Hashim Sharif

AMD Research and Development
7171 Southwest Pkwy, Austin, TX 78735
✉ *hasharif@amd.com*
🖥 *hashimsharif.com*

Experience

September 2022-Current	**Member of Technical Staff**, *AMD Research*, Research Area: Compilers for AI Accelerators
April 2021-August 2022	**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

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

Research Areas

- Compilers
- Systems for Machine Learning
- Processing in memory (PIM) Accelerators
- Accuracy-aware Program Optimization
- Program Analysis
- Programming Languages

Research 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

Conference Papers

[ASPLOS'24] Yifan Zhao, **Hashim Sharif**, Sasa Misailovic, Vikram Adve. *Felix:* Felix: Optimizing Tensor Programs with Gradient Descent. In Proceedings of the ACM International Conference on Architectural Support for Programming Languages and Operating System, 2024.

[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.

[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).*

Journal Publications

[IEEE IoT Journal 2024] Mobiprox: Supporting Dynamic Approximate Computing on Mobiles. Matevž Fabjančič; Octavian Machidon; **Hashim Sharif**; Yifan Zhao; Sasa Misailovic; Veljko Pejović. *IEEE Internet of Things Journal, 2024*

[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 Ejjeh, 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

[ASE'22 Tool Track] Aatira Anum, Mubashir Anwar, **Hashim Sharif**, Ashish Gehani, and Fareed Zaffar. Trimmer: Context-Specific Code Reduction. In Proceedings of the 37th IEEE/ACM International Conference on Automated Software Engineering (Tool track).

[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.

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

Academic Service

Fall 2022	ACM Transactions on Architecture and Code Optimization, 2022 - *Reviewer*
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 - *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