

Axel S. Feldmann

PHD STUDENT IN COMPUTER ARCHITECTURE

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Academic/Research

Massachusetts Institute of Technology – CSAIL

Cambridge, MA

PHD IN COMPUTER SCIENCE – COMPUTER ARCHITECTURE

2019-

- **Advisor:** Prof. Daniel Sanchez
- Working on *F1* [1], a flexible hardware accelerator for Fully Homomorphic Encryption (FHE)
 - FHE is a computationally expensive cryptographic system that enables arithmetic operations on encrypted data
 - Designed *F1*'s architecture based on a comprehensive analysis of the architectural characteristics of FHE
 - Developed scheduling algorithms for mapping FHE computations onto *F1*'s hardware
 - Evaluated *F1* on a variety of benchmarks showing gmean 5,400x speedups over CPU-based FHE implementations
- Coursework: Computer Architecture, Networks, Computer Vision, Distributed Algorithms
- GPA 5.0/5.0

Massachusetts Institute of Technology – CSAIL

Cambridge, MA

MS IN COMPUTER SCIENCE

2019-2021

- Thesis: Designing a Programmable Hardware Accelerator for Fully Homomorphic Encryption

Carnegie Mellon University - School of Computer Science

Pittsburgh, PA

B.Sc. IN COMPUTER SCIENCE

2015-2019

- Worked on *Livia* [2], a system architecture for data centric computing throughout the memory hierarchy
 - Worked in Prof. Nathan Beckmann's group
 - Created zsim-based simulation infrastructure to evaluate our proposed architecture
 - Designed *Livia*'s hardware-software interface
 - Evaluated our system on data intensive irregular applications obtaining 1.3-2.4x speedups over CPU baselines
- Served as a teaching assistant for Operating Systems (15-410) and Introduction to Computer Systems (15-213)
- Selected coursework: Operating Systems, Compilers, Parallel Computer Architecture, Programming Languages, Distributed Systems, Algorithms
- GPA 3.9/4.00

Industry Experience

NVIDIA

Santa Clara, CA

SOFTWARE ENGINEERING INTERN

Summer 2018

- Improved display driver performance for existing and upcoming Tegra SoCs
- Reduced kernel test time by 30% via improved thread synchronization

Yahoo – Flurry Analytics

Sunnyvale, CA

SOFTWARE ENGINEERING INTERN

Summer 2017

- Created webapp to help users design metrics API queries
- Re-engineered User Acquisition Analysis (UAA) features on the Flurry data platform

Publications

- [1] **Axel Feldmann***, Nikola Samardzic*, Aleksandar Krastev, Srini Devadas, Ron Dreslinski, Chris Peikert, and Daniel Sanchez. *F1: A fast and programmable accelerator for fully homomorphic encryption*. In *2021 54th Annual IEEE/ACM International Symposium on Microarchitecture (MICRO)*, 2021.
- [2] Elliot Lockerman, **Axel Feldmann**, Mohammad Bakhshalipour, Alexandru Stanescu, Shashwat Gupta, Daniel Sanchez, and Nathan Beckmann. *Livia: Data-centric computing throughout the memory hierarchy*. In *Proceedings of the Twenty-Fifth International Conference on Architectural Support for Programming Languages and Operating Systems*, 2020.

* authors contributed equally

Relevant Skills

Programming C++, C, Python, Rust, Java, x86/64 assembly
Tools Unix, Intel Pin, LLVM, Perf, PyTorch