AKANKSHA JAIN

CONTACT INFORMATION

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EDUCATION

The University of Texas at Austin   Aug 2009 - Aug 2016
PhD in Computer Science
Thesis: Exploiting Long-Term Behavior For Improved Memory System Performance
Advisor: Calvin Lin

Indian Institute of Technology Madras   April 2004 - July 2009
Bachelors in Technology (B.Tech) and Masters in Technology (M.Tech)
Computer Science and Engineering

EXPERIENCE

Research Associate   Sept 2018 - Current
Department of Computer Science, The University of Texas at Austin

Postdoctoral Researcher   Sept 2016 - Aug 2018
Department of Computer Science, The University of Texas at Austin

Research Intern   Fall 2014
Research and Advanced Development Labs, AMD Research, Austin

Research Intern   Summer 2011
Platform Architecture Research Group, Intel Labs, Santa Clara

Research Intern   Summer 2007, Summer 2008
Architecture and System Validation Group, Intel, Bangalore

AWARDS

MIT EECS Rising Stars Workshop   2018
Invited to participate in a workshop designed for top female researchers in EECS

Winner, International Cache Replacement Championship   2017
Hawkeye judged to be the best-performing cache replacement policy

IEEE MICRO Top Picks Honorable Mention   2017
Hawkeye selected as one among top 25 papers published in computer architecture
conferences in 2016

MICRO Best Paper Award Finalist   2013
ISB selected as one of the top 3 papers published at MICRO 2013

Microelectronics and Computer Development Fellowship   2009

BOOKS

Cache Replacement Policies
Akanksha Jain and Calvin Lin
Synthesis Lectures on Computer Architecture, June 2019
Morgan & Claypool Publishers

REFEREED PUBLICATIONS

Applying Deep Learning To The Cache Replacement Problem
Zhan Shi, Xiangru Huang, **Akanksha Jain**, and Calvin Lin
52nd International Symposium on Microarchitecture (MICRO), October 2019

Temporal Prefetching Without The Off-Chip Metadata
Hao Wu, Krishnendra Nathella (Arm), Joseph Pusdesris (Arm), Dam Sunwoo (Arm), **Akanksha Jain**, and Calvin Lin
52nd International Symposium on Microarchitecture (MICRO), October 2019

Efficient Meta-Data Management for Irregular Data Prefetching
Hao Wu, Krishnendra Nathella (Arm), Dam Sunwoo (Arm), **Akanksha Jain**, and Calvin Lin
46th International Symposium on Computer Architecture (ISCA), June 2019

Rethinking Belady's Algorithm to Accommodate Prefetching
Akanksha Jain and Calvin Lin
45th International Symposium on Computer Architecture (ISCA), June 2018

Back to the Future: Leveraging Belady's Algorithm for Improved Cache Replacement
Akanksha Jain and Calvin Lin
43rd International Symposium on Computer Architecture (ISCA), June 2016
Top Picks Honorable Mention

Linearizing Irregular Memory Accesses for Improved Correlated Prefetching
Akanksha Jain and Calvin Lin
46th International Symposium on Microarchitecture (MICRO), December 2013
Finalist, Best Paper Award

WORKSHOP PUBLICATIONS

Combining Branch History and Value History For Improved Value Prediction
Chirag Sakhuja, Anjana Subramanian, Pawanbalakri Joshi, **Akanksha Jain**, Calvin Lin
2nd Championship Value Prediction
First Place, Unlimited Category

Neural Hierarchical Sequence Model for Irregular Data Prefetching
Zhan Shi, **Akanksha Jain**, Kevin Swersky, Milad Hashemi, Parthasarathy Ranganathan, Calvin Lin
ML For Systems, NeurIPS 2019

Reeses: Integrating Spatial and Temporal Prefetching
Matthew Pabst, **Akanksha Jain** and Calvin Lin
Arm Research Summit, 2019

Using Machine Learning to Improve Cache Replacement

Akanksha Jain and Calvin Lin

Career Workshop For Women And Minorities In Computer Architecture, MICRO 2017

Hawkeye: Leveraging Belady's Algorithm for Improved Cache Replacement

Akanksha Jain and Calvin Lin

2nd Cache Replacement Championship, 2017

First Place

FUNDED PROPOSALS

I have co-authored multiple successful funding proposals during my postdoctoral research. All proposals were co-authored with Calvin Lin, who is the Principal Investigator.

