

Tesca Fitzgerald

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Research Overview

My research is centered around **interactive robot learning**. As robots become more commonplace in human environments, they will need to adapt to novel task variations that they have not been trained to address. I develop algorithms that allow a robot to structure and interpret its interactions with a human teacher in order to adapt its task knowledge to novel situations. By enabling a robot to ask for help in addressing unfamiliar problems, my work contributes toward a future of adaptive, collaborative robots.

Academic Positions

Assistant Professor July 2022 - Present	Yale University , Department of Computer Science
Postdoctoral Fellow Apr 2020 - June 2022	Carnegie Mellon University , Robotics Institute Advisors: Henny Admoni, Reid Simmons, Aaron Steinfeld
Ph.D Computer Science Aug 2020	Georgia Institute of Technology , School of Interactive Computing Thesis: <i>Human-guided Task Transfer in Interactive Robots</i> Advisors: Ashok Goel and Andrea Thomaz
B.Sc Computer Science June 2013	Portland State University , Department of Computer Science Thesis: <i>GUIInform: Interactive Fiction for GUI Prototyping</i> Advisor: Bart Massey

Awards and Honors

National Science Foundation Graduate Research Fellowship Highly competitive fellowship (~17% acceptance) providing tuition and stipend for 3 years	2014-17
IBM Ph.D Fellowship Highly competitive fellowship providing tuition and stipend for 9 months	2017
GVU Center Foley Scholars Award Recipient One of three Georgia Tech PhD students awarded for personal vision and potential impact	2017
Rising Stars in EECS Funded participant in highly selective workshop for women pursuing academic careers	2017
Microsoft Research Graduate Women's Scholarship Highly competitive scholarship for women in Computer Science, \$17,000	2014
Ford Foundation Fellowship Program, Honorable Mention Selected as a finalist for the Ford Foundation Predoctoral Fellowship	2014
Georgia Tech Institute Fellowship Georgia Tech's most prestigious fellowship for graduate students	2013
Portland State University Academic Student Achievement Award One of 7 undergraduate students recognized for excellence in scholarship	2013

Google Anita Borg Memorial Scholarship for First Years Highly competitive scholarship for women in computing, \$10,000	2011
Portland State University Engineering and Computer Science Scholarship Scholarship awarded for project at the Northwest Science Expo, \$6,000	2010
NCWIT Aspirations in Computing National Award Award for women in computing demonstrating aptitude, leadership, and academic plans	2010

Research & Professional Experience

Postdoctoral Researcher Robotics Institute, Carnegie Mellon University MURI on Self-assessment and Understanding of Competence and Conditions to Ensure System Success PIs: Henny Admoni, Reid Simmons, Aaron Steinfeld Research areas: self-assessment, explainable AI, human-robot interaction	Apr 2020 - June 2022
Graduate Research Assistant School of Interactive Computing, Georgia Institute of Technology Design and Intelligence Lab (PI: Ashok Goel) Socially Intelligent Machines Lab (PI: Andrea Thomaz) Research areas: transfer learning, human-robot interaction, cognitive robotics, artificial intelligence	Aug 2013 - May 2020
Undergraduate Research Assistant Computer Science Department, Portland State University Data Lab (PI: Lois Delcambre) Research areas: information retrieval, machine learning, query processing	Oct 2012 - Jun 2013
Undergraduate Researcher Computer Science Department, Portland State University Undergraduate Honors Thesis (Advisor: Bart Massey) Research areas: human-computer interaction, interface prototyping, interactive fiction	Apr 2012 - Jun 2013
Software Engineering Intern Puppet Developed server management app to be integrated into the company's commercial software product Skills: software engineering, web application development, open source, public speaking	Jun 2012 - Sept 2012

Publications

Peer-Reviewed Journal Papers

- [J4] Norton, A., Admoni, H., Crandall, J., **Fitzgerald, T.**, Gautam, A., Goodrich, M., Saretsky, A., Scheutz, M., Steinfeld, A., Yanco, H. "Metrics for Robot Proficiency Self-Assessment and Communication of Proficiency in Human-Robot Teams". ACM Transactions on Human-Robot Interaction (THRI). 2022.
- [J3] **Fitzgerald, T.**, Goel, A., Thomaz, A. "Learning and Modeling Constraints for Creative Tool Use". Frontiers in Robotics and AI. 2021.
- [J2] **Fitzgerald, T.**, Goel, A., Thomaz, A. "Abstraction in Data-Sparse Task Transfer". Artificial Intelligence Journal ([AIJ](#)). 2021.
Invited for full presentation at IJCAI 2022.

