

# VARUN GOHIL

Email : varuncgohil@gmail.com  
Phone Number :+91-9998417106

Website : varungohil.github.io  
GitHub ID : varungohil

## EDUCATION

---

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

## EXPERIENCE

---

**Research Fellow, Ashoka University** *August 2020 - Present*  
*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*

### **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](#)

12<sup>th</sup> 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, 10<sup>th</sup> International Conference on Performance Engineering (**ICPE**) 2019

### **META: Memory Exploration Tool for Android Devices**

[Nisarg Parikh](#), [Varun Gohil](#), [Manu Awasthi](#)

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

\* indicates equal contribution

## AWARDS AND HONORS

---

- Awarded cash prize of Rs.12,500 by IIT Gandhinagar for undergraduate research *July 2021*
- Best Presentation Award Finalist, HotStorage 2020 *July 2020*

- Awarded USENIX ATC 2020 Student Grant. July 2020
- Received Special Mention in Undergraduate Research Conclave, IIT Gandhinagar. September 2019
- Selected for Undergraduate Architecture (uArch) Workshop at ISCA 2019. June 2019
- Secured **A+** grade (11/10) for exceptional performance in the Machine Learning course. May 2019
- Awarded SIGSOFT CAPS grant for ICPE 2019. April 2019
- Awarded ACM MobiCom 2018 Scholarship. October 2018
- Secured a position in Top 5 for poster presentation at SRIP 2018, IIT Gandhinagar. July 2018
- Secured a position in Dean's List for excellent academic performance. All 6 semesters

## RESEARCH PROJECTS

---

### **Optimizing SAT solvers**

*Advisor: Prof. Subodh Sharma, Prof. Manu Awasthi*

*March 2021 - Present*

- Performed top-down microarchitectural analysis of Kissat solver using Intel Vtune.
- Designed an in-memory accelerator for DPLL algorithm.

### **Approximate Computing for Adversarial Defense**

*Advisor: Prof. Joyce Mekié, Prof. Manu Awasthi*

*March 2021 - Present*

- 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, CFPD and FPCAM multipliers.

### **Floating Point Representations & Circuits**

*Advisor: Prof. Joyce Mekié, Prof. Manu Awasthi*

*May 2020 - Present*

- Developed 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**

*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**

*Advisor: 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**

*Advisor: Prof. Joyce Mekié, 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.
- 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*)

## **TECHNICAL KNOWLEDGE**

---

### **Programming Languages**

Python, C, Verilog, Shell Scripting

### **Architectural Tools**

Intel Pin, Intel Vtune, NVMain, ZSim, QEMU, Systrace

### **Others**

L<sup>A</sup>T<sub>E</sub>X, Git, PyTorch,

## **MISCELLANEOUS ACTIVITIES**

---

- Conducted a tutorial on DRAM timing parameters at Computer Architecture Winter School (CAWS) 2020
- 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
- Assisted in organizing meetup of PyData Gandhinagar.