

RACHEL HOLLADAY

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EDUCATION

Ph.D. Computer Science 2017-	Massachusetts Institute of Technology (MIT) Advisors: Alberto Rodriguez and Tomás Lozano-Pérez Research Area: Forceful Manipulation Planning
M.S. Computer Science 2017-2019	Massachusetts Institute of Technology (MIT) Advisors: Alberto Rodriguez and Tomás Lozano-Pérez Thesis: <i>Force-and-Motion Constrained Planning for Tool Use</i>
B.S. Computer Science and Robotics 2013-2017	Carnegie Mellon University (CMU) Advisor: Siddhartha Srinivasa Thesis: <i>Following Paths in Task Space: Distance Metrics & Planning Algorithms</i>

EMPLOYMENT

Graduate Researcher 2017-Now	Computer Science and Artificial Intelligence Lab, MIT LIS Group (PIs: Tomás Lozano-Pérez and Leslie Pack Kaelbling)
Graduate Researcher 2017-Now	Mechanical Engineering Department, MIT MCube Lab (PI: Alberto Rodriguez)
Undergraduate Researcher 2013-2017	Robotics Institute, CMU Personal Robotics Lab (PI: Siddhartha Srinivasa)
Research Intern Summers 2012-2014	Naval Research Lab, Stennis Space Center Ocean Sciences Branch (PI: Sergio deRada)

AWARDS AND HONORS

RSS Best Student Paper Award	2018
Amazon Robotics Best Systems Paper Award in Manipulation	2018
Allen Newell Award for Excellence in Undergraduate Research	2017
HRI Pioneer	2017
NCWIT Collegiate Award	2016
Honorable Mention for CRA's Outstanding Undergraduate Female Research Award	2015
FIRST Robotics International Dean's List Winner	2012

Undergraduate Departmental Awards

Allen Newell Award for Excellence in Undergraduate Research 2017
CMU Women's Association's Outstanding SCS Senior Student 2017
CMU Judith Resnik Award Honorable Mention 2017
Senior Leadership Recognition 2017
Mark Stehlik SCS Alumni Undergraduate Impact Scholarship 2016
Graduated College Honors

PUBLICATIONS**Peer-Reviewed Journal Articles**

- J5** Caelan Reed Garrett, Rohan Chitnis, Rachel Holladay, Beomjoon Kim, Tom Silver, Leslie Pack Kaelbling and Tomás Lozano-Pérez “Integrated Task and Motion Planning”. *Annual Review of Control, Robotics, and Autonomous Systems* (2021).
- J4** Nikhil Chavan-Dafle, Rachel Holladay and Alberto Rodriguez. “Planar In-Hand Manipulation via Motion Cones”. *International Journal of Robotics Research* 39.2-3 (2019): 163-182.
- J3** Andy Zeng, Shuran Song, Kuan-Ting Yu, Elliott Donlon, Francois Hogan, Maria Bauza, Daolin Ma, Orion Taylor, Melody Liu, Eudald Romo, Nima Fazeli, Ferran Alet, Nikhil Chavan Dafle, Rachel Holladay, Isabella Morona, Prem Qu Nair, Druck Green, Ian Taylor, Weber Liu, Thomas Funkhouser, Alberto Rodriguez. “Robotic Pick-and-Place of Novel Objects in Clutter with Multi-Affordance Grasping and Cross-Domain Image Matching”. *International Journal of Robotics Research* (2019).
- J2** Rachel Holladay, Oren Salzman and Siddhartha Srinivasa. “Minimizing Task Space Fréchet Error via Efficient Incremental Graph Search.” *IEEE Robotics and Automation Letter* 4.2 (2019): 1999-2006.
- J1** Anca Dragan, Rachel Holladay, and Siddhartha Srinivasa. “Deceptive robot motion: synthesis, analysis and experiments.” *Autonomous Robots* (2015): 331-345.

