Ellen R. Novoseller (formerly Ellen R. Feldman)

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EMPLOYMENT

Postdoctoral Fellow May 2022 – present
DEVCOM Army Research Laboratory
Mentor: Nicholas Waytowich

Postdoctoral Scholar Jan. 2021 – Mar. 2022
University of California, Berkeley
Mentor: Ken Goldberg

EDUCATION

California Institute of Technology Aug. 2014 – Dec. 2020
PhD in Control and Dynamical Systems; GPA: 3.9
Dissertation: *Online Learning from Human Feedback with Applications to Exoskeleton Gait Optimization*
Advisors: Joel W. Burdick and Yisong Yue

University of Southern California (USC) Aug. 2010 – May 2014
B. S. in Electrical Engineering, *Summa cum laude*; GPA: 3.99
Concentration in signal processing, minor in mathematics

SELECTED RESEARCH EXPERIENCE

Postdoctoral Fellow Army Research Laboratory, May 2022 – present
Mentor: Nicholas Waytowich

- Researching human-guided learning to leverage human feedback and intuition in open-ended learning settings and multi-agent systems

Postdoctoral Researcher University of California, Berkeley, Jan. 2021 – Mar. 2022
Mentor: Ken Goldberg AUTOLAB

- Researched robot learning and manipulation, including algorithms for sim-to-real transfer, human-in-the-loop learning, and manipulating deformable objects such as cables and fabric

Graduate Research Assistant California Institute of Technology, Aug. 2014 – Dec. 2020
Advisors: Joel W. Burdick and Yisong Yue

- Conducted projects on preference-based bandit and reinforcement learning, including developing theory and learning personalized walking gaits for a robotic exoskeleton
- Modeled electrical stimulation of the spinal cord, a therapy for spinal cord injury, to identify critical features of the stimulation for patient standing

Summer NSF CSMR REU program Johns Hopkins University, May 2013 – Aug. 2013
Supervisors: Russell Taylor and Berk Gonenc

- Project: *Development and Evaluation of MICRON: A Robotic System for Retinal Microsurgery*
- Evaluated design options for a microforceps tool for a retinal microsurgical robotic system, wrote C++ code to control the microforceps system, and developed methodology to evaluate robot performance based on statistics and signal processing

PUBLICATIONS

Refereed Conference Proceedings

- Lawrence Yunliang Chen*, Huang Huang*, Ellen Novoseller, Daniel Seita, Jeffrey Ichnowski, Michael Laskey, Richard Cheng, Thomas Kollar, and Ken Goldberg, "Efficiently Learning Single-Arm Fling Motions to Smooth Garments," to appear in the *International Symposium on Robotics Research (ISRR)*, 2022.
- Vainavi Viswanath*, Kaushik Shivakumar*, Justin Kerr*, Brijen Thananjeyan, Ellen Novoseller, Jeffrey Ichnowski, Alejandro Escontrela, Michael Laskey, Joseph E. Gonzalez, and Ken Goldberg, "Autonomously Untangling Long Cables," *Conference on Robotics: Science and Systems (RSS)*, 2022.

  Received the **Best Systems Paper Award**.
- Satvik Sharma*, Ellen Novoseller*, Vainavi Viswanath, Zaynah Javed, Rishi Parikh, Ryan Hoque, Daniel S. Brown, Ashwin Balakrishna, and Ken Goldberg, "Learning Switching Criteria for Sim2Real Transfer of Robotic Fabric Manipulation Policies," *IEEE International Conference on Automation Science and Engineering (CASE)*, 2022.
- Ryan Hoque, Ashwin Balakrishna, Ellen Novoseller, Albert Wilcox, Daniel S. Brown, Ken Goldberg, "ThriftyDAgger: Budget-Aware Novelty and Risk Gating for Interactive Imitation Learning," *Conference on Robot Learning (CoRL)*, 2021.
- Ryan Hoque, Ashwin Balakrishna, Carl Putterman, Michael Luo, Daniel S. Brown, Daniel Seita, Brijen Thananjeyan, Ellen Novoseller, Ken Goldberg. "LazyDAgger: Reducing Context Switching in Interactive Imitation Learning," *IEEE International Conference on Automation Science and Engineering (CASE)*, 2021.
- Vainavi Viswanath*, Jennifer Grannen*, Priya Sundaresan*, Brijen Thananjeyan, Ashwin Balakrishna, Ellen Novoseller, Jeff Ichnowski, Minho Hwang, Michael Laskey, Joseph E. Gonzalez, Ken Goldberg. "Disentangling Dense Multi-Cable Knots," *IEEE International Conference on Intelligent Robots and Systems (IROS)*, 2021.
- Priya Sundaresan*, Jennifer Grannen*, Brijen Thananjeyan, Ashwin Balakrishna, Jeff Ichnowski, Ellen Novoseller, Minho Hwang, Michael Laskey, Joseph E. Gonzalez, Ken Goldberg. "Untangling Dense Non-Planar Knots by Learning Manipulation Features and Recovery Policies," *Conference on Robotics: Science and Systems (RSS)*, 2021.
- Kejun Li, Maegan Tucker, Erdem Bıyık, Ellen Novoseller, Joel W. Burdick, Yanan Sui, Dorsa Sadigh, Yisong Yue, Aaron D. Ames, "ROIAL: Region of Interest Active Learning for

