

Nathaniel Steele Dennler

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Ph.D. Candidate in Robotics
University of Southern California
Department of Computer Science

RESEARCH INTERESTS Human-Robot Interaction, Assistive Robotics, Preference Learning, Inverse Reinforcement Learning, User-Centered Design, Participatory Design.

EDUCATION **Ph.D., Computer Science.** Expected Dec 2024
University of Southern California, NSF GRFP Fellow, Annenberg Fellow GPA: 3.95
Dissertation: Enabling Socially Assistive Robots to Adapt to Users' Preferences, *Advisors:* Maja Matarić and Stefanos Nikolaidis

M.S., Computer Science. May 2021
University of Southern California, NSF GRFP Fellow, Annenberg Fellow GPA: 3.95
Advisors: Prof. Maja Matarić and Prof. Stefanos Nikolaidis

B.S., Computer Science, B.Eng., Robotics Engineering. May 2019
Worcester Polytechnic Institute GPA: 3.95
Major Qualifying Project: Mobile Manipulation through Tactile Sensing, *Interactive Qualifying Project:* Implications of Self-Determination Theory on Student Performance, *Advisors:* Prof. Charles Rich, Prof. Loris Fichera, and Prof. Cagdas Onal

PROFESSIONAL **Consumer Incentives Intern**, Uber *Supervisor: E. Chen* Jun 2023 - Sep 2023
Consumer Incentives Intern, Uber *Supervisor: J. Chen* Jun 2022 - Aug 2022
Navigation Systems Intern, iRobot *Supervisor: K. Morris* May 2019 - Aug 2019
Visiting Researcher, MIT Lincoln Labs *Advisor: W.R. Michalson* Aug 2018 - Dec 2018
Visiting Researcher, USC Interaction Lab *Advisor: K. Swift-Spong* May 2018 - Aug 2018
Research Assistant, ASSISTments Lab *Advisor: K. Ostrow* Aug 2017 - May 2018

TEACHING **Teaching Assistant**, CSCI 566–*Deep Learning and Its Applications*. University of Southern California. Developed homework assignments, advised project teams, hosted office hours and guest lectured in Spring 2022.

Teaching Assistant, CSCI 445–*Robotics*. University of Southern California. Directed and managed lab sections, provided supplementary lectures, and hosted office hours in Fall 2021.

Student Teaching Assistant, RBE 3002–*Unified Robotics IV: Mapping and State Estimation*. Worcester Polytechnic Institute. Managed lab sections, hosted office hours, and advised project groups in Fall 2018 and Spring 2019.

Student Teaching Assistant, RBE 3001–*Unified Robotics III: Kinematics and Dynamics*. Worcester Polytechnic Institute. Managed lab sections, hosted office hours, designed lab assignment infrastructure, and advised project groups in Fall 2018 and Spring 2019.

RESEARCH SUPERVISION **USC Undergraduate Students**
Joyce Ng, low-cost mobile platform for low-cost social robots. Mar 2024 - Present
Dora Meiwes, active learning for post-stroke assessment. Jan 2024 - Present
Allen Tran, robot embodiment perception. Oct 2023 - Present
Joseph Liu, lab tour guide developer. Jun 2023 - October 2023
Daniel Zeng, personalized signalling representation learning. Sep 2023 - May 2024
David Delgado, signalling mechanical interface development. Sep 2023 - Present
Erica De Guzman, stroke therapy game development. Jan 2022 - Jun 2023
Ashley Perez, stroke therapy game development. Jan 2022 - Jun 2022
Claudia Chiu, user input modeling for reward learning. Feb 2021 - Jun 2022
Brenna Chen, models for robot perception. Feb 2021 - Jun 2021

Jessica Hadiwijoyo , model for personalizing robot voices	Oct 2019 - May 2022
Changxiao Ruan , web interface for embodiment perception.	Oct 2019 - May 2020
Hanzo Huang , interface for animating facial expressions.	Oct 2019 - May 2019
Yunhao Zhao , dynamic motion primitives for robot expressions.	Oct 2019 - Dec 2019
Kangmin Tan , interactive text-to-speech for social robot faces.	Oct 2019 - Dec 2019