Peer-Reviewed Conference Papers

- C8** Rachel Holladay, Tomás Lozano-Pérez, Alberto Rodriguez. “Planning for Multi-stage Forceful Manipulation” *IEEE International Conference on Robotics and Automation (ICRA)*, 2021.
- C7** Rachel Holladay, Tomás Lozano-Pérez, Alberto Rodriguez. “Force-and-Motion Constrained Planning for Tool Use.” *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2019.
- C6** Nikhil Chavan-Dafle, Rachel Holladay and Alberto Rodriguez. “In-Hand Manipulation via Motion Cones”. *Robotics: Science and Systems (RSS)*, 2018. **Best Student Paper Award.**
- C5** Andy Zeng, Shuran Song, Kuan-Ting Yu, Elliott Donlon, Francois Hogan, Maria Bauza, Daolin Ma, Orion Taylor, Melody Liu, Eudald Romo, Nima Fazeli, Ferran Alet, Nikhil Chavan Dafle, Rachel Holladay, Isabella Morona, Prem Qu Nair, Druck Green, Ian Taylor, Weber Liu, Thomas Funkhouser, Alberto Rodriguez. “Robotic Pick-and-Place of Novel Objects in Clutter with Multi-Affordance Grasping and Cross-Domain Image Matching”. *International Conference of Robotics and Automation (ICRA)*, 2018. **Amazon Robotics Best Systems Paper Award in Manipulation.**
- C4** Rachel Holladay and Siddhartha Srinivasa. “Distance Metrics and Algorithms for Task Space Path Optimization.” *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2016.
- C3** Laura Herlant, Rachel Holladay, and Siddhartha Srinivasa. “Assistive Teleoperation of Robot Arms via Automatic Time-Optimal Mode Switching.” *Human Robot Interaction (HRI)*, 2016.

- C2** Rachel Holladay, Anca Dragan, Siddhartha Srinivasa. “Legible Robot Pointing.” *IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN)*, 2014.
- C1** Anca Dragan, Rachel Holladay, Siddhartha Srinivasa. “An Analysis of Deceptive Robot Motion.” *Robotics: Science and Systems (RSS)*, 2014.

Peer-Reviewed Workshop Papers

- W5** Rachel Holladay, Tomás Lozano-Pérez, Alberto Rodriguez. “Force-and-Motion Grasp Planning for Tool Use.” *Robotics: Science and Systems (RSS) Workshop on “Task-Informed Grasping (TIG-II): From Perception to Physical Interaction”*, 2019.
- W4** Oren Salzman, Rachel Holladay, Sherdil Niyaz, Alan Kuntz, Ron Alterovitz, and Siddhartha Srinivasa. “Minimizing the Fréchet Error of Task-Space Paths for Manipulators and Surgical Robots”. *Robotics: Science and Systems (RSS) Pioneers Workshop*, 2018.
- W3** Rachel Holladay, Laura Herlant, Henny Admoni and Siddhartha Srinivasa. “Visibility Optimization in Robot Manipulation Tasks.” *IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN) “Workshop on Human-Oriented Approaches for Assistive and Rehabilitation Robotics (HUMORARR)”*, 2016.
- W2** Rachel Holladay, Shervin Javdani, Anca Dragan and Siddhartha Srinivasa. “Active Comparison Based Learning Incorporating User Uncertainty and Noise.” *Robotics: Science and Systems (RSS) “Workshop Model Learning for Human-Robot Communication”*, 2016. 2016.
- W1** Rachel Holladay and Siddhartha Srinivasa. “RoGuE: Robot Gesture Engine.” *AAAI Spring Symposium: “Enabling Computing Research in Socially Intelligent Human-Robot Interaction: A Community-Driven Modular Research Platform”*, 2016.

Patents

- P2** Robotic Manipulation of Objects for Grip Adjustment. Nikhil Chavan-Dafle, Rachel Holladay and Alberto Rodriguez. US 62/765278, PCT/US2019/046771 (*Under review.*)
- P1** Robotic Manipulation of Objects using External Contacts. Nikhil Chavan-Dafle, Rachel Holladay and Alberto Rodriguez. US 62/765255, PCT/US2019/046780 (*Under review.*)

Theses

- T2** Rachel Holladay 2019. “Force-and-Motion Constrained Planning for Tool Use”. Master’s Thesis, Massachusetts Institute of Technology.
- T1** Rachel Holladay 2017. “Following Paths in Task Space: Distance Metrics and Planning Algorithms”. Undergraduate Honors Thesis, Carnegie Mellon University. **Allen Newell Award for Excellence in Undergraduate Research.**

TEACHING

Experience

6.800/6.834 Robotic Manipulation (Undergraduate/Graduate) Teaching Assistant, Massachusetts Institute of Technology <i>Instructor: Russ Tedrake</i>	Fall 2021
Robotics and Automation Subject Matter Expert (SME), MIT xPro Online Course <i>Program Faculty: Alberto Rodriguez, Julie Shah</i>	2020-2021

15-300 Research and Innovation in Computer Science (Undergraduate)
Teaching Assistant, Carnegie Mellon University
Instructors: Todd Mowry, Jonathan Aldrich