- [J1] **Fitzgerald, T.**, Goel A., Thomaz A. “Human-Guided Object Mapping for Task Transfer”. ACM Transactions on Human-Robot Interaction (THRI). 2018 Oct 9;7(2):17.
Invited for full presentation at HRI 2019.

Peer-Reviewed Conference Papers

- [C7] **Fitzgerald, T.**, Koppol, P., Callaghan, P., Wong, R., Kroemer, O., Simmons, R., Admoni, H. “INQUIRE: INTERactive Querying for User-Aware Informative REasoning”. Presented at the Sixth Conference on Robot Learning (CoRL). Auckland, New Zealand. Dec 2022. (39% acceptance rate)
- [C6] Cui, Y.*, Koppol, P.*, Admoni, H., Niekum, S., Simmons, R., Steinfeld, A., **Fitzgerald, T.** “Understanding the Relationship between Interactions and Outcomes in Human-in-the-Loop Machine Learning”. International Joint Conference on Artificial Intelligence (IJCAI). Aug 2021. (Survey track: **32% acceptance rate**)
- [C5] **Fitzgerald, T.**, Short, E., Goel, A., Thomaz, A., “Human-Guided Trajectory Adaptation for Tool Transfer”, Presented at the Eighteenth International Conference on Autonomous Agents and Multiagent Systems (AAMAS). Montréal, Québec. May 2019. (**24% acceptance rate**)
- [C4] **Fitzgerald, T.**, Goel, A., Thomaz, A., “Human-Robot Co-Creativity: Task Transfer on a Spectrum of Similarity”, Presented at the Eighth International Conference on Computational Creativity (ICCC). Atlanta, Georgia. June 2017.
- [C3] **Fitzgerald, T.**, Bullard, K., Thomaz, A., Goel, A., “Situated Mapping for Transfer Learning”, Presented at the Conference on Advances in Cognitive Systems (ACS). Evanston, Ill. June 2016.
- [C2] Chu, V., **Fitzgerald, T.**, Thomaz, A., “Learning Object Affordances by Leveraging the Combination of Human-Guidance and Self-Exploration”, International Conference on Human-Robot Interaction (HRI). Christchurch, New Zealand. Mar 2016. (**25% accept rate**)
Nominated for Best Technical Advance in HRI.
- [C1] **Fitzgerald, T.**, McGreggor, K., Akgun, B., Thomaz, A. L., Goel, A. K. (2015). “Visual Case Retrieval for Interpreting Skill Demonstrations.” Presented at the 23rd International Conference on Case-Based Reasoning (ICCBR). Frankfurt, Germany. Sept 2015.

Book Chapters

- [B1] Goel, A., **Fitzgerald, T.**, Parashar, P. “Analogy and metareasoning: Cognitive strategies for robot learning,” in Human-Machine Shared Contexts, W. Lawless, R. Mittu, and D. Sofge, Eds., Elsevier, 2020, ch. 2, pp. 23-44.

Peer-Reviewed Workshop & Symposia Papers

- [W8] Berk Karli, U., **Fitzgerald, T.** (2023). “Resolving Ambiguities in LLM-enabled Human-Robot Collaboration.” Presented at the 2nd Workshop on Language and Robot Learning: Language as Grounding at CoRL. Atlanta, Georgia. Nov 2023.
- [W7] **Fitzgerald, T.**, Goel, A., Thomaz, A. (2017). “Defining Interactions for Co-Creative Task Transfer”, Presented at the Co-Creation Workshop at International Conference on Computational Creativity (ICCC). Atlanta, Georgia. June 2017.
- [W6] **Fitzgerald, T.**, Thomaz, A. L., Goel, A. K. (2016). “Abstraction for Analogical Reasoning in Robotic Agents.” Presented at the ICCBR Workshop on Computational Analogy. Atlanta, Georgia. Oct 2016.
- [W5] **Fitzgerald, T.**, Goel, A. K. (2015). “A Case-Based Framework for Task Demonstration Storage and Adaptation.” Presented at the ICCBR Workshop on Case-Based Agents. Frankfurt, Germany. Sept 2015.

