

Hashim Sharif

Computer Science Department
University of Illinois at Urbana-Champaign
201 N Goodwin Ave, Urbana, 61801
✉ hsharif3@illinois.edu
📧 hashimsharif.com

Education

- 2014–2021 **University of Illinois at Urbana-Champaign, Urbana, IL**
PhD in Computer Science
Advisor: Vikram Adve
- 2009–2013 **National University of Computer and Emerging Sciences, Lahore, Pakistan**
Bachelor of Science in Computer Science

Experience

- April 2021– **Postdoctoral Researcher, University of Illinois at Urbana-Champaign,**
Advisors: Vikram Adve and Sasa Misailovic
- 2016–2021 **Graduate Research Assistant, University of Illinois at Urbana-Champaign, Urbana, IL,**
- 2017 Summer **Summer Research Associate, Argonne National Lab, Lemont, IL**
- 2015 Summer **Summer Research Associate, SRI International, Menlo Park, CA**
- 2013–2014 **Research Assistant, Lahore University of Management Sciences, Lahore, Pakistan**

Research Areas

- Compilers
- Systems for Machine Learning
- Accuracy-aware Program Optimization
- Program Analysis
- Programming Languages

Impact

- Collaborating with a robotics startup, Earthsense, I optimized the software stack of an in-production autonomous agriculture robot using *ApproxCaliper* - an **application-aware neural network optimization framework**. Our optimizations reduced the cost of deployed compute hardware by 3x.

- The ApproxHPVM deep learning compiler is being actively used at IBM Research for compiling neural network programs to a custom heterogeneous SoC developed for self-driving vehicles.
- I led two major open-source releases of the HPVM project; release v0.5 was presented at the open-source conference, FOSDEM 2020, and v1.0 is actively used by IBM Research and academic research groups.
- In terms of teaching and collaborating on various projects, I have mentored over 10 PhD and undergraduate students.

Publications

Selected Conference Papers

- [MLSys'23] Yifan Zhao*, **Hashim Sharif***, Peter Pao-Huang, Vatsin Ninad Shah, Arun Narenthiran, Mateus Valverde Gasparino, Nathan Zhao, Abdulrahman Mahmoud, Sarita Adve, Girish Chowdhary, Sasa Misailovic, Vikram Adve. *ApproxCaliper: Exploiting Application-level Error Resiliency for Optimizing Neural Networks*. (* **equal contribution.**)
- [IEEE VR 2023] Rahul Singh, Muhammad Huzaifa, Jeffery Liu, Anjul Patney, **Hashim Sharif**, Yifan Zhao, Sarita Adve. *Power, Performance, and Image Quality Tradeoffs in Foveated Rendering*. In Proceedings of the 30th IEEE Conference on Virtual Reality and 3D User Interfaces.
- [PPoPP'21] **Hashim Sharif**, Yifan Zhao, Maria Kotsifakou, Akash Kothari, Ben Schreiber, Elizabeth Wang, Yasmin Sarita, Nathan Zhao, Keyur Joshi, Vikram Adve, Sasa Misailovic, and Sarita Adve. *ApproxTuner: a Compiler and Runtime System for Adaptive Approximations*. In *Proceedings of the 26th ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP'21)*, 2021, February, Virtual.
- [OOPSLA'19] **Hashim Sharif**, Prakalp Srivastava, Muhammad Huzaifa, Maria Kotsifakou, Keyur Joshi, Yasmin Sarita, Nathan Zhao, Vikram Adve, Sasa Misailovic, and Sarita Adve. *ApproxHPVM: a Portable Compiler IR for Accuracy-aware Optimizations*. In *Proceedings of the ACM on Programming Languages (OOPSLA'19)*, 25 October 2019, Athens, Greece.
- [ASE'18] **Hashim Sharif**, Muhammad Abubakar, Ashish Gehani, and Fareed Zaffar. *TRIMMER: Application Specialization for Code Debloating*. In *Proceedings of the 33rd ACM/IEEE International Conference on Automated Software Engineering (ASE'18)*, September 7, 2018, Montpellier, France.