USC Viterbi Summer Undergraduate Research Experience (SURE)

Yenessa Maldonado , designing robots in virtual reality.	May 2021 - Aug 2021
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External NSF REU Summer Fellows

Anthony Song , developing a mobile social robot platform.	May 2024 - Aug 2024
Melina Daniilidis , adapting difficulty for rehabilitation tasks.	Jun 2023 - Aug 2023
Lia Vargas , visualizing user expectations of robots.	May 2021 - Aug 2021

Research Distributed Mentor Program Undergraduates (DREU) Program

Sophia Hager , controllable text generation.	May 2021 - Aug 2021
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Summer High School Intensive in Next-Generation Engineering (SHINE)

Evan Torrence , robot-assisted interlingual communication.	Jun 2024 - Jul 2024
Lina Cryer , creating co-speech gestures for tabletop robots.	Jun 2024 - Jul 2024

HONORS AND AWARDS

<i>ACM UIST 2024</i> Doctoral Symposium Panelist	October 2024
<i>IEEE/ACM HRI 2024</i> Best Late-Breaking Poster (with Uksang Yoo)	March 2024
<i>ACM FAccT 2023</i> Best Paper Award	June 2023
USC George Bekey Service Award	May 2023
WPI Salisbury Award	April 2019
NSF Graduate Research Fellow	April 2019
USC Annenberg Fellow	February 2019
WPI Charles O. Thompson Scholar	March 2016

CO-AUTHORED AWARDED GRANTS

NSF/NIH Smart Health and Biomedical Research in the Era of Artificial Intelligence and Advanced Data Science (\$1,200,000 total) Aug 2024 - Aug 2028
 “Personalized AI-Driven Models for Supporting User Engagement and Adherence in Health Interventions: Validation in Cognitive Behavioral Therapy for Anxiety,” PI: Maja Matarić, Co-PIs: Stefanos Nikolaidis, Bruna Martins-Klein.
 Motivated problem through the psychological framework of self-determination theory, provided background on self-determination theory, described mathematical formulation for learning user preferences from explicit user feedback, designed all user studies (co-design sessions and randomized controlled trials), and identified outcome instruments and measurements.

Amazon Research Award (\$100,000 total) Sep 2022 - Aug 2023
 “Learning User Preferences for In-Home Robots Through In Situ Augmented Reality,” PI: Maja Matarić, Co-PI: Stefanos Nikolaidis.
 Provided motivation for grant, described mathematical formulation for learning user preferences, designed user studies, and created timeline and budget.

PUBLICATIONS Journal Publications

Nathaniel Dennler, Mina Kian, Stefanos Nikolaidis, and Maja J. Matarić. “Designing Robot Identity: The Role of Voice, Clothing, and Task on Robot Gender Perception”. *International Journal of Social Robotics*. *Under Review*.

Raj Korpan, Ruchira Ray, Andrea Sipos, **Nathan Dennler**, Max Parks, Maria E. Cabrera, and Roberto Martín-Martín. “Launching Queer in Robotics.” *IEEE Robotics & Automation Magazine* 31, no. 2 (2024): 144-146. DOI: 10.1109/MRA.2024.3388277

(IF: 5.7)

Nathaniel Dennler, Amelia Cain, Erica De Guzman, Claudia Chiu, Carolee J. Winstein, Stefanos Nikolaidis, and Maja J. Matarić. “A metric for characterizing the arm nonuse workspace in poststroke individuals using a robot arm.” *Science Robotics* 8, no. 84 (2023): eadf7723. DOI: 10.1126/scirobotics.adf7723

(IF: 25.0)

Nathaniel Dennler, Changxiao Ruan, Jessica Hadiwijoyo, Brenna Chen, Stefanos Nikolaidis, and Maja Matarić. “Design metaphors for understanding user expectations of socially interactive robot embodiments.” *ACM Transactions on Human-Robot Interaction* 12, no. 2 (2023): 1-41. DOI: 10.1145/3550489

(IF: 5.1)

