

VARUN CHANDRASHEKHAR GOHIL

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EDUCATION

Massachusetts Institute of Technology September 2022 - Present
PhD, Electrical Engineering and Computer Science

Indian Institute of Technology Gandhinagar July 2016 - July 2020
B.Tech, Computer Science and Engineering CPI: 9.04/10

EXPERIENCE

Research Intern, Google June 2022 - August 2022
Mentors : Sundar Dev, David Lo

Graduate Researcher, Cornell University August 2021 - May 2022
Mentors : Prof. Christina Delimitrou

Research Fellow, Ashoka University August 2020 - July 2021
Advisor : Prof. Manu Awasthi

Visiting Scholar, University of Utah May 2019 - July 2019
Advisor : Prof. Rajeev Balasubramonian

Summer Research Intern, IIT Gandhinagar May 2018 - July 2018
Advisor : Prof. Manu Awasthi

PUBLICATIONS

Paper titles are hyperlinked

Performance optimization opportunities in the Android software stack

[Varun Gohil*](#), [Nisarg Ujjainkar*](#), [Joycee Mekie](#), [Manu Awasthi](#)
BenchCouncil Transactions on Benchmarks, Standards and Evaluations (**TBench**), October 2021

Fixed-Posit: A Floating-Point Representation for Error-Resilient Applications

[Varun Gohil*](#), [Sumit Walia*](#), [Joycee Mekie](#), [Manu Awasthi](#)
IEEE Transactions on Circuits and Systems II : Express Briefs (**TCAS-II**), April 2021

Prefetching in Hybrid Main Memory Systems

[Subisha V](#), [Varun Gohil](#), [Nisarg Ujjainkar](#), [Manu Awasthi](#)
12th USENIX Workshop on Hot Topics in Storage and File Systems (**HotStorage**) 2020

[Reproducibility Report] One ticket to win them all: generalizing lottery ticket initializations across datasets and optimizers

[Varun Gohil*](#), [S. Deepak Narayanan*](#), [Atishay Jain*](#)
NeurIPS Reproducibility Challenge, **ReScience C**, 2020.

Effect of Feature Hashing on Fair Classification

[Ritik Dutta*](#), [Varun Gohil*](#), [Atishay Jain*](#)
Young Researchers' Symposium, ACM India Joint International Conference on Data Science & Management of Data, (**CODS-COMADS**) 2020

FAB: Framework for Analyzing Benchmarks

Varun Gohil*, Shreyas Singh*, Manu Awasthi

Work in Progress Track, 10th International Conference on Performance Engineering (**ICPE**) 2019

META: Memory Exploration Tool for Android Devices

Nisarg Parikh, Varun Gohil, Manu Awasthi

Poster Track, 24th International Conference on Mobile Computing and Networking (**MobiCom**) 2018

* indicates equal contribution

AWARDS AND HONORS

- Awarded the Jacobs Fellowship at Cornell University September 2021
- Awarded cash prize of Rs.12,500 by IIT Gandhinagar for undergraduate research July 2021
- Best Presentation Award Finalist, HotStorage 2020 July 2020
- Received Special Mention in Undergraduate Research Conclave, IIT Gandhinagar. September 2019
- Secured a position in Top 5 for poster presentation at SRIP 2018, IIT Gandhinagar. July 2018

Grants : USENIX ATC 2020, ISCA 2019 (uArch), SIGSOFT CAPS ICPE 2019, ACM MobiCom 2018

TECHNICAL SKILLS

Programming Languages	Python, C/C++, Verilog
Cloud Computing Tools	Docker, Kubernetes, OpenTelemetry, Jaeger
Architectural Tools	Intel Pin, Intel Vtune, NVMain, ZSim, QEMU, Systrace
Others	L ^A T _E X, Git, PyTorch

RESEARCH PROJECTS

Accelerating Inter-function Communication in Serverless

Advisors: Prof. Christina Delimitrou

March 2022 - Present

- Implementing a hardware accelerator for RDMA using near-memory reconfigurable NICs.

Configuration Tuning for Microservices

Advisors: Prof. Christina Delimitrou

October 2021 - Present

- Studying impact of software configurations (timeouts, fsync frequency, buffer sizes, window sizes) and resource configurations (cpu frequency) on end-to-end tail latency of microservice applications.
- Implemented tracing on a class enrollment microservice app using OpenTelemetry.

