Nathaniel Steele Dennler

dennler@usc.edu
ndennler.github.io
Los Angeles, CA

Ph.D. Candidate studying 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

University of Southern California, Los Angeles, CA — August 2019 - Present
Ph.D., Computer Science. ***NSF GRFP Fellow*** and ***Annenberg Fellow***.
Advisors: Maja Matarić and Stefanos Nikolaidis

Worcester Polytechnic Institute, Worcester, MA — May 2019
B.S., Computer Science and *B.Eng.* Robotics Engineering — *GPA*: 3.95
Advisors: Charles Rich, Loris Fichera, and Cagdas Onal

PUBLICATIONS

Nathaniel Dennler, Changxiao Ruan, Jessica Hadiwijoyo, Brenna Chen, Stefanos Nikolaidis, and Maja Matarić. Using Design Metaphors to Understand User Expectations of Socially Interactive Robot Embodiments. Transactions on Human-Robot Interaction (THRI), 2022.

Nathaniel Dennler, Eura Shin, Maja Matarić, and Stefanos Nikolaidis. Design and Evaluation of a Hair Combing System Using a General-Purpose Robotic Arm. 2021 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS).

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. 2021 30th IEEE International Conference on Robot and Human Interactive Communication (ROMAN).

Nathaniel Dennler, Matthew LeMay, and Toby Macaluso. Mobile Manipulation through Tactile Sensing (Undergraduate Thesis). *B.S. Computer Science and B.Eng. Robotics Engineering, Worcester Polytechnic Institute, Department of Computer Science*, 2019.

Nathaniel Dennler. Implications of Self-Determination Theory on Student Performance (Undergraduate Thesis). *B.S. Computer Science and B.Eng. Robotics Engineering, Worcester Polytechnic Institute, Department of Computer Science*, 2018.

PRESENTATIONS

"Robot-Assisted Hair Combing," — December 2019
demoed at **NeurIPS 2019** Demo Track in Vancouver, Canada.

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

"Mobile Manipulation through Tactile Sensing," — October 2018
presented at **MIT Lincoln Labs** in Lexington, MA.

"Expression Salience in Socially Assistive Robots," — July 2018
presented at the **Southern California REU Conference** in Los Angeles, CA

GRANTS

Amazon Research Award — Sept. 2022 - Aug. 2023
Project Title: "Learning User Preferences for In-Home Robots Through In Situ Augmented Reality" (*total $100,000*)

RESEARCH EXPERIENCE

USC ICAROS Lab
Ph.D. Candidate, *Advisor: Stefanos Nikolaidis* — August 2019 - Present

1. Currently working on modeling user behavior when specifying their preferences for robot behaviors in an inverse reinforcement learning context.
2. Implemented an impedance controller to follow trajectories in task space without exerting excessive forces on users.
3. Developed a system for robotic hair combing for users with limited mobility by designing a trajectory planning algorithm that generates comb trajectories through hair from a single click.

USC Interaction Lab
Ph.D. Candidate, *Advisor: Maja Matarić* August 2019 - Present

1. Currently working on designing games in collaboration with Occupational Therapists to supplement stroke rehabilitation activities with robotic partners.
2. Performed a large-scale user study to evaluate the impact that clothing, voice, and task have on the perception of robot gender. Performed qualitative thematic analysis and statistical analysis to inform the design of clothing and voice in robot systems as it relates to robot gender construction.
3. Created and assembled a dataset of 165 different robot embodiments and coded these embodiments with respect to low-level design features and design metaphors. Conducted a large-scale user study to quantify functional and social perceptions of these robots, and how these perceptions relate to the design metaphors and design features of the robot.
4. Learned user dynamics in a number guessing game for participants with cerebral palsy practicing orthosis use to allow robots to select social feedback actions that maintain user engagement throughout the game.

MIT Lincoln Labs
Tactile Sensing and Mobile Manipulation August 2018 - December 2018
Undergraduate Researcher, *Advisor: William R. Michalson*

1. Developed a controller to perform fine manipulation of plugging in a USB device with tactile feedback.
2. Optimized a vision based tactile sensor based on GelSight to reduce costs, manufacturing time, while also increasing modularity. The production time of each device decreased from 3 days to 6 hours.