Conference Publications

Nathaniel Dennler, Stefanos Nikolaidis, Maja Matarić. “Using Exploratory Search to Learn Representations for Human Preferences”, *Companion of the ACM/IEEE International Conference on Human-Robot Interaction (HRI LBR)*, Boulder, CO, March 11-15, 2024. DOI: 10.1145/3610978.3640745

(3.38 Impact Score)

Uksang Yoo, **Nathaniel Dennler**, Maja Matarić, Stefanos Nikolaidis, Jean Oh, Jeffrey Ichnowski. “MOE-Hair: Toward Soft and Compliant Contact-rich Hair Manipulation and Care”, *Companion of the ACM/IEEE International Conference on Human-Robot Interaction (HRI LBR)*, Boulder, CO, March 11-15, 2024. DOI: 10.1145/3610978.3640682

(Best LBR Poster)(3.38 Impact Score)

Melina Daniilidis, **Nathaniel Dennler**, Maja Matarić, Stefanos Nikolaidis. “Adapting Task Difficulty in a Cup-Stacking Rehabilitative Task”, *Companion of the ACM/IEEE International Conference on Human-Robot Interaction (HRI LBR)*, Boulder, CO, Mar 11-15, 2024. DOI: 10.1145/3610978.3640558

(3.38 Impact Score)

Nathaniel Dennler, David Delgado, Daniel Zeng, Stefanos Nikolaidis, Maja Matarić. “The RoSiD Tool: Empowering Users to Design Multimodal Signals for Human-Robot Collaboration”, *18th International Symposium on Experimental Robotics (ISER)*, Chiang Mai, Thailand, Nov 26-30, 2023.

(2.48 Impact Score)

Ilaria Torre, Erik Lagerstedt, **Nathaniel Dennler**, Katie Seaborn, Iolanda Leite, Eva Szekely. “Can a gender-ambiguous voice reduce gender stereotypes in human-robot interactions?”, *32nd IEEE International Conference on Robot and Human Interactive Communication (RO-MAN)*, Busan, Korea, Aug 28-30, 2023. DOI (shortened): 10/gs4tw7

(65% Acceptance Rate)

Nathaniel Dennler, Anaelia Ovalle, Ashwin Singh, Luca Soldaini, Arjun Subramonian, Huy Tu, William Agnew, Avijit Ghosh, Kyra Yee, Irene Font Peradejordi, Zeerak Talat, Mayra Russo, Jess De Jesus De Pinho Pinhal. “Bound by the Bounty: Collaboratively Shaping Evaluation Processes for Queer AI Harms”, *AAAI/ACM Conference on AI, Ethics, and Society (AIES)*, Montreal, Canada, Aug 8-10, 2023. DOI: 10.1145/3600211.3604682

(with Queer in AI)(38% Acceptance Rate)

Bryon Tjanaka, Matthew C. Fontaine, David H. Lee, Yulun Zhang, Nivedit Reddy Balam, **Nathaniel Dennler**, Sujay S. Garlanka, Nikitas Dimitri Klapsis, and Stefanos Nikolaidis. "pyribs: A bare-bones python library for quality diversity optimization." *ACM Genetic and Evolutionary Computation Conference (GECCO)*, Lisbon, Portugal, Jul 15-19, 2023. DOI: 10.1145/3583131.3590374

(35% Acceptance Rate)

Anaelia Ovalle, Arjun Subramonian, Ashwin Singh, Claas Voelcker, Danica J. Sutherland, Davide Locatelli, Eva Breznik, Filip Klubicka, Hang Yuan, Hetvi J, Huan Zhang, Jaidev Shriram, Kruno Lehman, Luca Soldaini, Maarten Sap, Marc Peter Deisenroth, Maria Leonor Pacheco, Maria Ryskina, Martin Mundt, Milind Agarwal, Nyx Mclean, Pan Xu, A Pranav, Raj Korpan, Ruchira Ray, Sarah Mathew, Sarthak Arora, St John, Tanvi Anand, Vishakha Agrawal, William Agnew, Yanan Long, Zijie J. Wang, Zeerak Talat, Avijit Ghosh, **Nathaniel Dennler**, Michael Noseworthy, Sharvani Jha, Emi Baylor, Aditya Joshi, Natalia Y. Bilenko, Andrew Mcnamara, Raphael Gontijo-Lopes, Alex Markham, Evyn Dong, Jackie Kay, Manu Saraswat, Nikhil Vytla, Luke Stark. "Queer In AI: A Case Study in Community-Led Participatory AI", *ACM Conference on Fairness, Accountability, and Transparency (FAccT)*, Chicago, IL, Jun 12-15, 2023. DOI: 10.1145/3593013.3594134