Approximate Computing for Adversarial Defense

Advisors: Prof. Joyce Meki, Prof. Manu Awasthi

March 2021 - July 2021

- Independently modified Pytorch to support user-defined multiplication functions in Convolution module
- Evaluated success rates of fgsm, pgd, cw2, hsj and deepfool attacks when using approxlp, rmac, cfpu and fpcam multipliers.

Floating Point Representations & Circuits

Advisors: Prof. Joyce Meki, Prof. Manu Awasthi

May 2020 - July 2021

- Independently developed a pintool that replaces IEEE-754 arithmetic operations in programs with operations of user-defined representations.
- Evaluated fixed-posit, posit and IEEE-754 representations on AxBench and OpenBLAS.

Prefetching in Hybrid Main Memory Systems

Advisor : Prof. Manu Awasthi

September 2019 - April 2020

- Modified NVMain to trace DRAM memory accesses.
- Setup ZSim and NVMain to simulate proposed prefetcher.

Generalizing lottery ticket initializations across datasets and optimizers

Advisors: Prof. Nipun Batra, Prof. Anirban Dasgupta

September 2019 - December 2019

- Implemented iterative magnitude pruning in PyTorch.
- Trained ResNet50 and VGG19 architectures on CIFAR-10, CIFAR-100, SVHN and FashionMNIST.
- Reproduced results of “*One ticket to win them all: generalizing lottery ticket initializations across datasets and optimizers*” as part of NeurIPS Reproducibility Challenge 2019.

Performance Analysis of Mobile Apps

Advisors: Prof. Joyce Meki, Prof. Manu Awasthi

September 2019 - December 2019

- Traced CPU utilization of threads for 11 mobile apps using Systrace.
- Developed bins of threads having common functionality to identify most time-consuming functionalities.
- Observed that inter-process communication and frame-rendering are most time-consuming functionalities.

Optimizing Autonomous Driving Systems

Advisor : Prof. Rajeev Balasubramonian

May 2019 - July 2019

- Implemented a simple autonomous driving software pipeline.
- Optimized pipeline by using a common feature extractor for all stages. This led to significant (85%) computation reduction.
- Studied CNN accelerators like Eyeriss, Google TPU, Neural Cache and Tesla FSD.
- Studied MobileNet, ShuffleNet, DenseNet, ResNet, Inception neural network architectures.

Workload Characterization of Contemporary Benchmarks

Advisor : Prof. Manu Awasthi

March 2018 - October 2018

- Performed instruction profiling of SPEC CPU 2017, PARSEC 3, SPLASH 3 and OpenBLAS using Pin.
- Performed similarity analysis of benchmarks by developing functionality-based instruction bins.
- Developed a jupyter-based frontend to visualize instruction profiles and workload similarity.

META - Memory Exploration Tool for Android Devices

Advisor : Prof. Manu Awasthi

May 2018 - July 2018

- Designed META, a tool-chain for exploring memory design space in mobile devices.
- Independently implemented instruction tracing in Android emulator by modifying source code of QEMU.
- Implemented a cache simulator.

TEACHING EXPERIENCE

Teaching Assistant

Machine Learning, IIT Gandhinagar

December 2019 - May 2020

Instructor: Prof. Nipun Batra

- Gave a lecture on Automatic Differentiation ([Video Link](#))
- Developed a toy neural network library ([Code Link](#))
- Assisted instructor in creating slides and interactive notebooks for lectures.

Teaching Assistant

Operating Systems, IIT Gandhinagar

July 2019 - November 2019

Instructor: Prof. Nipun Batra

- Conducted 10 lab sessions focusing on virtualization, concurrency and file systems.

- Gave a lecture on Assembly Language (*Slides*)

MISCELLANEOUS ACTIVITIES

- Conducted a tutorial on DRAM timing parameters at Computer Architecture Winter School (CAWS).
- Pre-conference Volunteer for ICLR 2020
- Attended Workshop on Memory Systems (WOMS) held at IIT Gandhinagar
- Attended Workshop on Computer Systems (WOCS) held at Ashoka University