

Sarah Dean

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- RESEARCH INTERESTS** *I study the interplay between optimization, machine learning, and dynamics in real-world systems with the goal of developing principled data-driven methods for control and decision-making. My work can be broadly categorized into two thrusts: **guaranteeing safety in feedback control** and **ensuring values in social-digital systems**. My research is grounded in collaborative projects in robotics, recommendation systems, and developmental economics.*
- EDUCATION**
- University of California, Berkeley**
Ph.D. candidate, Electrical Engineering and Computer Science, May 2021 (expected).
M.S., Electrical Engineering and Computer Science, May 2019.
Advised by Prof. Benjamin Recht.
- University of Pennsylvania**
B.S.E., Electrical Engineering and Mathematics, May 2016.
- HONORS AND AWARDS**
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|---|------|
| Best Paper Finalist, <i>Conference on Robot Learning</i> | 2020 |
| Best Paper Award, <i>NeurIPS Joint Workshop on AI for Social Good</i> | 2019 |
| Best Paper Award, <i>International Conference of Machine Learning</i> | 2018 |
| Best Student Paper in Imaging Systems, <i>OSA Imaging Applied Optics Congress</i> | 2018 |
| Tong Leong Lim Pre-Doctoral Prize, <i>UC Berkeley EECS Department</i> | 2018 |
| Atwater Kent Prize in Electrical Engineering, <i>University of Pennsylvania</i> | 2016 |
| Albert P. Godsho Engineering Prize, <i>University of Pennsylvania</i> | 2016 |
| Hugo Otto Wolf Memorial Prize, <i>University of Pennsylvania</i> | 2016 |
| E. Stuart Eichert, Jr. Memorial Prize for Electrical Engineering, <i>UPenn</i> | 2015 |
| Good Teaching Award, <i>UPenn Math Department</i> | 2015 |
- GRANTS AND FELLOWSHIPS**
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| Center for Longterm Cybersecurity Project Grant, <i>UC Berkeley</i> | 2020 |
| Social Science Matrix Research Grant, <i>UC Berkeley</i> | 2019 |
| Center for Longterm Cybersecurity Seed Grant, <i>UC Berkeley</i> | 2019 |
| NSF Graduate Research Fellowship | 2016 |
| Berkeley Fellowship, <i>UC Berkeley</i> | 2016 |
| Tau Beta Pi Fellowship | 2016 |
- TEACHING**
- Graduate Student Instructor**, *University of California, Berkeley EECS Department.*
- EECS Anti-Racism and Social Justice Course Development, Fall 2020.
 - Statistical Learning Theory, Fall 2019.
 - Introduction to Machine Learning, Fall 2018.
- Teaching Assistant**, *John's Hopkins Center for Talented Youth at Skidmore College.*
- Electrical Engineering. Summer 2016.
- Teaching Assistant**, *University of Pennsylvania ESE Department.*
- Digital Audio Basics. Spring 2014, 2016.
 - Introduction to Electrical and Systems Engineering. Fall 2013, 2014, 2015.
- Teaching Assistant**, *University of Pennsylvania Math Department.*
- Integral Calculus. Spring 2016.
 - Multivariate Calculus. Fall 2014, Spring 2015.
- Tutor**, *University of Pennsylvania.*
- Multivariate Calculus. Spring 2013, Fall 2013, Spring 2014.
 - Linear Algebra and Differential Equations. Fall 2013, Spring 2014.
- INTERNSHIPS**
- Research Intern at Canopy, Summer 2019.
Explored concepts relating to user agency within a closed-loop recommender system and developed a computationally efficient audit of model "reachability."

Infrastructure Quality Engineer Intern at Palantir, Summer 2015.

Created a relevant automated test suite for Nexus Peering, a data sharing technology. Tested and wrote regression tests for a front end web form product.

SERVICE AND LEADERSHIP

Conference reviewer for ACC, CDC, ICML, ITCS, L4DC, and NeurIPS. **Journal reviewer** for IEEE-TAC, JMLR, and Springer Machine Learning.

Co-founder of Graduates for Engaged and Extended Scholarship in Computing and Engineering (geesegraduates.org), a cross-disciplinary group that aims to give graduate students a constructive place to reflect on issues of society and technology and **organizer** of affiliated panel and speaker events.

Women in Computer Science and Engineering lunch coordinator, 2018. **WITI@UC Women in Tech Symposium** planning committee, 2019.

Volunteer mentor for students in elementary school (Bay Area Scientists in Schools, 2017), middle school (Be A Scientist, 2016), high school (CalMentors, 2020), and college (BAIR Undergraduate Mentoring Program, 2017).

PUBLICATIONS

PREPRINTS

1. *Towards Robust Data-Driven Control Synthesis for Nonlinear Systems with Actuation Uncertainty.*
Andrew J. Taylor, Victor D. Dorobantu, Sarah Dean, Benjamin Recht, Yisong Yue, and Aaron D. Ames.
2. *Do Offline Metrics Predict Online Performance in Recommender Systems?* arXiv:2011.07931.
Karl Krauth, Sarah Dean, Alex Zhao, Wenshuo Guo, Mihaela Curmei, Benjamin Recht, and Michael I. Jordan.
3. *Certainty-Equivalent Perception-Based Control.* arXiv:2008.12332.
Sarah Dean and Benjamin Recht.