- [W4] **Fitzgerald, T.**, Goel, A. K., Thomaz, A. L. (2015). “A Similarity-Based Approach to Skill Transfer.” (Extended Abstract). Presented at the Women in Robotics Workshop at the Robotics: Science and Systems Conference. Rome, Italy. July 2015.
- [W3] **Fitzgerald, T.**, Goel, A. K., Thomaz, A. L. (2014). “Representing Skill Demonstrations for Adaptation and Transfer.” (Extended Abstract). Presented at the AAAI Fall Symposium on Knowledge, Skill, and Behavior Transfer in Autonomous Robots. Arlington, Virginia. Nov 2014.
- [W2] **Fitzgerald, T.**, Goel, A. K. (2014). “A Case-Based Approach To Imitation Learning in Robotic Agents.” Presented at the ICCBR Workshop on Case-Based Agents. Cork, Ireland. Sept 2014.
- [W1] **Fitzgerald, T.**, McGregor, K., Akgun, B., Goel, A. K., Thomaz, A. L. (2014). “A Visual Analogy Approach to Source Case Retrieval in Robot Learning from Observation.” Presented at the AAAI Workshop on Artificial Intelligence and Robotics. Québec City, Québec, Canada. July 2014.

Doctoral Consortium

- [DC3] **Fitzgerald, T.** (2015). “Toward a Case-Based Framework for Imitation Learning in Robotic Agents.” Presented at the ICCBR Doctoral Consortium. Frankfurt, Germany. Sept 2015.
- [DC2] **Fitzgerald, T.**, (2015). “Case-Based Skill Transfer in Robotic Agents.” (Extended Abstract). Presented at the Students of Cognitive Systems Workshop at the Third Annual Conference on Advances in Cognitive Systems. Atlanta, Georgia. May 2015.
- [DC1] **Fitzgerald, T.**, Thomaz, A. L. (2015). “Skill Demonstration Transfer for Learning from Demonstration.” (Extended Abstract). Proceedings of the Tenth Annual ACM/IEEE International Conference on Human-Robot Interaction Extended Abstracts. Portland, Oregon. Mar 2015.

Technical Reports

- [TR1] **Fitzgerald, T.**, (Sept 2013), “A System for Bidirectional Robotic Pathfinding.” Portland State University, Portland, OR, Tech. Rep. TR-12-02.

Theses

- [T2] **Fitzgerald, T.**, (Aug 2020). “Human-Guided Task Transfer for Interactive Robots.” (PhD Dissertation). Georgia Institute of Technology, Atlanta, GA.
- [T1] **Fitzgerald, T.**, (June 2013). “GUInform: Interactive Fiction for GUI Prototyping.” (Undergraduate Honors Thesis). Portland State Univ., Portland, OR, Tech. Rep. TR-13-01.

Invited Talks

Learning to Address Novel Situations Through Human-Robot Collaboration

Sept 2023	University of Miami
July 2023	Carnegie Mellon University (RISS)
Oct 2022	Worcester Polytechnic Institute
Sept 2022	Cornell University
Apr 2022	Northwestern University
Apr 2022	University of California, San Diego
Apr 2022	Georgia Institute of Technology
Mar 2022	University of Southern California
Mar 2022	Yale University
Mar 2022	Carnegie Mellon University
Mar 2022	Colorado School of Mines
Feb 2022	Northeastern University
Feb 2022	University of Michigan

Feb 2022 Arizona State University
Feb 2022 Naval Research Lab
Feb 2022 Rutgers University