Journal Publications

- [TSE'22] Aatira Anum Ahmad, Abdul Rafae Noor, **Hashim Sharif**, Usama Hameed, Shoaib Asif, Mubashir Anwar, Ashish Gehani, Fareed Zaffar, and Junaid Haroon Siddiqui. TRIMMER: An Automated System for Configuration-based Software Debloating. *IEEE Transactions on Software Engineering (TSE'22)*.
- [IEEE Micro Journal 2022] Adel Ejje, Aaron Councilman, Akash Kothari, Maria Kotsifakou, Leon Medvinsky, Abdul Rafae Noor, **Hashim Sharif**, Yifan Zhao, Sarita Adve, Sasa Misailovic, Vikram Adve. *HPVM: Hardware-Agnostic Programming for Heterogeneous Parallel Systems. IEEE Micro Journal 2022*

Workshop Papers and Presentations

- [LLVMDev'20] **Hashim Sharif**, Maria Kotsifakou, Yifan Zhao, Akash Kothari, Ben Schreiber, Elizabeth Wang, Yasmin Sarita, Nathan Zhao, Keyur Joshi, Vikram Adve, Sasa Misailovic, and Sarita Adve. ApproxTuner: a Compiler and Runtime System for Adaptive Approximations. *2020 LLVM Virtual Developers Meeting*, October 8, 2020 (**Oral**).
- [LLVM-HPC 2017] **Hashim Sharif**, Vikram Adve, and Hal Finkel. Developing an OpenMP Offloading Runtime for UVM-Capable GPUs. *The Fourth Workshop on the LLVM Compiler Infrastructure in HPC*, November 13, 2017, Denver, CO (**Oral**).
- [OpenMPCon 2017] **Hashim Sharif**, Vikram Adve, Hal Finkel, and Lingda Li. Developing an OpenMP Offloading Runtime for UVM-Capable GPUs. *2017 OpenMP Developers Meeting*, September 19, 2017, Stony Brook University, NY (**Oral**).
- [IPAW'16] Manolis Stamatogiannakis, Hasanat Kazmi, **Hashim Sharif**, Remco Vermeulen, Ashish Gehani, Herbert Bos, Paul Groth. Trade-Offs in Automatic Provenance Capture. *6th International Provenance and Annotation Workshop*, Maclean, VA, June 8, 2016.

Undergraduate Research

- [PACIS'15] **Hashim Sharif**, Saad Ismail, Shehroze Farooqi, Mohammad Taha Khan, Mohammad Ali Gulzar, Hasnain Lakhani, Fareed Zaffar, and Ahmed Abbasi. A Classification Based Framework to Predict Viral Threads *Pacific Asia Conference on Information Systems (PACIS'15)*.
- [SocialCom'14] **Hashim Sharif**, Fareed Zaffar, Ahmed Abbasi, and David Zimbra. Detecting Adverse Drug Reactions Using a Sentiment Classification Framework. *Proceedings of the 2014 International Conference on Social Computing (SocialCom'14)*.

Talks

- **Accuracy-aware Compilers for Energy-efficient Machine Learning**
 - AMD Research, 12/2022
 - Virginia Tech University, 05/2022, Virtual
 - VMware Research, 05/2022, Virtual
 - NYU Abu Dhabi, 04/2022, Virtual
 - Amazon AWS, 04/2022, Virtual
 - Nvidia Research, 03/2022, Virtual
 - IBM Research, 03/2022, Virtual
- **ApproxCaliper: Exploiting Application-level Error Resiliency for Optimizing Neural Networks**
 - Harvard University, 02/18/2022, Virtual
 - SRI International, 02/14/2022, Virtual
 - UIUC Compiler Seminar, 02/07/2022, University of Illinois
 - Illinois Autonomous Farm Workshop, 7/7/2021, University of Illinois
- **ApproxTuner: a Compiler and Runtime System for Adaptive Approximations**
 - PPOPP'21, 3/2/2021, Virtual
 - Google Compiler Seminar, 3/12/2021
 - DePaul University, Chicago, 2/19/2021
 - Qualcomm Compiler Group, 12/13/2020
 - LLVM Developers conference, 10/8/2020
 - Amazon Compiler Team, 6/2/2020
- **ApproxHPVM: a Portable Compiler IR for Accuracy-aware Optimizations**
 - UIUC Compiler Seminar, 10/16/2019, University of Illinois
 - IBM Research Computer Architecture Team, 9/6/2019, Yorktown Heights, NY
- **TRIMMER: Application Specialization for Code Debloating**
 - LUMS ISPL Seminar Series, 11/5/2020, Virtual
 - UIUC Compiler Seminar, 08/28/2018, University of Illinois
- **Developing an OpenMP Offloading Runtime for UVM-Capable GPUs**
 - OpenMP Developers Meeting, September 19, 2017, Stony Brook University, NY
 - LLVM-HPC Workshop at Supercomputing 2017, November 13, 2017, Denver, CO