Characterizing Exoskeleton Gait Preference Landscapes," *IEEE International Conference on Robotics and Automation (ICRA)*, 2021.

- Maegan Tucker, Myra Cheng, Ellen Novoseller, Richard Cheng, Yisong Yue, Joel W. Burdick, Aaron D. Ames, "Human Preference-Based Learning for High-Dimensional Optimization of Exoskeleton Walking Gaits," *IEEE International Conference on Intelligent Robots and Systems (IROS)*, 2020.
- Ellen Novoseller, Yibing Wei, Yanan Sui, Yisong Yue, Joel W. Burdick, "Dueling Posterior Sampling for Preference-Based Reinforcement Learning," *Conference on Uncertainty in Artificial Intelligence (UAI)*, 2020.
- Maegan Tucker*, Ellen Novoseller*, Claudia Kann, Yanan Sui, Yisong Yue, Joel W. Burdick, Aaron D. Ames, "Preference-Based Learning for Exoskeleton Gait Optimization," *IEEE International Conference on Robotics and Automation (ICRA)*, 2020.

  Received the **Best Paper Award** and **Best Paper in Human-Robot Interaction Award**.
- Ellen Feldman, Joel W. Burdick, "Modeling Motor Responses of Paraplegics under Epidural Spinal Cord Stimulation," *IEEE International Conference on Neural Engineering (NER)*, 2017.
- Berk Gonenc, Ellen Feldman, Peter Gehlbach, James Handa, Russell H. Taylor, Iulian Iordachita, "Towards Robot-Assisted Vitreoretinal Surgery: Force-Sensing Micro-Forceps Integrated with a Handheld Micromanipulator," *IEEE International Conference on Robotics and Automation (ICRA)*, 2014.

Workshop Proceedings

- Myra Cheng, Ellen Novoseller, Maegan Tucker, Richard Cheng, Joel W. Burdick, Yisong Yue, "Preference-Based Bayesian Optimization in High Dimensions with Human Feedback," *Workshop on Real World Experiment Design and Active Learning at the International Conference on Machine Learning (ICML)*, 2020.
- Ellen Novoseller, Yanan Sui, Yisong Yue, Joel W. Burdick, "Dueling Posterior Sampling for Preference-Based Reinforcement Learning," *Workshop on Real-world Sequential Decision Making: Reinforcement Learning and Beyond at the International Conference on Machine Learning (ICML)*, 2019.

AWARDS AND PROFESSIONAL ACTIVITIES

- Paper awards: Best Systems Paper at the Conference on Robotics: Science and Systems (RSS) for "Autonomously Untangling Long Cables," 6/2022; Best Paper and Best Paper in Human-Robot Interaction at the IEEE International Conference on Robotics and Automation (ICRA) for "Preference-Based Learning for Exoskeleton Gait Optimization," 5/2020.
- Wonderfest Science Envoy: program in science communication with workshops on topics such as public speaking, teaching, and improvisation, 2021.
- Computing Innovation Fellow, 2020

- Microsoft Graduate Teaching in CMS Award (Caltech CMS departmental award), 5/2018
- Excellent TA award, Winter 2018 (award from the Caltech Registrar's Office)
- 2017 Amazon Graduate Fellowship
- National Science Foundation Graduate Research Fellowship, 2014 – 2017
- USC graduation awards, 4/2014: Emma Josephine Bradley Bovard Graduation Award; Philip S. Biegler Memorial Award for Outstanding Achievement in Electrical Engineering
- Professional and Honor Societies: Institute of Electrical and Electronics Engineers (IEEE), Society of Women Engineers (SWE), Women in Robotics, Tau Beta Pi (Engineering Honor Society); Eta Kappa Nu (Electrical and Computer Engineering Honor Society); Alpha Lambda Delta

INVITED TALKS

- "Online Learning from Human Preference Feedback with Application to Assistive Exoskeletons", Data Science, Statistics & Visualisation (DSSV) and the European Conference on Data Analysis (ECDA) joint virtual conference, session on "Preference-Based Reinforcement Learning," 7/9/2021.

