Keyur Parag Joshi

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Work Experience

Google – Software Engineer L4   August 12, 2024 – Ongoing

- Designed & implemented infrastructure for testing AI agents that use stateful tools while maintaining isolation across tests
- Onboarded and evaluated benchmarks for tool-using AI agents in key domains (e.g., airline and retail assistant bots)
- *Skills used* – Python, Mercurial, AI, software engineering, teamwork, documentation, etc.

Microsoft Research India – Research Intern   May 2022 – August 2022

- Designed and implemented a library for training neural networks such as RNNs exclusively using fixed-point arithmetic
- Demonstrated proof-of-concept which achieved accuracy similar to that of a floating-point implementation of the same RNN
- Published open-source tool at github.com/KPJoshi/Fixed-Point-RNN-Training
- *Skills used* – Python, PyTorch, Git, compilers, approximation, documentation, etc.

Education

University of Illinois Urbana-Champaign (UIUC), USA   August 2017 – May 2024
PhD in Computer Science
Research focus – analysis of quantitative uncertainty in programs and systems; effective application of approximations

Indian Institute of Technology, Hyderabad (IITH), India   August 2013 – May 2017
Bachelor of Technology (Honours) in Computer Science and Engineering
Valedictorian

Skills

Programming: Python, C/C++, Go, Java, Git, Make, Bash, LLVM, ANTLR, PyTorch, Docker

Soft Skills: Teamwork (10+ team members), communication, documentation (developer and end-user)

Languages: English (native proficiency), German (elementary proficiency)

Coursework: Programming Languages, Compilers and Optimizations, Data Structures and Algorithms, Software Engineering, Approximate Algorithms, Software Verification, Machine Learning, Computer Architecture, Operating Systems, Networks, etc.

Open-Source Tools

Fixed-Point-RNN-Training: Tool for training RNNs using exclusively fixed-point arithmetic

- Tool, example, and tutorial available at github.com/KPJoshi/Fixed-Point-RNN-Training
- *Skills used* – Python, PyTorch, Git, compilers, approximation, documentation, etc.

AxProf: Tool for statistical analysis of the precision of approximate algorithms

- Successfully found bugs in multiple approximate algorithm implementations
- Tool, examples, and tutorial available at axprof.org
- *Skills used* – Python, Git, compilers, approximation, statistical analysis, etc.

Parallely: Tool for static analysis of quantitative error propagation in parallel programs

- Tool and instructions available at github.com/uiuc-arc/parallely
- *Skills used* – Python, Git, program analysis, compilers, etc.

Publications

- **FastFlip: Compositional SDC Resiliency Analysis**
  Keyur Joshi, Rahul Singh, Tommaso Bassetto, Sarita Adve, Darko Marinov, Sasa Misailovic
  International Symposium on Code Generation and Optimization (CGO 2025) | Preprint: arxiv.org/abs/2403.13989

- **Compositional Analysis of the Effects of Uncertainty on Computations**
  Keyur Joshi
  PhD Dissertation (2024)

- **GAS: Generating Fast and Accurate Surrogate Models for Autonomous Vehicle Systems**
  Keyur Joshi, Chiao Hsieh, Sayan Mitra, Sasa Misailovic
  International Symposium on Software Reliability Engineering (ISSRE 2024) | Preprint: github.com/uiuc-arc/GAS

- **Verifying Controllers with Vision-based Perception Using Safe Approximate Abstractions**
  Chiao Hsieh, Yangge Li, Dawei Sun, **Keyur Joshi**, Sasa Misailovic, Sayan Mitra
  Embedded Software (EMSOFT 2022)

- **Diamont: Dynamic Monitoring of Uncertainty for Distributed Asynchronous Programs**
  Vimuth Fernando, **Keyur Joshi**, Jacob Laurel, Sasa Misailovic
  International Conference on Runtime Verification (RV 2021)

- **ApproxTuner: A Compiler and Runtime System for Adaptive Approximations**
  Hashim Sharif, Maria Kotsifakou, Yifan Zhao, Akash Kothari, Ben Schreiber, Elizabeth Wang, Yasmin Sarita, Nathan Zhao,
  Keyur Joshi, Vikram Adve, Sasa Misailovic, Sarita Adve
  ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPOPP 2021)

- **Aloe: Verifying Reliability of Approximate Programs in the Presence of Recovery Mechanisms**
  Keyur Joshi, Vimuth Fernando, Sasa Misailovic
  IEEE/ACM International Symposium on Code Generation and Optimization (CGO 2020)

- **Statistical Algorithmic Profiling for Randomized Approximate Programs**
  Keyur Joshi, Vimuth Fernando, Sasa Misailovic
  ACM/IEEE International Conference on Software Engineering (ICSE 2019)

- **Verifying Safety and Accuracy of Approximate Parallel Programs via Canonical Sequentialization**
  Vimuth Fernando, **Keyur Joshi**, Sasa Misailovic
  ACM SIGPLAN Conference on Object-Oriented Programming, Systems, Languages and Applications (OOPSLA 2019)

- **ApproxHPVM: A Portable Compiler IR for Accuracy-Aware Optimizations**
  Hashim Sharif, Prakalp Srivastava, Muhammad Huzaifa, Maria Kotsifakou, **Keyur Joshi**, Yasmin Sarita, Nathan Zhao,
  Vikram S. Adve, Sasa Misailovic, Sarita Adve
  ACM SIGPLAN Conference on Object-Oriented Programming, Systems, Languages and Applications (OOPSLA 2019)

- **Identifying Optimal Parameters for Randomized Approximate Algorithms**
  Vimuth Fernando, **Keyur Joshi**, Darko Marinov, Sasa Misailovic
  Workshop on Approximate Computing Across the Stack (WAX 2019 – co-located with PLDI 2019)