Nathaniel Steele Dennler

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RESEARCH INTERESTS

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

EDUCATION

Ph.D., Computer Science. 2019–2024
University of Southern California (USC) *GPA*: 3.95
NSF GRFP Fellow, Annenberg Fellow
Dissertation: Physical and Social Adaptation for Assistive Robotic Interactions,
Advisors: Maja Matarić and Stefanos Nikolaidis

M.S., Computer Science. 2019–2022
University of Southern California (USC) *GPA*: 3.95
NSF GRFP Fellow, Annenberg Fellow
Advisors: Prof. Maja Matarić and Prof. Stefanos Nikolaidis

B.S., Computer Science; B.Eng., Robotics Engineering. 2015–2019
Worcester Polytechnic Institute (WPI) *GPA*: 3.95
Major Qualifying Project: Mobile Manipulation through Tactile Sensing,
Interactive Qualifying Project: Self-Determination Theory on Student Performance,
Advisors: Prof. Charles Rich, Prof. Loris Fichera, and Prof. Cagdas Onal

PROFESSIONAL

Software Engineer II, Uber. *Supervisor: H. Safavi* Jan 2025-Present
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, WPI 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 signaling representation learning. Sep 2023 - May 2024
David Delgado, signaling 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

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

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

2025 IEEE/ACM Conference on Human-Robot Interaction
HRI Pioneers (Honorable Mention) December 2024
Awarded to the top 30% of HRI Pioneers applicants.

2024 ACM User Interface and Software Technology
Doctoral Symposium October 2024
One of eight awardees to attend a mentorship session with established academic and industry researchers in the UIST community.

2024 IEEE/ACM Conference on Human-Robot Interaction
Best Late-Breaking Poster (with Uksang Yoo) March 2024
For the poster “MOE-Hair: Toward Soft and Compliant Contact-rich Hair Manipulation and Care”.

2023 ACM Conference on Fairness, Accountability, and Transparency
Best Paper Award (with Queer in AI) June 2023
For the paper “Queer in AI: A case study in Community-Led Participatory AI”.

USC George Bekey Service Award May 2023
For outsanding service to the robotics community at USC.

WPI Salisbury Award April 2019
One of two computer scientists from the WPI class of 2019 with the strongest academic record at their university.

WPI Program of the Year Award April 2019
For excellence in planning and executing *Merit Badge University*, a program that aligned with WPI’s core values of advocacy, citizenship, empowerment, inclusion, and support.

NSF Graduate Research Fellow April 2019
Competitive three-year fellowship to support graduate studies in the United States.

USC Annenberg Fellow February 2019
Competitive one-year fellowship to support graduate studies at USC.

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

[J4] *IJSR '25*

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. *In press*.

(IF: 3.8)

[J3] *RA-M '24*

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

(with Queer in Robotics)(IF: 5.7)

[J2] *Sci. Rob. '23*

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)

[J1] *T-HRI '23*

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

[C11] *HRI '25*

Nathaniel Dennler, Stefanos Nikolaidis, Maja Matarić. "Contrastive Learning from Exploratory Actions: Leveraging Natural Interactions for Preference Elicitation.", *ACM/IEEE Conference on Human-Robot Interaction (HRI)*, Melbourne, Australia, March 4–6, 2025.

(25% Acceptance Rate)

[C10] *HRI '25*

Uksang Yoo, **Nathaniel Dennler**, Eliot Xing, Stefanos Nikolaidis, Maja Matarić, Jeffrey Ichnowski, Jean Oh. "Soft and Compliant Contact-rich Hair Manipulation and Care.", *ACM/IEEE Conference on Human-Robot Interaction (HRI)*, Melbourne, Australia, March 4–6, 2025.

(25% Acceptance Rate)

[C9] *ISRR '24*

Nathaniel Dennler, Zhonghao Shi, Stefanos Nikolaidis, Maja Matarić. "User Experience in Preference-Based Optimization of Reward Functions for Assistive Robots.", *International Symposium on Robotics Research (ISRR)*, Long Beach, CA, Dec 8-12, 2024.