NSF Foundations of Microarchitecture Program, Award # 1823546   2018-2021
Title: Using Machine Learning to Design Next Generation Caches and Data Prefetchers
Award amount: USD 450,000 over a period of 3 years

Samsung Global Outreach Program   2018-2019
Title: Expanding the Scope of Value Prediction Using Machine Learning
Award amount: USD 100,000 over a period of 1 year

Oracle Extrenal Research Office Grant   2017-2018
Title: Machine Learning For Improving Software Caches
Award amount: USD 93,500 over a period of 1 year

PATENTS

Evicting Appropriate Cache Line Using A Replacement Policy Utilizing Belady's Optimal Algorithm

Akanksha Jain and Calvin Lin

Granted, October 2018

Power Management Of Instruction Processors In A System-On-Chip

Akanksha Jain, Wei Huang, and Indrani Paul

Granted, August 2018

INVITED TALKS

Using Machine Learning For Fine-Grained Hardware Prediction
Invited Talk, ML For Systems Workshop, NeurIPS   Dec 2019

Towards Smarter Hardware Prediction Mechanisms
CSCE 681 Seminar, Texas A&M   Nov 2019

Recent Advances In Value Prediction And Data Prefetching
Samsung Austin Research Center, Austin TX   August 2019

Towards Smarter Hardware Prediction Mechanisms
University of Southern California (USC)   June 2018

Towards Smarter Hardware Prediction Mechanisms
ARM, Austin TX   Oct 2017

Novel Approaches to Cache Replacement, Data Prefetching, and Beyond
Oracle, Austin TX   June 2017

Leveraging Beladys Algorithm for Improved Cache Replacement
Samsung Austin Research Center, Austin TX   Aug 2016

PROFESSIONAL ACTIVITIES

ISCA External Review Committee	2020
MICRO Program Committee	2019
Supercomputing Program Committee	2019
ISCA External Review Committee	2019
3rd Data Prefetching Championship Program Committee	2019
HPCA Program Committee	2019
PACT External Review Committee	2018
2nd Cache Replacement Championship Program Committee	2017
HPCA External Review Committee	2017
Computer Architecture Letters, Invited Reviewer	2018-2019
Transactions on Computer Architecture and Code Optimization, Invited Reviewer	2017-2019
Women in Computer Architecture, Organizing Committee Member	2017-current

TEACHING

Research in Computer Architecture   Spring 2019
Undergraduate Research Course
Co-Instructor with Calvin Lin
Helped design the course to focus on undergraduate research

Prediction Mechanisms in Computer Architecture   Spring 2018
Graduate Research Course   Spring 2017
Co-Instructor with Calvin Lin   Spring 2013
Helped design the course to introduce students to research in computer architecture

Systems I   Spring 2012
Undergraduate Honors Course
Teaching Assistant

Parallel Systems   Spring 2011
Graduate Course
Teaching Assistant

GRADUATE RESEARCH CO-ADVISING

Anjana Subramanian (Advisor: Calvin Lin)
Masters Thesis: Advancing Value Prediction, May 2019

Pawan B Joshi (Advisor: Calvin Lin)
Masters Thesis: Techniques For Advancing Value Prediction, May 2019

Cassidy Burden (Advisor: Calvin Lin)
Masters Report: Evaluating Headroom for Smart Caching Policies on GPUs, May 2018

UNDERGRADUATE RESEARCH CO-ADVISING

Tres Brenan (Advisor: Calvin Lin)
Honors Thesis: Understanding Compressed Caching through the Compressed Optimal, May 2019

Joanna Bridgewater (Advisor: Calvin Lin)
Honors Thesis: Learning from Optimal Algorithms for Software Cache Replacement, May 2019

Matthew Pabst (Advisor: Calvin Lin)
Honors Thesis: Analyzing Spatial and Temporal Locality for Integrated Stream Prefetching, Dec 2018

Chance Raine (Advisor: Calvin Lin)
Honors Thesis: Branch Prediction with Sparse Distributed Memory, May 2016

Houston Putman (Advisor: Calvin Lin)
Honors Thesis: Historical Context in Irregular Data Prefetching, May 2016

Mark Mansi (Advisor: Calvin Lin)
Honors Thesis: An Improved Hybrid AMPM and ISB Prefetcher, May 2016

Matthew Hicks (Advisor: Calvin Lin)
Honors Thesis: Exploring the Design Space of DRAM Caches, May 2014

Kev Kitchens (Advisor: Calvin Lin)
Honors Thesis: Predicting and Prefetching TLB Entries from Irregular Access Streams, Dec 2013