JOURNAL ARTICLES

1. *High-throughput fluorescence microscopy using multi-frame motion deblurring.*
Biomedical Optics Express, 2020.
Zachary Phillips, Sarah Dean, Laura Waller, and Benjamin Recht.
2. *On the Sample Complexity of the Linear Quadratic Regulator.*
Foundations of Computational Mathematics, 2019.
Sarah Dean, Horia Mania, Nikolai Matni, Benjamin Recht, and Stephen Tu.

CONFERENCE PAPERS

1. *AI Development for the Public Interest: From Abstraction Traps to Sociotechnical Risks.*
IEEE International Symposium on Technology and Society (ISTAS), 2020.
McKane Andrus, Sarah Dean, Thomas Krendl Gilbert, Nathan Lambert, and Tom Zick.
2. *Guaranteeing Safety of Learned Perception Modules via Measurement-Robust Control Barrier Functions.*
Conference on Robot Learning (CoRL), 2020.
Sarah Dean, Andrew Taylor, Ryan Cosner, Benjamin Recht, and Aaron Ames.
3. *Balancing Competing Objectives with Noisy Data: Score-Based Classifiers for Welfare-Aware Machine Learning.*
International Conference on Machine Learning (ICML), 2020.
Esther Rolf, Max Simchowitz, Sarah Dean, Lydia T. Liu, Daniel Bjorkegren, Moritz Hardt, and Joshua Blumensstock.
4. *Robust Guarantees for Perception-Based Control.*
Learning for Dynamics and Control (L4DC), 2020.
Sarah Dean, Nikolai Matni, Benjamin Recht, and Vickie Ye.
5. *Recommendations and User Agency: The Reachability of Collaboratively-Filtered Information.*
Conference on Fairness, Accountability, and Transparency (FAccT), 2020.
Sarah Dean, Sarah Rich, and Benjamin Recht.
6. *Safely Learning to Control the Constrained Linear Quadratic Regulator.*
American Controls Conference (ACC), 2019.
Sarah Dean, Stephen Tu, Nikolai Matni, and Benjamin Recht.

7. *Regret Bounds for Robust Adaptive Control of the Linear Quadratic Regulator*. Advances in Neural Information Processing Systems (NeurIPS), 2018. Sarah Dean, Horia Mania, Nikolai Matni, Benjamin Recht, and Stephen Tu.
8. *Delayed Impact of Fair Machine Learning*. International Conference on Machine Learning (ICML), 2018. Lydia T. Liu, Sarah Dean, Esther Rolf, Max Simchowitz, and Moritz Hardt.

WORKSHOP PAPERS

1. *Designing Recommender Systems with Reachability in Mind*. Participatory Approaches to Machine Learning Workshop at ICML 2020. Sarah Dean, Mihaela Curmei, and Benjamin Recht.
2. *Balancing Competing Objectives for Welfare-Aware Machine Learning with Imperfect Data*. AI for Social Good Workshop at NeurIPS 2019. Esther Rolf, Max Simchowitz, Sarah Dean, Lydia T. Liu, Daniel BJORKEGREN, Moritz Hardt, and Joshua Blumenstock.
3. *Optimal Path and Illumination Design for Multiframe Motion Deblurring*. OSA Imaging and Applied Optics Congress 2018. Sarah Dean, Zachary Phillips, Laura Waller, and Benjamin Recht.
4. *A Broader View on Bias in Automated Decision-Making: Reflecting on Epistemology and Dynamics*. Workshop on fairness, accountability, and transparency in machine learning. (FAT/ML), 2018. Roel Dobbe, Sarah Dean, Thomas Gilbert, and Nitin Kohli.

INVITED TALKS

- RL Theory Virtual Seminar, *On the Sample Complexity of the Linear Quadratic Regulator*, May 2020.
- Stanford Robotics and Autonomous Systems Seminar, *Safe and Robust Perception-Based Control*, February 2020.
- CDS Seminar at California Institute of Technology, *Safe and Robust Perception-Based Control*, February 2020.
- Sister Conferences Track at the International Joint Conferences on Artificial Intelligence, *Delayed Impact of Fair Machine Learning*, August 2019.
- Interplay between Control, Optimization, and Machine Learning Workshop at the American Controls Conference, *Guarantees for Learning-Enabled Control*, July 2019.
- CITRIS/CPAR Control Theory and Automation Symposium, *Safely Learning to Control the Linear Quadratic Regulator*, April 2019.

REFERENCES

1. Ben Recht
Associate Professor, Electrical Engineering and Computer Sciences, UC Berkeley
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2. Moritz Hardt
Assistant Professor, Electrical Engineering and Computer Sciences, UC Berkeley
hardt@berkeley.edu
3. Francesco Borrelli
Professor, Mechanical Engineering, UC Berkeley
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4. Nikolai Matni
Assistant Professor, Electrical and Systems Engineering, University of Pennsylvania
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