Daniel Pfrommer

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EDUCATION

Massachusetts Institute of Technology, Cambridge, MA   Sep 2022-Present
- 1st Year PhD Student – Department of Electrical Engineering and Computer Science
- Researching Optimization 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 for Control Researcher, *University of Pennsylvania*, Philadelphia, PA   Dec 2020-Jun 2022
- Advised by Professor Nikolai Matni
- Devised a novel algorithm for learning latent state-space models of dynamical systems from images
- Developed theoretical guarantees for imitation learning, resulting in a first-author NeurIPS conference paper
- Wrote and debugged deep machine learning models using Jax, Pytorch, Tensorboard, and Wandb

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
- Used numerical ODE solvers to simulate large pressure systems for continuous-integration based verification of part testing routines
- Supported valve and battery production and streamlined the test automation software stack

Driver Assist Software Research Intern, *Daimler AG*, Sindelfingen, Germany   May 2019-Aug 2019
- Developed multi-sensor radar-lidar sensor fusion framework 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 from scratch.
  - Developed CUDA and Intel MKL compute pipelines
  - Supported automatic CPU-GPU data transfer, multi-operation kernel fusion
  - Implemented native Tensorboard logging support
- Wrote 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, Haiku

PREPRINTS

Pfrommer*, D., Zhang*, T. T., Tu, S., & Matni, N. (2022). "TaSIL: Taylor Series Imitation Learning." *Neurips 2022*. `https://arxiv.org/abs/2205.14812`.

Pfrommer, D., & Matni, N. (2022). Linear variational state space filtering. *arXiv preprint*. `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
- Ongoing independent research into formal operational semantics for language-level caching mechanisms as part of the core execution model
- Pure Rust implementation, with core lambda calculus intermediate representation, lazy VM design
- Unique language design including lazy evaluation with dynamic type checking, lazy module imports, and first-class incremental computation support

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

Insteon Terminal, a low-level Insteon home automation protocol toolkit   2015-2018

- Wrote Interactive shell for configuring Insteon Powerline Modem and Insteon Hub based home automation systems
- Support for dozens of different home automation devices. Was used as the primary test platform by others for the development of OpenHAB InsteonPLM automation bindings

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)

AWARDS, HONORS, AND GRANTS

- PennApps Spring 2019 Hackathon 1st Place Award for "Yeevisualizer" — a graph-based visualization for employee movement between different companies using data automatically scraped from LinkedIn
- UPenn Center for Undergraduate Research & Fellowships grant summer 2021
- Dean's List 2018-2019 (Suspended due to Covid 2019-2020, 2020-2021)