Anish Saxena

PHD STUDENT · GEORGIA INSTITUTE OF TECHNOLOGY

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Education

Georgia Institute of Technology *Atlanta, USA*
DOCTOR OF PHILOSOPHY, COMPUTER SCIENCE · **GPA: 4.0/4.0** *2021 - present*
- Advisor: Prof. Moinuddin K. Qureshi

Indian Institute of Technology Kanpur *Kanpur, India*
BACHELOR OF TECHNOLOGY, MECHANICAL ENGINEERING · **CPI: 9.1/10.0** *2017 - 2021*
- Minor in Computer Systems

Honors & Awards

2019 **Semiconductor Research Corporation (SRC) Member**, Indian Research Program *India*
2017 **Aditya Birla Group Scholarship**, Awarded to 15 students selected from IITs and BITS *Mumbai*
2017 **All India Rank 1828**, Joint Entrance Examination Advanced, 175,000 students *India*
2017 **KVPY Fellowship**, Awarded by IISc Bangalore and Government of India *Bangalore*

Relevant Experience

Micron Technology, USA *Patrick Estep*
RESEARCH INTERN, ADVANCED MEMORY GROUP *May. 2022 - Aug. 2022*
- Analyzed Google's cloud traces and architected CXL-based memory hierarchies.
- Filed a patent for a novel mechanism to emulate application behavior natively in hardare using its trace.

Memory Systems Lab, Georgia Tech *Prof. Moinuddin K. Qureshi*
GRADUATE RESEARCH ASSISTANT *Aug. 2021 - present*
- Designed PT-Guard, a mechanism to protect page tables against Rowhammer at negligible overheads.
- Designed AQUA, a Rowhammer mitigation that dynamically quarantines aggressor rows at runtime.

NVIDIA Corporation, India *Bharatkumar Sharma*
HPC GPU ADVOCATE INTERN, HACKATHONS AND BOOT-CAMPS TEAM *May 2021 - Aug. 2021*
- Created open-source tutorials and bootcamps on multi-node GPU programming for HPC applications.
- Published all materials online; bootcamp is accessible at github.com/gpuhackathons-org/gpubootcamp/.

Intel Labs, India *Anant Nori*
RESEARCH INTERN, PROCESSOR ARCHITECTURE RESEARCH LAB *May 2020 - Sep. 2020*
- Improved the performance of non-inclusive cache hierarchy by extending state-of-the-art cache policies.
- Extended a cycle-accurate simulator, collected memory traces, and performed functional simulations.

CAR3S Group, IIT Kanpur *Prof. Biswabandan Panda*
GROUP MEMBER AND SRC STUDENT MEMBER *Apr. 2019 - Jun. 2020*
- Devised DABANGG, a set of refinements that enable accurate and noise-resilient flush-based cache attacks.
- Developed tracing techniques for ARM architectures and analyzed cache compression for mobile SoCs.

New York Office, IIT Kanpur *Prof. Manindra Agrawal*
COMPUTER SYSTEMS INTERN *May 2018 - Jul. 2018*
- Led a team of 4 to develop the infrastructure stack of a scalable microservice-based web portal.
- Configured Spinnaker-based CI/ CD pipeline and integrated canary analysis and stress testing capabilities.

Papers

AQUA: Scalable Rowhammer Mitigation by Quarantining Aggressor Rows at Runtime
Anish Saxena, Gururaj Saileshwar, Prashant Nair, Moinuddin Qureshi
55th Annual IEEE/ACM International Symposium on Microarchitecture (**MICRO**), Chicago, USA, October 2022.

PT-Guard: Guarding Page Tables Against DRAM Fault Injection Attacks

Anish Saxena, Gururaj Saileshwar, Jonas Juffinger, Andreas Kogler, Daniel Gruss, Moinuddin Qureshi

Under submission

DABANGG: A Case for Noise Resilient Flush-Based Cache Attacks

Anish Saxena and Biswabandan Panda

16th IEEE Workshop on Offensive Technologies **(WOOT)**, San Francisco, USA, May 2022.

