

Samuel Pfrommer

(203) 570 4563

[in](#) samfrommer

✉ sam.pfrommer@berkeley.edu

sam.pfrommer.us

Education

University of California, Berkeley, Berkeley, CA.

Aug '21–Present

- PhD student — Department of Electrical Engineering and Computer Sciences

University of Pennsylvania, Philadelphia, PA.

Aug '17–May '21

- BSE Computer Science (second major Mathematics) — School of Engineering and Applied Science

Work Experience

Machine Learning Researcher, *University of California, Berkeley*, Berkeley, CA.

Aug '21–Present

- Conduct research on robust machine learning, reinforcement learning, and controls

Graph Neural Networks Researcher, *University of Pennsylvania*, Philadelphia, PA.

May '20–July '21

- Developed a notion of discriminability for graph learning architectures (advised by Prof. Alejandro Ribeiro)
- Theoretically analyzed discriminability impact of nonlinearities in graph neural networks (GNNs)
- Derived practically satisfied filter conditions for GNNs to be more discriminative than plain graph filters
- Examined impact of underlying graph support error on discriminative bounds

Robotic Manipulation Researcher, *University of Pennsylvania*, Philadelphia, PA.

May '19–May '20

- Conducted research on learning contact dynamics for robotic manipulation (advised by Prof. Michael Posa)
- Combined novel parameterization and loss function to yield over 10x data efficiency improvements w.r.t. baselines
- Developed 10,000-line codebase including method implementations and a 300-instance cloud deployment system
- Set up AprilTag-based tracking system for recording manipulation dataset with 750 tosses

CIS 160 and ESE 224 Teaching Assistant, *University of Pennsylvania*, Philadelphia, PA.

Aug '18–May '20

- TA'd for CIS 160 (proofs, combinatorics, probability, graph theory) and ESE 224 (signal processing)
- CIS 160 for 20 hours/wk from Aug '18 to Dec '18; ESE 224 for 10 hrs/wk from Feb '20 to May '20
- Taught recitations, held office hours, wrote homeworks, graded homeworks and exams

Digital Products Development Intern, *Porsche*, Weissach, BW, Germany.

May '18–Aug '18

- Analyzed large infotainment system datasets using Spark to facilitate data-driven development
- Built effective, management-tailored Qlik Sense BI dashboards with custom visualizations

Software Engineering Intern, *iRobot*, Pasadena, CA.

Jul '17–Aug '17

- Refactored large preexisting C++ computational geometry code base to add cleaner abstractions
- Developed an efficient algorithm for computing nested connected components with border detection

Robotics Intern, *Oregon State University Dynamic Robotics Lab*, Corvallis, OR.

Jun '16–Aug '16

- Implemented telemetry interface (transmitter and receiver) for new bipedal robot Cassie
- Wrote firmware software for and compared three candidate inertial measurement units (IMUs) for Cassie
 - Employed extended Kalman filter to compensate against gyro bias
 - Analyzed g-sensitivity bias effects using numerical function optimization techniques
 - Concluded with 14-page report detailing findings (saved over \$10k by recommending move to cheaper IMU)

Awards, honors, grants

- NSF Graduate Research Fellowships Program honorable mention
- INFORMS 2022 Data Mining Best Paper Competition Award runner up (Student Track)
- Student Travel Grand Award *IEEE Conference on Decision and Control* 2022
- Judge's choice award for senior design project Jazz-o-matic (2021)
- 3rd place overall Formula SAE Electric 2019 out of 30 electric teams from across Americas
 - 2nd place autocross event, 3rd place endurance event (most important events)
 - Served as team lead for vehicle dynamics and machining (see activities)
- Penn Undergraduate Research Mentoring Program grant 2019

