts 2024: workshop for 18 middle-school Girl Scouts covering basic robotics, assistive technology, and the access needs model of assistive technology. Tufts University, May 2024
- O1** Allen, K. H., Aronson, R. M., Bhattacharjee, T., Broz, F., Chang, M. L., Collier, M., Kessler Faulkner, T., Lee, H. R., Neto, I., Winkle, K., and Short, E. S. (2024). Assistive applications, accessibility, and disability ethics in hri. In *Companion of the 2024 ACM/IEEE International Conference on Human-Robot Interaction, HRI '24*, page 1305–1307, New York, NY, USA. Association for Computing Machinery

## Peer-Reviewed Workshop Papers

- W2** Allen, K. H. (2024). Accessible Makerspaces in Indigenous North American Communities. In *ACW Workshop '24: "Challenges and Considerations for Accessibility Research Across Cultures and Regions"*, St. John's, Newfoundland, CA
- W1** Allen, K. (2023). "Human-Robot Haptic Communication and Accessible Assistive Technology". In *Doctoral Consortium of the 25th International ACM SIGACCESS Conference on Computers and Accessibility, ASSETS '23*, New York, New York, USA

## Other Workshops

- “Disability Theory in HCF”, Rua Williams, November 2024
- “Tackling the Lack of a Practical Guide in Disability-Centered Research”, Emma McDonnell, Kelly Avery Mack, Kathrin Gerling, Katta Spiel, Cynthia Bennett, Robin N. Brewer, Rua M. Williams, and Garreth W. Tigwell, ASSETS 2023, <https://assets2023guide.mere.st/>

## Mentoring

### Current Undergraduate and Masters students

Elijah Sarvey, Tufts ME-BS, <i>UR3 Simulation in MATLAB and Introductory ROS</i>	2024
Eli Houlton, Tufts ME-MS, <i>UR3 Hand to Hand HRI</i>	2024-2025
Sarah Cody, Tufts ME, <i>Puppetry with UR3</i>	2024

### Past Undergraduate students

Aengus Kennedy, Tufts ME, <i>UR3 control with Jupyter Notebooks</i>	2024
Liam Campbell, Tufts ME, <i>UR3 control with Jupyter Notebooks</i>	2024
Manpreet Kaur, Tufts CS, <i>A<sup>2</sup> Makerspace Senior Capstone</i>	2023-2024
Harnalija Fenelon, Tufts CS, <i>A<sup>2</sup> Makerspace Senior Capstone</i>	2023-2024
Angel Cruz Salvador, Tufts CS, <i>A<sup>2</sup> Makerspace Senior Capstone</i>	2023-2024
Jake Lawton, Tufts CS, <i>A<sup>2</sup> Makerspace Senior Capstone</i>	2023-2024
Andy Xu, Tufts <i>Designing an Accessible Hybrid Makerspace</i> , NSF REU	2023

## Invited Talks and Panel Discussions

<b>American Studies Association Meeting</b> , “Grounding Disability Justice in Anticolonial Scholarship and Praxis Across Borders” (Panel)—Baltimore, MD	Nov 2024
<b>Haptics for Inclusion Symposium</b> —Boras, Sweden	Nov 2023
<b>Center for Engineering Education and Outreach DEIJ All-Hands Meeting</b> —Tufts University	Oct 2013

Access Computing Partner Meeting—Online

Oct 2023

## Long-Term Outreach

Girl Scouts of Eastern Massachusetts Troop 82122 Leader

Prepared and executed biweekly lesson plans and intermittent activities covering STEM, outdoors, financial literacy, leadership, advocacy, citizenship, and special interest topics for a group of girls from K-9th grade

2017-present

Girl Scouts of Somerville and Cambridge Treasurer and Encampment Director

Provided logistical support for troops in the Somerville and Cambridge areas, and organized service-unit level events including a 100+ attendee camping event in May 2024

2020-present

Cub Scout Den Leader, Pack 313

Prepared and executed monthly and then weekly lesson plans and activities covering citizenship, outdoors skills, leadership, cyber safety, and STEM topics for a group of K-3rd graders

2021-present

Master Educator and Board of Directors, Bay State Babywearers

Led a non-profit which empowers families and caregivers through babywearing. Oversaw the transition of the organization from a local chapter to an independent 501c3 serving Massachusetts and southern New Hampshire. Pivoted the organization to an entirely on-line/remote model during the CoViD-19 pandemic, and then to a hybrid organization providing technical help online and at in-person events.

2011-2023

Board of Directors, Secretary and Technology Team, Babywearing International

Served as a director in several roles for a rapidly-growing organization with 110 chapters across the US. Served on the hiring committee the organization's first paid staff member. Developed communication plans for policy and social media responses for urgent organizational issues. Served as an Educator Evaluator providing training and evaluation to certify volunteer educators serving in local communities.

2014-2017