

# Axel S. Feldmann

PHD STUDENT IN COMPUTER ARCHITECTURE

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## Academic/Research

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### Massachusetts Institute of Technology – CSAIL

Cambridge, MA

PHD IN COMPUTER SCIENCE – COMPUTER ARCHITECTURE

2019-

- **Advisor:** Prof. Daniel Sanchez
- Working on *F1* [2], 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

### Carnegie Mellon University - School of Computer Science

Pittsburgh, PA

B.SC. IN COMPUTER SCIENCE

2015-2019

- Worked on *Livia* [1], 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

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### 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

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- [1] 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.
- [2] **Axel Feldmann\***, Nikola Samardzic\*, Aleksandar Krastev, Srinu 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.

\* authors contributed equally

## Relevant Skills

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