Human-guided Task Transfer for Interactive Robots

Apr 2021 Talking Robotics (Virtual Seminar)
Sept 2019 Cornell University, Robotics Seminar
May 2019 University of Washington, Robotics Colloquium
May 2019 Stanford University, Stanford Computer Vision Lab
May 2019 Massachusetts Institute of Technology, CSAIL
Apr 2019 Carnegie Mellon University, Robotics Institute

Workshops

Mar 2023 Invited Panelist HRI Pioneers Workshop
Oct 2022 Invited Panelist IROS Workshop on “Reinforcement Learning meets HRI,
Control, and Formal Methods”
July 2022 Invited Speaker IJCAI Workshop on “Generalization in Planning”

Abstraction in Data-Sparse Task Transfer July 2022
Journal paper [J2] invited for full presentation at IJCAI 2022

Keynote Speaker: Oregon NCWIT Regional Awards Program Apr 2021
Award program for High School students receiving the Aspirations in Computing award

Human-Guided Object Mapping for Task Transfer Mar 2019
Journal paper [J1] invited for full presentation at the 2019 Human-Robot Interaction conference

Professional Activities

Organizing Committee

ACM/IEEE International Conference on Human-Robot Interaction (HRI) 2024
Late-Breaking Reports Co-Chair

Northeast Robotics Colloquium 2023
Website Chair

ACM/IEEE International Conference on Human-Robot Interaction (HRI) 2021
Workshop and Tutorials Co-Chair

Program Committee

International Conference on Robotics and Automation (ICRA) 2024
Meta-Reviewer: Human-Robot Interaction

Technological Advances in Human-Robot Interaction 2024
Program Committee

ACM/IEEE International Conference on Human-Robot Interaction (HRI) 2022, 2024
Meta-Reviewer: Technical and Systems Tracks

Workshop Leadership

AAAI Undergraduate Consortium Organizing Committee	2023
RSS Workshop on Robotics for People Organizing Committee	2021
RSS Pioneers Workshop Co-Chair	2019
IROS Workshop on Synergies Between Learning and Interaction Organizing Committee	2017
ICCBR Workshop on Computational Analogy Organizing Committee	2017
ICCBR Workshop on Computational Analogy Co-Chair	2016

Journal Reviewer

Artificial Intelligence Journal (AIJ)	2023
Journal of Artificial Intelligence Research (JAIR)	2022
Transactions on Human-Robot Interaction (THRI)	2018-19, 2021-23
IEEE Robotics and Automation Letters (RA-L)	2021
IEEE Transactions on Human-Machine Systems	2021
Frontiers in Robotics and AI	2020-21
International Journal of Social Robotics Autonomous Robotics	2020, 2022 2019

Conference Reviewer

International Conference on Autonomous Agents and Multiagent Systems (AAMAS)	2023-24
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)	2021
Robotics: Science and Systems (RSS)	2021, 2023
AAAI Conference on Artificial Intelligence	2021
ACM/IEEE International Conference on Human-Robot Interaction (HRI)	2017-19, 2021-23
IEEE International Conference on Robotics and Automation (ICRA)	2018-19, 2021
Conference on Robot Learning (CoRL)	2018, 2020-22
International Conference on Case-Based Reasoning (ICCBR)	2014, 2018

Workshop Reviewer

Pioneers Workshop @ HRI	2016-19, 2021-24
Pioneers Workshop @ RSS	2018, 2021
Robust and Reliable Autonomy in the Wild @ IJCAI	2021
Workshop on Human-Centered Robotics @ RSS	2017
Workshop on Computational Analogy @ ICCBR	2017

Teaching

Robot Learning (CPSC 489/589), Yale University Instructor ; Enrollment: 17 Topics: Learning from Demonstration, Inverse Reinforcement Learning, Interface Design	Spring 2024
Artificial Intelligence (CPSC 370/570), Yale University Instructor ; Enrollment: 67	Fall 2023

