

# SAMEERAN JOSHI

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## CONTACT

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## RESEARCH INTEREST

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Compilers, Computer Architecture, Programming Languages, Compiler Optimizations, LLVM, Hardware-Software Codesign, Modern C++, HPC systems

## PUBLICATIONS

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**PEAK: Generating High-Performance Schedules in MLIR**, Amir Mohammad Tavakkoli\*, **Sameeran Joshi\***, Shreya Singh, Yufan Xu, P. Sadayappan, and Mary Hall. In Proceedings of the 36th International Workshop on Languages and Compilers for Parallel Computing (**LCPC23**). Oct. 2023(Accepted)

**An NSF REU Site Based on Trust and Reproducibility of Intelligent Computation: Experience Report**, Mary Hall, Ganesh Gopalakrishnan, Eric Eide, Johanna Cohoon, Jeff M. Phillips, Mu Zhang, Shireen Y. Elhabian, Aditya Bhaskara, Harvey Dam, Artem Yadrov, Tushar Kataria, Amir Mohammad Tavakkoli, **Sameeran Joshi**, Mokshagna Sai Teja Karanam. In **EduHPC workshop** at The International Conference for High Performance Computing, Networking, Storage, and Analysis (**SC23**) (Accepted)

## EDUCATION

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**School of Computing, University of Utah**

PhD Student in Computer Science | Aug 2022 – Currently Enrolled

**Pune University, India**

*Bachelor's In Computer Engineering* | Aug 2015 – May 2019

GPA: 8.29/10

## WORK EXPERIENCE

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### Advanced Micro Devices (AMD)

*CPU Compiler Engineer* | June 2019 – June 2022

**Software System Designer 2**, April 2020 to Present

#### Parallel compilation in clang-driver

- Parallelized the compilation phase for building applications with AOCC by adding compiler flag
- Achieved huge gains in build times of large HPC applications like WRF from 10min to 1min and CAM4 from 38sec to 10 sec with AOCC clang driver

#### Binary Level Static Performance Analyzer Tool

- Extended LLVM BOLT to compare statically 2 binaries to report performance difference
- Implemented python utilities for analyzing the data, plotting results and graphs to aid in reporting issues
- Added count of basic blocks, vector, loops, scalars, loads & stores, spills & reloads, etc. to report issues based on various metrics
- Reported performance issues and suggested missing optimizations in AOCC for SPEC CPU 2017, polybench and HPC workloads compared to ICC
- Presented paper in internal conference (13% acceptance rate) at AMD

#### LLVM Flang Group

- 50+ commits to Fortran language compiler frontend in LLVM including new features, bug fixes, infrastructure changes
- Added parsing and semantic support for OpenMP 4.5/5.0 and Fortran 2018 language features in LLVM Flang
- Reviewed voluntarily OpenMP, OpenACC, Flang driver patches from community members

**Software System Designer 1**, July 2019 to March 2020

#### Compiler Validation Group:

- Implemented from scratch regression, unit tests for 12+ Fortran 2008 language standard to fuzz AOCC compiler
- Reported Internal Compiler Errors, segmentation faults, mis compilations in AOCC Flang source
- Focused on compiler validation, automation, CI/CD frameworks, debug testing to verify AOCC

## OTHER PROJECTS

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### **GCC - GNU Compiler Collection**

Google Summer Of Code

*Extending Csmith for GCC C-Language Extensions, June 2018 – April 2019*

Mentor: Andi Kleen

- Added ~15 GNU C language extensions to Csmith and found unexplored bugs (ICE's, seg faults, crashes) in GCC compiler
- Found 12 critical bugs, 11 were fixed by GCC community
- Increased the fuzzing code coverage of csmith on GCC by – line coverage: 5%, function coverage: 7%, branch coverage: 4%
- Presented work at Pune Kernel meetup on work done in Csmith

### **Git Statistics Excel Generator, AMD, India**

Manager: Hariharan Parasuraman

- Designed small utility to collect, visualize, create reports of individual contributions in open-source projects for managerial audits

## AWARDS

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- TFWS Scholarship (awarded to 5% students of baccalaureate class) 2015-2019
- AMD Spotlight award for performance recognition at AMD 2020

## ACTIVITIES AND INTERESTS

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- Volunteered at CppOnSea'21, CppCon'21
- 2021 LLVM developers meeting PC member
- Co-founded bitSimplify: RISC-V based LLVM toolchain startup
- Student Travel Grant for attending [Workshop on Sparse Tensor Computations](#)