USC Interaction Lab
Expression Salience in Socially Assistive Robots May 2018 - August 2018
Undergraduate Researcher, *Advisor: Kate Swift-Spong*

1. Designed a screen-based robot face for use in social robots. The face automatically synchronizes mouth movement and speech to arbitrary generated text.

ASSISTments Lab
Undergraduate Researcher, *Advisor: Korinn Ostrow* August 2017 - May 2018

1. Developed six randomized controlled trials for deployment with middle school students across the east coast for learning math skills.

TEACHING EXPERIENCE

University of Southern California
Teaching Assistant
CSCI 566: Deep Learning and Its Applications Spring 2022
CSCI 445: Robotics Fall 2021

Worcester Polytechnic Institute
Teaching Assistant
RBE 3002: Unified Robotics IV: Mapping and State Estimation Fall 2018, Spring 2019
RBE 3001: Unified Robotics III: Kinematics and Dynamics Fall 2018, Spring 2019

INDUSTRY EXPERIENCE

Uber
Consumer Incentives Intern, *San Francisco, CA* June 2022 - August 2022

1. Personalized promos to different users based on behavioral interactions with the platform.
2. Generated heterogeneous promo assignment policies that increased key performance metrics compared to homogeneous promo assignments.

iRobot
Navigation Systems Intern, *Bedford, MA* May 2019 - August 2019

1. Developed a web-based animation interface to allow users to preview and customize robot behaviors for execution on iRobot products.
2. Prototyped and demonstrated a robot for waste disposal that provided real time feedback of household waste production, *winning the intern design competition.*
3. Contributed to iRobot's navigation stack and performed code reviews.

MENTORSHIP EXPERIENCE

Undergraduate Students (12)

Erica De Guzmann, stroke therapy game development.	Jan 2022 - Present
Ashley Perez, stroke therapy game development.	Jan 2022 - Present
Claudia Chiu, User input modeling for reward learning.	Feb 2021 - Present
Brenna Chen, stroke therapy game development.	Feb 2021 - Present
Jessica Hadiwijoyo, voice personalization study	Oct 2019 - May 2022
Lia Vargas (REU), visualizing user expectations of robots.	May 2021 - Aug 2021
Yenessa Maldonado (SURE), designing robots in AR/VR.	May 2021 - Aug 2021
Sophia Hager (DREU), controllable text generation.	May 2021 - Aug 2021
Changxiao Ruan, web deployment and coding for embodiments.	Oct 2019 - May 2020
Hanzo Huang, animation platform for facial expressions.	Oct 2019 - May 2019
Yunhao Zhao, parameterized social robot facial movements.	Oct 2019 - Dec 2019
Kangmin Tan, on-the-fly text to speech for social robot faces.	Oct 2019 - Dec 2019

SERVICE

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)

South LA Robotics
Coding Club Instructor, *Los Angeles, CA* November 2021 - Present

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

Alpha Phi Omega at Worcester Polytechnic Institute
Merit Badge University Director, *Worcester, MA* May 2018 - April 2019
Service Vice President, *Worcester, MA* January 2018 - May 2018

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

AWARDS

Salisbury Award, for outstanding impact on the WPI community — April 2019
NSF Graduate Research Fellow — April 2019
Program of the Year, for excellence in planning Merit Badge University — April 2019
Distinguished Service Key, highest award for service in Alpha Phi Omega — April 2019
USC Annenberg Fellow — February 2019
U.S. Challenge Skate Pairs Champion — October 2017
Charles O. Thompson Scholar, for outstanding academic performance — March 2016
AP Scholar with Distinction — July 2014, July 2015
National Chemistry Olympiad Semi-Finalist — April 2015
US Figure Skating National Silver Medalist, for Intermediate Pairs — January 2015

TECHNICAL SKILLS

Languages: Python, Javascript, C/C++, C#, MATLAB, Bash, LaTeX.
Frameworks: ROS, MoveIt, PyTorch, scikit-learn, OpenCV, MediaPipe, Huggingface
Robots/Hardware: Kinova JACO2 Arm, QTRobot, Quori, Turtlebot, Realsense Depth Camera, Kinect v2 Depth Camera, OpenCV AI Kit
Data Collection: Amazon Mechanical Turk, Study Design, Statistical Analysis, Usability Studies, Qualitative Analysis
Other skills: Linux/Unix Shell, GIT version control.