Publications

- Pffrommer, S., Y. Bai, et al. (2023). "Initial State Interventions for Deconfounded Imitation Learning". In *62nd IEEE Conference on Decision and Control*. <http://arxiv.org/abs/2307.15980>.
- Anderson, B., S. Pffrommer, and S. Sojoudi (2023). "Tight Certified Robustness via Min-Max Representations of ReLU Neural Networks". In *62nd IEEE Conference on Decision and Control*. <https://brendon-anderson.github.io/files/publications/anderson2023tight.pdf>.
- Gautam, T., S. Pffrommer, and S. Sojoudi (2023). "Meta-Learning Parameterized First-Order Optimizers using Differentiable Convex Optimization". In *62nd IEEE Conference on Decision and Control*. <https://arxiv.org/abs/2303.16952>.
- Pffrommer, S., T. Gautam, et al. (2022). "Safe Reinforcement Learning with Chance-constrained Model Predictive Control". In *4th Learning for Dynamics and Control Conference*. <https://arxiv.org/abs/2112.13941>.
- Pffrommer, S. and S. Sojoudi (2022). "LQR Control with Sparse Adversarial Disturbances". In *61st IEEE Conference on Decision and Control*. <https://arxiv.org/abs/2209.10629>.
- Pffrommer, S., F. Gama, and A. Ribeiro (2021). "Discriminability of Single-Layer Graph Neural Networks". In *46th IEEE Int. Conf. on Acoustics, Speech and Signal Processing*. <https://arxiv.org/abs/2010.08847>.
- Pffrommer*, S., M. Halm*, and M. Posa (2020). "ContactNets: Learning Discontinuous Contact Dynamics with Smooth, Implicit Representations". In *4th Conference on Robot Learning*. <https://arxiv.org/abs/2009.11193>.

Presentations and workshops

- Anderson, B., S. Pffrommer, and S. Sojoudi (2022). "Towards Optimal Randomized Smoothing: A Semi-Infinite Linear Programming Approach". In *International Conference on Machine Learning, 1st Workshop on Formal Verification of Machine Learning*. <https://people.eecs.berkeley.edu/~sojoudi/wfvml2022.pdf>.
- Pffrommer*, S., M. Halm*, and M. Posa (2020). "Efficient Learning of Discontinuous Contact Dynamics with Smooth Parameterizations". In *Robotics: Science and Systems, Structured Approaches to Robot Learning Workshop*.
- Pffrommer, S. (2017). "Key Control Strategies Emerge in Spring Loaded Inverted Pendulum Traversal of Slippery Terrain". In *Dynamic Walking*.

Preprints

- Pffrommer, S., B. Anderson, and S. Sojoudi (2022). "Projected Randomized Smoothing for Certified Adversarial Robustness". In *Under Review*. <https://people.eecs.berkeley.edu/~sojoudi/pffrommer2022projected.pdf>.
- Pffrommer, S., B. Anderson, and S. Sojoudi (2022). "Asymmetric Certified Robustness via Feature-Convex Neural Networks". In *Under Review*. <https://brendon-anderson.github.io/files/publications/pffrommer2022asymmetric.pdf>.

Professional service

- o Session chair for *5th NorCal Control Workshop*
- o Invited reviewer, *International Conference on Machine Learning*
- o Invited reviewer, *Conference on Neural Information Processing Systems*
- o Invited reviewer, *IEEE Conference on Decision and Control*
- o Session chair for at the *61st IEEE Conference on Decision and Control*
- o Session chair for *Safety and Robustness in Machine Learning* at the *INFORMS 2022 Annual Meeting*
- o Session chair for the *Artificial Intelligence Flash Session* at the *INFORMS 2022 Annual Meeting*
- o Berkeley EECS 2022 social chair, treasurer

Skills

Programming languages: Python, C/C++, Java, MATLAB, Haskell

Software: PyTorch, Google Cloud Platform, Qlik Sense, Spark, ROS, Git, Vim, Linux, L^AT_EX

Robotics: manipulation, legged locomotion, numerical trajectory optimization, embedded systems development

Manufacturing: SOLIDWORKS, OnShape, metals machining, basic composites and woodworking

Languages: English (native), German (professional proficiency), Spanish (intermediate)

Activities

Vehicle Dynamics Lead and Machining Lead, *Penn Electric Racing.*

Aug '18–May '20

- Headed development of 8,000 line in-house vehicle dynamics simulator for optimizing design tradeoffs
- Coordinated machining for several hundred car parts, responsibilities included reviewing drawings, managing manufacturing timelines and permits, and assigning work to appropriate team members
- Mentored onboarding / training projects for new members