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: 3.93/4.00** *2021 - 2026 (expected)*
- 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

Papers

START: Scalable Tracking for Any Rowhammer Threshold
Anish Saxena and Moinuddin Qureshi
To appear in 30th IEEE International Symposium on High-Performance Computer Architecture **(HPCA)**, Edinburgh, Scotland, March 2024.

Rubix: Low Overhead Secure Rowhammer Mitigations via Randomized Memory Mapping
Anish Saxena, Saurav Mathur, Moinuddin Qureshi
Under submission

PT-Guard: Integrity-Protected Page Tables against Breakthrough Rowhammer Attacks
Anish Saxena, Gururaj Saileshwar, Jonas Juffinger, Andreas Kogler, Daniel Gruss, Moinuddin Qureshi
53rd IEEE/IFIP Conference on Dependable Systems and Networks **(DSN)**, Porto, Portugal, June 2023.

A Case for CXL-Centric Server Processors
Albert Cho, **Anish Saxena***, Moinuddin Qureshi, Alexandros Daglis* **Equal contribution*
Under submission

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*
SN Computer Science 4, 625, Springer Nature Singapore, 2023.

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.

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.

Relevant Experience

Memory Systems Lab, Georgia Tech *Prof. Moinuddin K. Qureshi*
GRADUATE RESEARCH ASSISTANT *Aug. 2021 - present*
- Using computer architecture to tackle problems in hardware security, datacenter systems, and efficient AI.
- Published first-author conference papers (HPCA, MICRO, DSN) and delivered conference and invited talks.

AMD Research, USA *Shaizeen Aga*
RESEARCH INTERN, APPLICATION PERFORMANCE ANALYSIS TEAM *May. 2023 - Aug. 2023*
- Devised distributed training techniques that minimize training time for Large Language Models (LLM).
- Developed a DDR-centric GPU design with better LLM training scalability compared to HBM-centric designs.

Micron Technology, USA

Patrick Estep

RESEARCH INTERN, ADVANCED MEMORY GROUP
May. 2022 - Aug. 2022

- Architected CXL memory systems to accelerate performance of Google's datacenter workloads.
- Developed a multi-core emulation mechanism to replay datacenter workload traces on native hardware.

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.
- The bootcamp and code are accessible at github.com/gpuhackathons-org/gpubootcamp/.

Intel Labs, India

Anant Nori

RESEARCH INTERN, PROCESSOR ARCHITECTURE RESEARCH LAB
May 2020 - Sep. 2020

- Improved performance of non-inclusive caches by extending reuse-distance based cache policies.
- Accelerated 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 (WOOT'22), refinements that enable accurate and noise-resilient 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 multi-node microservices-based Kubernetes cluster.
- Configured Spinnaker-based CI/ CD pipeline and integrated canary analysis and stress testing capabilities.

Honors & Awards

2019	**Semiconductor Research Corporation (SRC) Member**, Indian Research Program	*India*
2017	**Aditya Birla Group Scholarship**, Awarded to 15 students from IIT 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*

Projects

Efficient Materialized Views in CXL-enabled Databases

Pratik Mishra

AMD RESEARCH
June. 2023 - Aug. 2023

- Filed a patent for a CXL-centric infrastructure which minimizes compute by reusing common sub-queries.

Bandwidth-centric Server Memory System

Prof. Alexandros Daglis

MEMORY SYSTEMS LAB
Aug. 2022 - present

- Architected a CXL-enabled throughput-oriented server with high bandwidth serial-attached DDR memory.

Rowhammer-aware Memoy Allocator

Prof. Alexandros Daglis

MEMORY SYSTEMS LAB
Oct. 2021 - present

- Devised Aegis, a DRAM-aware memory allocator which prevents Rowhammer using domain isolation.

Talks

2023	**PT-Guard: Integrity-Protected Page Tables**, paper talk at 53rd DSN conference	*Portugal*
2023	**Secure and Scalable Rowhammer Defenses**, guest talk at ETH Zurich	*Switzerland*
2022	**AQUA Rowhammer Mitigation**, paper talk at the 55th MICRO conference	*Chicago*
2022	**Rowhammer Attacks and Defenses**, guest lecture at IIT Bombay	*Mumbai*
2022	**Google Datacenter Application Traces**, invited research talk at Intel Labs	*Bangalore*
2022	**DABANGG Attack**, paper talk at the 16th WOOT workshop	*San Francisco*
2021	**CUDA Programming**, guest lecture, course on High Performance Computing	*IIT Kanpur*
2020	**Noise-resilient Flush Attacks**, 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*

Technical Service

2023	**HPCA 2024 Conference**, Artifact Evaluation Committee	*Edinburgh*
2023	**Secure and Reliable Computer Architecture**, Head TA	*Atlanta*
2022	**Introduction to Quantum Computing**, Course Development TA	*Atlanta*

Prepared lectures for the first course on quantum computing on Georgia Tech's Online MS program.

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.

Relevant Coursework

- Advanced OS: Distributed Systems^A
- High Performance CompArch^A
- High Performance Computing^{A*}
- Topics in OS: Programming NVMe
- Computer Organization^A
- Machine Learning^A
- Parallel CompArch^A
- High Performance Programming^A
- Operating Systems^A
- Data Structures & Algorithms
- Secure & Reliable CompArch^A
- Computer Architecture^{A*}
- Modern Cryptology^A
- Quantum Computing^A
- Non Classical Logic

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

Miscellaneous

- Gave an invited talk, as a "pioneering alumni" of IIT Kanpur, on research career opportunities in CS. *2023*
- Mentored MS and PhD students on technical projects and advised them on navigating grad school. *2021-present*
- Mentor to 15 students at IIT Kanpur; helped them navigate academic and career challenges in college. *2020*
- Represented CAR3S group in departmental seminars and maintained the group's digital presence. *2019, 2020*