Fall 2016

Pedagogical Training

Grad Teaching Development Tracks (MIT Teaching+Learning Lab)
Four multi-session workshop tracks on: Lesson Planning, Microteaching, Inclusive Teaching and Subject Design

2021-2022

TA Days Training (MIT Teaching+Learning Lab)
Workshop Series introducing evidence-based teaching practices for TAs

Summer
2021

INVITED TALKS

Constraints and Planning for Forceful Robotic Manipulation
Brown University, Oct 2021
Tel Aviv University, Computational Geometry Seminar (virtual), Nov 2021

Force-and-Motion Constrained Manipulation Planning
MIT CSAIL and Schlumberger-Doll Research Workshop, Oct 2019

MENTORING

Research Mentoring

Rachel Lu (MIT Undergraduate)
Daniella White (MIT MEng)
Ashwin Krishna (Harvard Undergraduate)
Isabella Morona (High Schooler)
Connor Mowry (High Schooler)

2022-
2021-2022
2020-2021
2018
2016

Other Mentoring

Mentor in MIT EECS AI Mentorship Program
FIRST Robotics Tech Challenge Mentor for Team 13620 Winsor Wildbots
FIRST Robotics Competition Mentor for Team 3504 Girls of Steel

2020-
2018-
2013-2017

GRANTS AND FELLOWSHIPS

Graduate Fellowships
National Science Foundation (NSF) Graduate Research Fellowship, 2018-2021
Science, Mathematics And Research for Transformation Scholarship (declined), 2017-2020
MIT Merrill Lynch Fellowship, 2017-2018

Travel Grants

MIT GSC Travel Grant, 2019
CRA-W Grad Cohort for Women Workshop, 2018
CMU URO Presentation Award, 2016
ACM-W Scholarship for Attendance at Research Conferences, 2014

Undergraduate Research Grants

SURF (Summer Undergraduate Research Fellowships) Grant Winner for 2015, 2016
CREU (Collaborative Research Experience for Undergraduates) Grant Winner for 2015
SRC URO (Undergraduate Research Program) Grant Winner 2014-17

Undergraduate Scholarships

NASA College Scholarship, 2013-2017
Holleran Scholar, 2013-2017

SERVICE

Refereeing: Conferences and Journals

Conference on Robot Learning (CoRL)	2021
IEEE Transactions on Automation Science and Engineering (T-ASE)	2021
IEEE Conference on Decision and Control (CDC)	2021
IEEE Robotics and Automation Letters (RA-L)	2021-22
IEEE Transactions on Robotics (T-RO)	2020-21
International Conference on Automated Planning and Scheduling (ICAPS)	2020
Robotics: Science and Systems (RSS)	2019-20
International Journal of Robotics Research (IJRR)	2018
International Symposium on Robotics Research (ISRR)	2017
IEEE International Conference on Robotics and Automation (ICRA)	2017-22
AAAI Symposium	2016
ACM/IEEE International Conference on Human-Robot Interaction (HRI)	2016, 2018
IEEE Symposium on Robot and Human Interactive Communication (RO-MAN)	2015-16
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)	2015,16,20,21
International Journal of Social Robotics (IJSR)	2015
Autonomous Robotics (AURO)	2015, 2021

Refereeing: Other

NCWIT Award Aspiration in Computing Reviewer	2018, 2020
NCWIT Collegiate Award Reviewer	2020-2021
CMU Alumni Interviewer	2018

Service: Conferences

Student Volunteer at the RSS Conference	2020
Co-Organizer of MCube Lab-MLab Manipulation Workshop	2018
Photographer for RSS Conference	2017
Local Arrangements Committee for Intel ISEF	2016
Student Volunteer at the HRI Conference	2016

Service: MIT EECS Department

MIT EECS Graduate Student Advisory Group for Faculty Search	2021
Executive Committee for MIT EECS Graduate Application Assistance Program (GAAP)	2020-
Member of MIT EECS REFS (Resources for Easing Friction and Stress)	2019-
GW@MIT (Graduate Women at MIT) EECS Department Representative	2018
Graduate Women in MIT Course 6 (GW6) Co-President	2018

Service: Other

Webmaster and Student Volunteer for Robotics Today Seminar Series	2020-2021
Webmaster for Embodied Intelligence Community of Research at CSAIL	2020-
Student Leader and Co-Founder of GWiRC (Graduate Women in Robotics Community)	2019-
Interest Groups Manager for Sidney Pacific Graduate Dorm (MIT)	2018-2020
Student Leader in CMU SCS Day, SCS4ALL, Women@SCS	2013-2017