Scalable Multi-node Fast Fourier Transform on GPUs

Manthan Verma, Soumyadeep Chatterjee, Gaurav Garg, Bharatkumar Sharma, Nishant Arya, Shashi Kumar, **Anish Saxena**,
Mahendra K. Verma

Under submission

Projects

Scalable Fast Fourier Transform on GPUs
Prof. Mahendra Verma

PROF. VERMA'S GROUP IN COLLABORATION WITH CDAC AND NVIDIA
Feb. 2021 - Aug. 2021

- Extended Tarang, a parallel computational fluid dynamics simulator, to enable multi-node multi-GPU FFTs.
- Developed scalable 3D FFT implementation and evaluated it on PARAM Siddhi AI supercomputer.

Efficient Memory Tracing for Mobile Architectures
Prof. Biswabandan Panda

CAR3S GROUP IN COLLABORATION WITH QUALCOMM RESEARCH
Jul. 2020 - Jun. 2021

- Developed a framework to collect native traces for Android applications on ARM architectures.
- Extended QEMU for emulation and Valgrind for native tracing and evaluated cache compression algorithms.

Campus Sustainability Challenge
Team Leader

7TH INTER-IIT TECH MEET, IIT BOMBAY
Oct. 2018 - Dec. 2018

- Led a team of 6 to propose and implement solutions for waste generated on the institute campus.
- Mounted sensors in composting bins, captured Biogas, reduced PNG consumption in hostel messes by 14%.

E-Waste Management Software
Prof. Indranil Saha

COURSE PROJECT
Aug. 2017 - Nov. 2017

- Given E-waste disposal behavior and constraints on economic and environmental resources, identified the optimal path to safely and efficiently treat the E-waste.
- Modelled the path-finding algorithm from scratch, verified results for data-sets of up-to 4 million residents.

Relevant Coursework

- Topics in OS (Distributed Systems)[A]
- High Performance CompArch[A]
- Advanced OS (Programming NVMe)
- High Performance Computing[A*]
- Data Structures & Algorithms

- Quantum Computing[A]
- Parallel CompArch[A]
- High Performance Programming[A]
- Operating Systems[A]
- Non Classical Logic

- Secure & Reliable CompArch[A]
- Computer Architecture[A*]
- Modern Cryptology[A]
- Computer Organization[A]

A: grade for exceptional performance*   *A: grade*

Talks

2021 **CUDA Programming**, guest lecture, course on High Performance Computing   *IIT Kanpur*
2020 **DABANGG Attack**, CAOS reading group to students and faculty   *IIT Kanpur*
2020 **Microarchitectural Security**, talk and demo as part of SRC Annual Design Review   *Bangalore*
2019 **Flush-based Attacks**, guest lecture, course on Secure Memory Systems   *IIT Kanpur*
2019 **ZombieLoad and CLKScrew Attacks**, CAOS reading group to students and faculty   *IIT Kanpur*

Skills

Programming	C++, C, Python, Bash, Verilog
Frameworks	Pthreads, MPI, OpenMP, CUDA, NCCL, Intel TBB, ANTLR, Valgrind
Utilities	Git, LaTeX, GDB, PIN, QEMU, ChampSim, gem5, Xilinx ISE, Nsight Systems, Docker, Kubernetes

Technical Service

2020 **Systems Reading Group**, Leader   *IIT Kanpur*
        Discussed topics in computer systems. Resources: https://anish-saxena.github.io/tags/srg/

2019 **Programming Club**, Coordinator   *IIT Kanpur*
        Led a team of 24, conducted workshops, organized hackathons, and delivered lectures.

Miscellaneous

- Senior Mentor to 15 students at IIT Kanpur, helped them navigate life and career choices in college.   *2020*
- Represented CAR3S group in departmental seminars and maintained the group's digital presence.   *2019, 2020*