Artificial Intelligence (CPSC 470/570), Yale University Co-Instructor ; Enrollment: 94	Spring 2023
Interactive Robot Learning (CPSC 672), Yale University Instructor ; Enrollment: 4 Topics: Learning from Demonstration, Inverse Reinforcement Learning, Interface Design	Fall 2022
Introduction to Artificial Intelligence (CS 3600), Georgia Institute of Technology Graduate TA ; Enrollment: 270	Fall 2017
Machine Learning (CS 4641), Georgia Institute of Technology Co-Head TA ; Enrollment: 240; Effectiveness rating: 4.7/5.0	Spring 2016

Guest Lectures

Oct 2023	Yale University	CGSC 395	Junior Colloquium in Cognitive Sci.
Sept 2022	Yale University	CPSC 472	Intelligent Robotics
Sept 2021	Carnegie Mellon University	16-867	Human-Robot Interaction
Nov 2020	Carnegie Mellon University	16-867	Human-Robot Interaction
Jan 2018	Georgia Institute of Technology	CS 7610	Comp. Creativity
Nov 2017	Georgia Institute of Technology	CS 3630	Perception & Robotics
Oct 2017	Georgia Institute of Technology	CS 3600	Introduction to AI
Oct 2017	Georgia Institute of Technology	CS 3600	Introduction to AI
Oct 2016	Georgia Institute of Technology	CS 4635	Knowledge-based AI

Teaching Education

2020-21	Carnegie Mellon University	Future Faculty Program
Fall 2017	Georgia Tech CETL 8713	Fundamentals of Teaching and Learning in Higher Ed.

Mentoring

PhD Advisor

Ulas Berk Karli	Yale University	2023 -
Anushka Potdar	Yale University	2023 -
Anjiabei Wang	Yale University	2023 -
Shuangge Wang (Co-advised)	Yale University	2023 -

PhD Area/Qualifying Exam Committee

Qiping Zhang	Yale University (CS Area Exam)	2023
Kate Candon	Yale University (CS Area Exam)	2023

Masters' Research Mentor

Rui Shen	Yale University	2023
Mary Hatfalvi	Carnegie Mellon University	2021 - 22
Prajakta Bhutada	Georgia Institute of Technology	2015

Undergraduate Research Mentor

Suba Ramesh	Yale University	2023 -
Jacky Chen	Yale University	2023 -
Neil Song	Yale University	2023 -
Jinqi (Kathryn) Chen	Carnegie Mellon University	2020
Carolyn Youstra	Carnegie Mellon University	2020
Jinqi (Kathryn) Chen	Carnegie Mellon University	2020

Srinjoy Majumdar	University of Texas, Austin	2019
Sarah Storer	Georgia Institute of Technology	2017 - 18
Enoch Kumala	Georgia Institute of Technology	2016 - 18
Raj Prateek Kosaraju	Georgia Institute of Technology	2015

Project Management, Multi-University Research Initiative (MURI) 2020 - 22
 Carnegie Mellon University, UMass Lowell, Brigham Young University, Tufts University
 As a postdoc, organized cross-university integration projects between 12 grad students at 4 universities
 Led recurring student meetings and two collaborative “hack weeks”

Outreach

Voices Against Violence, Carnegie Mellon University 2020 - 2021
 Assisted in organizing and mentoring virtual coding workshops for middle school students

SCS Graduate Application Support Program, Carnegie Mellon University 2020
 Reviewed and provided feedback on underrepresented students’ PhD applications

National Robotics Week Open House, Georgia Institute of Technology 2014 - 2018
 Demonstrated research at annual open house event (draws over 100 attendees yearly)

Executive Board, GradWomen@CC, Georgia Institute of Technology 2015 - 2018
 Organized academic, mentorship, and social events for graduate women in computing

GVU Research Showcase, Georgia Institute of Technology 2016 - 2018
 Presented a research poster during biannual research showcases for the general public

Vice President of Outreach, RoboGrads, Georgia Institute of Technology 2014 - 2016
 Coordinated outreach efforts and lab tours for our robotics graduate student organization

Featured “Maker”, Google “Made with Code” Initiative 2014
 Featured in Google’s video campaign encouraging young women in STEM

Student Ambassador (Employed Position), Portland State University May 2012 -
 Prepared and facilitated STEM outreach activities and lab tours for K-12 students Aug 2013