TEACHING EXPERIENCE

- Head Teaching Assistant for Machine Learning and Data Mining (CS 155), Winter 2018, Caltech
- Teaching Assistant for Introduction to Robotics (ME 133a), Fall 2017, Caltech
- Completed a quarter-long course on "University Teaching and Learning in STEM," Fall 2017

ACADEMIC SERVICE

- Reviewing: IROS 2022, 2021; RAL (ICRA option) 2022; ICRA 2022, 2021; NSF panelist, 2021; NeurIPS Workshop on Safe and Robust Control of Uncertain Systems, 2021; CoRL 2020; Women in Machine Learning Workshop 2019, 2017
- Seminar committees: CITRIS People and Robots seminar at UC Berkeley, 8/2021 – 3/2022; Berkeley AI Research seminar, 8/2021 – 12/2021; Caltech Computing and Mathematical Sciences Colloquium, 5/2016 – 5/2017. Responsibilities include proposing, inviting, and hosting speakers.
- PhD Admissions: Berkeley AI Research, 12/2021; Caltech CMS Department, 12/2018, 12/2019
- Member of the Computing and Mathematical Sciences Graduate Student Council, Caltech, 10/2018 – 10/2020
- Volunteer at Caltech's AI for Science initiative office hours, 10/2019 – 3/2020
- Mentored 20+ PhD, Master's, undergraduate, and high school students on projects in machine learning and robotics, e.g. reinforcement learning and human-in-the-loop learning

OUTREACH

- Mentoring women and underrepresented minorities in engineering: Society of Women Engineers (SWE) Mentor Network, 6/2021 – present; Berkeley AI Research Undergraduate Mentoring Program, 9/2021 – 3/2022; Project Advance, organized by Women in Robotics, summer 2021
- Presented on online machine learning for robotics in: Wonderfest public lecture, "Ask a Science Envoy: Robot Learning and Toad Navigation," 4/27/2022; STEMinist Club at Berkeley High School, 10/27/2021
- Co-organized two workshops for undergraduate women on "How to Get Involved in Research," co-hosted by Ken Goldberg's AUTOLAB and UC Berkeley's chapter of the Society of Women Engineers (SWE), 2/2/2022 and 9/1/2021
- Presented on "Treating Spinal Cord Injury via Electrical Spinal Cord Stimulation": Introduce a Girl to Engineering Day, Caltech Society of Women in Engineering Event, 2/21/20; USC Biomedical Device Design Team, 3/19/18; Caltech undergraduate computer science seminar class (CS 9), 10/4/2017; W.V.T. Rusch Undergraduate Engineering Honors Colloquium, USC, invited talk, 9/8/2017
- Helped to develop lecture notes for an introductory machine learning course that was piloted at Pasadena City College in Spring 2019; delivered a guest lecture on decision trees
- Presented on "Artificial Intelligence for Spinal Cord Therapy," Leadership Pasadena workshop, 3/1/19
- Presented on "Reinforcement Learning for Treating Spinal Cord Injury," DataTalk series at UC Santa Barbara, organized by the UCSB Data Science Club, 5/2/19
- Delivered keynote talk, "My Journey Toward Spinal Cord Therapy and Machine Learning," Pasadena Girl Scout Robotics Expo, 4/6/19
- Presented in the TEDx Pasadena Salon "Her Path to Engineering," aimed at inspiring women to choose STEM disciplines, 7/14/18
- Volunteered at Tech Savvy (a STEM program for 6^{th}-9^{th} grade girls), co-running a workshop entitled "Coding Virtual Reality Environments," 4/14/18
- Volunteered at science nights, engaging students in origami and math puzzles: Alverno Heights Academy (12/4/18), the Pasadena Public Library (3/9/18), Washington Elementary School (9/28/17)
- Volunteered at the Science Olympiad Los Angeles Regionals, 3/3/18