Nikola Samardzic

US Citizen | phone: +1-857-244-5304 | mail: nsamar@csail.mit.edu | web: n-samar.github.io

EDUCATION

Massachusetts Institute of Technology   Boston, MA

Ph.D. Computer Science   Sept. 2020 – June 2024 (expected)

  - Advisor: Prof. Daniel Sanchez

M.Sc. Computer Science   Sept. 2020 – May 2022

  - Coursework: computer architecture, computer networking, machine learning, geometric computing.

University of California, Los Angeles   Los Angeles, CA

B.Sc. Computer Science   Sept. 2016 – June 2020

  - Research advisor: Prof. Jason Cong; GPA: 3.98/4.00 (Summa Cum Laude and Phi Beta Kappa)
  - Extensive math and theoretical computer science coursework

RESEARCH

Contributions:
  - Drove the design of an accelerator for computation on encrypted data that improve state-of-the-art performance by >1,000x. The specific cryptographic technique we use is called Fully Homomorphic Encryption (FHE).
  - Drove the design and implemented a compiler that automatically translates arbitrary PyTorch models into programs that run inference *on encrypted data*, targeting both CPUs and our accelerator.
  - In undergrad, I implemented the fastest sorting accelerator in the 4-60GB range, using FPGAs; I also worked with and published on High-Bandwidth Memory (HBM) and SmartSSDs.

Selected Publications:
  - **Nikola Samardzic***, Aleksandar Krastev*, Simon Langowski, Srinivas Devadas, Daniel Sanchez. Fhelipe: A Compiler and DSL for Tensor Programming in Fully Homomorphic Encryption. (under submission)
  - **Nikola Samardzic**, Axel Feldmann, Aleksandar Krastev, Nathan Manohar, Nicholas Genise, Srinivas Devadas, Karim Eldefrawy, Chris Peikert, Daniel Sanchez. CraterLake: A Hardware Accelerator for Efficient Unbounded Computation on Encrypted Data. ISCA 2022.
  - **Nikola Samardzic***, Axel Feldmann*****, Aleksandar Krastev, Srinivas Devadas, Ron Dreslinski, Christopher Peikert, Daniel Sanchez. F1: A Fast and Programmable Accelerator for Fully Homomorphic Encryption. MICRO 2021.
  - **Nikola Samardzic***, Weikang Qiao*, Vaibhav Aggarwal, M.C. Frank Chang, Jason Cong. Bonsai: High-performance Adaptive Merge Tree Sorting. ISCA 2020.
  - Young-kyu Choi, Yuze Chi, Weikang Qiao, **Nikola Samardzic**, Jason Cong. HBM Connect: High-performance HLS Interconnect for FPGA HBM. FPGA 2021.

* indicates equal contribution

RECOGNITION

- F1, my first-author publication, received the MICRO 2021 TopPicks award, which "collects some of the most significant research papers in computer architecture based on novelty and potential for long-term impact." It is awarded to only 12 papers annually.
- Research funded by National Science Foundation (NSF), Defense Advanced Research Projects Agency (DARPA), Google, Samsung, Wistron, and the MIT Fellowship.
- Summa Cum Laude and Phi Beta Kappa at UCLA.

WORK EXPERIENCE

- **NAND Capital (Intern, 2020):** I was the first employee in a three-person hedge fund start-up funded by Founder's Fund and Paradigm; Developed basic data pipelines for running experiments on large amounts of market data. Used the pipeline to find predictable trends in markets.
- **Goldman Sachs (Intern, 2018):** Created custom NLP model for performing a specific accounting classification task that was previously performed full time by two employees.
- **SpaceX (Intern, 2017):** Created software to automate defining and testing of all propulsion joints on SpaceX rockets; Was offered to leave school and begin full time work as a freshman.

AREAS & SKILLS

- Areas: computer architecture, computer systems, performance engineering, cryptography, FPGA, ASIC, compilers, HW/SW codesign, software engineering, ML performance.
- Skills: C++, Python, Verilog, Minispec/Bluespec, Linux, Rust.