(Best Paper) (with Queer in AI) (25% Acceptance Rate)

Zhonghao Shi, Han Chen, Anna-Maria Velentza, Siqi Liu, **Nathaniel Dennler**, Allison O'Connell, and Maja Matarić. "Evaluating and Personalizing User-Perceived Quality of Text-to-Speech Voices for Delivering Mindfulness Meditation with Different Physical Embodiments", *ACM/IEEE International Conference on Human-Robot Interaction (HRI)*, Stockholm, Sweden, Mar 13-16, 2023. DOI: 10.1145/3568162.3576987

(24% Acceptance Rate)

Nathaniel Dennler, Eura Shin, Maja Matarić, and Stefanos Nikolaidis. "Design and Evaluation of a Hair Combing System Using a General-Purpose Robotic Arm", *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, presented virtually, Sep 28-30, 2021. DOI: 10.1109/IROS51168.2021.9636768

(45% Acceptance Rate)

Nathaniel Dennler, Catherine Yunis, Jonathan Realmuto, Terence Sanger, Stefanos Nikolaidis, and Maja Matarić. "Personalizing User Engagement Dynamics in a Non-Verbal Communication Game for Cerebral Palsy", 30th *IEEE International Conference on Robot and Human Interactive Communication (RO-MAN)*, presented virtually, Aug 8-12, 2021. DOI: 10.1109/RO-MAN50785.2021.9515466

(65% Acceptance Rate)

Refereed Workshop Papers

Uksang Yoo, **Nathan Dennler**, Sarvesh Patil, Jean Oh and Jeffrey Ichnowski. "Inclusion in Assistive Haircare Robotics: Practical and Ethical Considerations in Hair Manipulation", *ACM/IEEE International Conference on Human-Robot Interaction (HRI)*, at the 3rd Workshop on Inclusive HRI, Boulder, CO, Mar 11-15, 2024.

Nathaniel Dennler, Amy O'Connell, Stefanos Nikolaidis, Maja Matarić. "Robot Costume Design: Identity as a Narrative", *ACM/IEEE International Conference on Human-Robot Interaction (HRI)*, at the 3rd Workshop on Robo-Identity, Boulder, CO, Mar 11-15, 2024.

Nathaniel Dennler, Stefanos Nikolaidis, Maja Matarić. "Using Causal Trees to Estimate Personalized Task Difficulty," *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)* at the Workshop on Assistive Robotics for Citizens, Detroit, MI, Oct 1-5, 2023.

Nathaniel Dennler, Stefanos Nikolaidis, Maja Matarić. “Singing the Body Electric: The Impact of Robot Embodiment on User Expectations”, *Robotics: Science and Systems (RSS)* at the *Workshop on Social Intelligence in Humans and Robots*, Daegu, Korea, Jul 10-14, 2023.

Demonstrations

Nathaniel Dennler, Evan Torrence, Uksang Yoo, Stefanos Nikolaidis, Maja Matarić. “PyLips: an Open-Source Python Package” demonstrated at *2024 ACM Symposium on User Interface Software and Technology (UIST)*, Pittsburgh, PA, Oct 13-16, 2024.

Nathaniel Dennler, Eura Shin, Maja Matarić, Stefanos Nikolaidis. “Robot-Assisted Hair Combing,” demonstrated at *2019 Conference on Neural Information Processing Systems*, Vancouver, Canada, Dec 8-14, 2019.