(56% Acceptance Rate)

[C8] *ISER '23*

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. DOI: 10.1007/978-3-031-63596-0_1

(55% Acceptance Rate)

[C7] *RO-MAN '23*

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

(65% Acceptance Rate)

[C6] *AIES '23*

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)

[C5] *GECCO '23*

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)

[C4] *FAccT '23*

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)*

[C3] *HRI '23*

Zhonghao Shi, Han Chen, Anna-Maria Velentza, Siqi Liu, **Nathaniel Dennler**, Allison O'Connell, and Maja Mataric. "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)

[C2] *IROS '21*

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)

[C1] *RO-MAN '21*

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", 30^{th} *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)

Peer-Reviewed Short Papers

[S3] *HRI '24* **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)

[S2] *HRI '24* 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)*

[S1] *HRI '24* 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)

Refereed Workshop Papers

[WS4] *HRI '24* 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.

[WS3] *HRI '24* **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.

[WS2] *IROS '23* **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.

[WS1] *RSS '23* **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.

Technical Demonstrations

[D2] *UIST '24* **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.

[D1] *NeurIPS '19* **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 Social Adaptation for Assistive Robot Interactions" Oct 2024
invited lecture for *CSCI 545: Robotics* at **University of Southern California**. Los Angeles, CA.

"Physical and Social Adaptation for Assistive Robot Interactions" Oct 2024
presented at the *Doctoral Seminar Series on Interaction* at **Simon Fraser University**. Presented Virtually.

"Physical and Behavioral Adaptation in Human-Robot Interaction" Aug 2024
presented at the *HCI Seminar* at **Johns Hopkins University**. Presented Virtually.

"Shaping User Expectations through Robot Design" May 2024
presented at the *Bot Intelligence Group (BIG)* at **Carnegie Mellon University**. Pittsburgh, PA.

"Shaping User Expectations through Robot Design" May 2024
presented at the *USC Robotics Seminar* at **University of Southern California**. Los Angeles, CA.

"Characterizing the Arm Nonuse Workspace in Post-stroke Individuals" Feb 2024
presented at the *WiSE STEM Bytes Seminar* at **University of Southern California**. Los Angeles, CA.

"Characterizing the Arm Nonuse Workspace in Post-stroke Individuals" Apr 2023
presented at the *USC Robotics Seminar* at **University of Southern California**. Los Angeles, CA.

"Socially Assistive Robots that Adapt to Users' Preferences," Apr 2024
invited lecture for *CSCI 699: Computational Human-Robot Interaction* at **University of Southern California**. Los Angeles, CA.

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

"Introduction to PyTorch," January 2022
invited lecture for the *Deep Learning and Its Applications course* at the **University of Southern California**. Presented Virtually.

"Particle Filtering," November 2021
invited lecture for the *Robotics course* at the **University of Southern California**. Los Angeles, CA.

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

SERVICE

Organizing Committees

Co-organizer (with Uksang Yoo, Jean Oh, Jeffrey Ichnowski, Jonathan Francis, Zeyi Liu, Achu Wilson, Benjamin Yen, Moonyoung Lee, Vito Mengers), *IEEE International Conference on Robotics and Automation (ICRA)* Workshop on Acoustic Sensing and Representations for Robotics, Atlanta, GA, May 19th–May 23rd, 2025.

Co-organizer (with Zhonghao Shi, Leigh Levinson, Tiantian Feng, Xuan Shi, Nicholas Georgiou, Jieyu Zhao, Shrikanth Narayanan, Brian Scassellati, Selma Šabanović, Maja Matarić), *AAAI Spring Symposium* on Child-AI Interaction in the Era of Foundation Models, Burlingame, CA, March 31st–April 2, 2025.

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.

Service Roles

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), International 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.
4. Providing mentorship and funding to queer students applying to graduate programs.

Editor Jun 2023 - Present
RASC Blog

1. Solicit and prepare articles to communicate USC Robotics Research to non-technical audiences.

Organizer Jun 2024 - Jul 2024
USC 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 of community service across the organization to the chapter, campus, community, and country—the largest number of hours in the chapter's 50+ year history in a single semester.

OTHER COMPETITIVE ACTIVITIES

3rd Place, in the IROS functional fashion competition Oct 2023
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