Services

Fall 2021 Empirical Software Engineering Journal 2021 - *Reviewer*

- Fall 2021 Principles and Practice of Parallel Programming 2022 (PPoPP'22) - *External Reviewer*
- Spring 2021 Transactions on Design Automation of Electronic Systems 2021 - *Reviewer*
- Spring 2018 UIUC Compiler Seminar - *Student Organizer*

Teaching and Mentoring

Teaching Assistant

- Fall 2015 UIUC CS 498 Digital Forensics (with Roy Campbell)

Guest Lectures

- Spring 2021 UIUC CS 526 Advanced Compiler Construction
- Fall 2020 UIUC CS 598 Approximate and Probabilistic Computing
- Spring 2020 UIUC CS 526 Advanced Compiler Construction
- Fall 2013 LUMS CS Topics in Network Security
- Spring 2014 LUMS CS Network Security

Research Mentoring

- 2019-present UIUC PhD student, Yifan Zhao
Worked jointly on the ApproxCaliper and ApproxTuner projects.
- 2019-present UIUC PhD student, Akash Kothari
Worked together on the ApproxTuner project and the HPVM release.
- 2019-present UIUC PhD student, Abdul Rafae Noor
Worked together on TRIMMER and HPVM release.
- 2020-present UIUC PhD student, Mubashir Anwar
Collaborated on TRIMMER Journal version and TRIMMER release.
- 2019-present UIUC undergraduate student, Nathan Zhao
Worked together on ApproxHPVM, ApproxTuner, and ApproxCaliper.
- 2020-present UIUC undergraduate student, Peter Pao-Huang
Worked together on ApproxTuner and ApproxCaliper.
- 2021-present UIUC undergraduate student, Vatsin Ninad Shah
Collaborated on the ApproxCaliper project.
- 2019-2020 UIUC undergraduate student, Elizabeth Wang
Collaborated on the ApproxTuner project.
- 2019-2020 Cornell undergraduate student, Yasmin Sarita
Worked on ApproxHPVM, while Yasmin was a summer intern at UIUC.
- 2018-2019 LUMS undergraduate student, Usama Hameed
Worked together on TRIMMER. Usama is pursuing his PhD at UCLA.
- 2019-2020 LUMS undergraduate student, Shoaib Asif
Collaborated on TRIMMER. Shoaib is pursuing his PhD at UT Austin.

References

Vikram Adve

Donald B. Gillies Professor
Department of Computer Science
University of Illinois at Urbana-Champaign
vadve@illinois.edu

Sasa Misailovic

Assistant Professor
Department of Computer Science
University of Illinois at Urbana-Champaign
misailo@illinois.edu

Sarita Adve

Richard T. Cheng Professor
Department of Computer Science
University of Illinois at Urbana-Champaign
sadve@illinois.edu

Ashish Gehani

Principal Computer Scientist
Computer Science Laboratory
SRI International
Menlo Park, CA
ashish.gehani@sri.com

Girish Chowdhry

Associate Professor
Agricultural and Biological Engineering and Computer Science
University of Illinois Urbana-Champaign
girishc@illinois.edu