INVITED TALKS “Physical and Behavioral Adaptation in Human-Robot Interaction” Aug 2024
presented at the *HCI Seminar* at **Johns Hopkins University**.

“Shaping User Expectations through Robot Design” May 2024
presented at the *Bot Intelligence Group (BIG)* at **Carnegie Mellon University**.

“Shaping User Expectations through Robot Design” May 2024
presented at the *USC Robotics Seminar* at **University of Southern California**.

“Characterizing the Arm Nonuse Workspace in Post-stroke Individuals” Feb 2024
presented at the *WiSE STEM Bytes Seminar* at **University of Southern California**.

“Characterizing the Arm Nonuse Workspace in Post-stroke Individuals” Apr 2023
presented at the *USC Robotics Seminar* at **University of Southern California**.

“Socially Assistive Robots that Adapt to Users’ Preferences,” Apr 2024
invited lecture for *CSCI 699: Computational Human-Robot Interaction* at **University of Southern California**.

“Developing Assistive Technologies: Social and Functional Considerations,” Mar 2023
invited lecture for the *Assistive Technology course* at **Seoul National University**. Presented virtually.

“Expression Salience in Socially Assistive Robots,” Oct 2019
presented at the *National Science Foundation Engineering and Education Centers Conference* in **Alexandria Virginia**.

SERVICE

Organizing Committees

Co-organizer (with Arjun Subramonian, Anaelia Ovalle, Luca Soldaini, Zeerak Talat, Sunipa Dev, Kyra Yee, William Agnew, Irene Font Peradejordi, and Avijit Ghosh), *ACM Fairness Accountability and Transparency (FAccT) CRAFT session* on Community Ownership of Queer Data and Models, Chicago, IL, June 21st, 2022.

Journal Reviewer

International Journal of Robotics Research (IJRR), Transactions on Neural Systems and Rehabilitation Engineering (TSNRE), Robotics and Automation Letters (RA-L), Science Robotics, and Public Library of Science ONE (PLOS ONE), Frontiers in Robotics, Transactions on Human-Robot Interaction (T-HRI), Autonomous Robotics

Conference Reviewer

Human-Robot Interaction (HRI), International Conference on Robot and Human Interactive Communication (RO-MAN), International Conference on Social Robotics (ICSR), Interna-

tional Conference on Intelligent Robots and Systems (IROS), International Conference on Robotics and Automation (ICRA), Knowledge Discovery and Data Mining (KDD)

Core Organizer Jun 2023 - Present
Queer in AI / Queer in Robotics

- 1. Documenting organizational procedures to facilitate other special interest groups to develop grassroots efforts for inclusion.
- 2. Organizing socials at conferences, fostering community among queer researchers in robotics.
- 3. Organizing workshops to publicize queer works and considerations. Previously organized a CRAFT workshop at FAccT, assessing what queer harms exist in AI systems and how to measure these harms.

Organizer Jun 2024 - Jul 2024
Summer Robotics Research Seminar

- 1. Initiated a seminar for visiting undergraduate and high school summer researchers to learn about robotics research at USC.
- 2. Invited speakers, curated research themes, and designed promotional materials to advertise the seminar.

Coding Club Instructor Nov 2021 - Dec 2023
South LA Robotics

- 1. Teaching coding fundamentals to elementary and middle school students in the South Los Angeles area.

Merit Badge University Director, Service Vice President Jan 2018 - Apr 2019
Alpha Phi Omega

- 1. Lead a committee to plan a two-day conference for 300 boy scouts.
- 2. Designed courses according to merit badge specifications.
- 3. Planned community service opportunities for over 80 active members, resulting in a total of 3000 hours across the organization, the largest number of hours in the chapter's history for one semester

OTHER COMPETITIVE ACTIVITIES	3rd Place , in the IROS functional fashion competition	Oct 2023
	Program of the Year , for excellence in planning Merit Badge University	Apr 2019
	Distinguished Service Key , highest award for service in Alpha Phi Omega	Apr 2019
	U.S. Challenge Skate Novice Pairs Champion	Oct 2017
	U.S. Figure Skating Intermediate Pairs National Silver Medalist	Jan 2015