

Daniel Pfrommer

dpfrom@mit.edu | (203) 570-4568 | [linkedin/in/dpfrom](https://www.linkedin.com/in/dpfrom) | [github/pfrommerd](https://github.com/pfrommerd) | dan.pfrommer.us

EDUCATION

- Massachusetts Institute of Technology**, 5.00/5.00 GPA, Cambridge, MA Sep 2022-Present
- 3rd Year PhD Student – Department of Electrical Engineering and Computer Science
 - Researching Machine Learning and Control Theory, advised by Professor Ali Jadbabaie
- University of Pennsylvania**, 3.98/4.00 GPA, Philadelphia, PA Aug 2018-May 2022
- BSE Computer Science, additional major in Mathematics
- Darien High School**, 4.00/4.00 GPA, Salutatorian, Darien, CT Aug 2014-May 2018

EXPERIENCE

- Machine Learning Phd Student**, MIT, Cambridge, MA Sept 2022-Present
- Studying control theory and generalization for diffusion models, advised by Professor Ali Jadbabaie. This includes both (1) control theory for understanding generative models and optimization as well as (2) theory and novel algorithm development for using generative models in controls tasks. See publication list below.
- Machine Learning for Control Researcher**, University of Pennsylvania, Philadelphia, PA Dec 2020-Jun 2022
- Devised novel algorithms for learning the latent state-space models of dynamical systems from video sequences, advised by Prof. Nikolai Matni.
 - Developed theoretical guarantees for imitation learning from completely offline data, resulting in a first-author NeurIPS conference paper as an undergraduate. Demonstrated significant performance gains across a wide range of simulated MuJoCo environments.
- CIS 261, CIS 190 Teaching Assistant**, University of Pennsylvania, Philadelphia, PA May 2020-Dec 2021
- TA'd for CIS 190: C++ Programming from Jan '20 to May '20
 - TA'd for CIS 261: Probability, Stochastic Processes, Statistical Inference from Sep '21 to Dec '21
 - Taught recitations, held office hours, and graded homeworks and projects
- Vehicle Systems Intern**, SpaceX, Hawthorne, CA May 2020-Aug 2020
- On team responsible for engine valve, StarShip battery production and tests.
- Driver Assist Software Research Intern**, Mercedes-Benz AG, Sindelfingen, Germany May 2019-Aug 2019
- Developed multi-sensor radar-lidar sensor fusion framework based on occupancy grids to handle dynamic scenes
 - Devised and implemented new algorithms for running massively parallel particle filters (on the order of millions of particles) with low-level CUDA code
 - Wrote custom highly templated C++ linear algebra library
- Intelligent Systems Group Intern**, Progeny Inc, Manassas, VA June 2018 – Aug 2018
- Wrote custom C++ neural network inference engine, designed for low-power and lightweight systems including:
 - CUDA and Intel MKL compute pipelines
 - Automatic multi-operation kernel fusion
 - Native Tensorboard logging support
 - Wrote performance profiler, complete with Qt-based UI, for the custom inference engine.

SKILLS

Programming Languages: Java, C++, Python, Javascript, Rust

Web Development: Vuejs/React, JavaScript, TypeScript, HTML/CSS

Other Technologies: Git, Protobuffers, Google Cloud Platform, Docker, OpenGL, CUDA, \LaTeX , DynamoDB

Robotics: ROS, embedded systems development, CAN, SPI, I2C.

Machine Learning: Pytorch, Tensorflow, Jax, Wandb

PUBLICATIONS

Reverse Chronological Order:

Daniel Pfrommer*, Swati Padmanabhan*, Kwangjun Ahn, Jack Umenberger, Tobia Marcucci, Zakaria Mhammedi, Ali Jadbabaie. "On the Sample Complexity of Imitation Learning for Smoothed Model Predictive Control." *To appear in Conference on Decision and Control* (2024). <https://arxiv.org/abs/2306.01914>.

(α - β) Adam Block, Ali Jadbabaie, **Daniel Pfrommer**, Max Simchowitz, Russ Tedrake. "Provable Guarantees for Generative Behavior Cloning: Bridging Low-Level Stability and High-Level Behavior" *Advances in Neural Information Processing Systems* 35 (2023). <https://arxiv.org/abs/2307.14619>.

Daniel Pfrommer*, Max Simchowitz*, Tyler Westenbroek, Nikolai Matni, Stephen Tu. "The Power of Learned Locally Linear Models for Nonlinear Policy Optimization." *International Conference on Machine Learning* (2023). <https://arxiv.org/abs/2305.09619>.

Daniel Pfrommer*, Thomas Zhang*, Stephen Tu, and Nikolai Matni. "TaSIL: Taylor Series Imitation Learning." *Advances in Neural Information Processing Systems* 34 (2022). <https://arxiv.org/abs/2205.14812>.

Unpublished Manuscripts:

Daniel Pfrommer*, Swati Padmanabhan*, Kwangjun Ahn, Jack Umenberger, Tobia Marcucci, Zakaria Mhammedi, Ali Jadbabaie. "Improved Sample Complexity of Imitation Learning for Barrier Model Predictive Control." *arXiv preprint* (2024). <https://arxiv.org/abs/2306.01914>.

Daniel Pfrommer, Nikolai Matni. "Linear variational state space filtering." *arXiv preprint* (2022). <https://arxiv.org/abs/2201.01353>.

PROJECTS

Atlas Build Language, a purely functional build tool

2021-Present

- In-development purely functional lazy language, with design inspired by Bazel, NixOS, Python, and Rust
- Pure Rust implementation, with core lambda calculus intermediate representation
- Unique language design including lazy evaluation, dynamic type checking, lazy module imports, and builtin caching mechanism.

Penn Electric Racing Software Lead, for Formula SAE electric race car team

2018-2022

- Architected and developed embedded C++ logging, telemetry, and multi-board communication system, comprising ~20k lines of code for Uart, CAN, and TCP based telemetry (including a VueJS-based frontend for graphing and streaming data)
- Personally mentored and onboarded 6 new members onto Penn Electric Racing's software team
- Wrote C++ UART/CAN-enabled bootloader for remotely flashing STM32 microcontrollers over multiple Uart/CAN network links

SELECT COURSEWORK

Graduate-level mathematics coursework:

Real Analysis (MATH 508/509, single and multivariate), Abstract Algebra (MATH 502/503)
Combinatorial Analysis (MATH 580), Differential Geometry (MATH 501)

Graduate-level engineering coursework:

Convex Optimization (ESE 605), Learning for Dynamics and Control (ESE 618),
Linear Systems (ESE 500), Nonlinear Systems (ESE 617),
Computer Networking (CIS 553), Algorithms for Inference (6.7810)

AWARDS, HONORS, AND GRANTS

- MathWorks EECS Fellowship (2024-2025)
- NSF GRFP Honorable Mention (2024)
- UPenn Center for Undergraduate Research & Fellowships grant (Summer 2021)
- PennApps Spring 2019 Hackathon 1st Place Award