

# AASHEESH KOLLI

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## BRIEF BIOGRAPHY

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I am a computer systems researcher. My research interests are in the areas of computer architecture and systems software, focusing on designing high-performance and programmable memory systems.

My recent research investigates designing computing systems for a new class of memory technologies called *Persistent Memories*. These technologies have the potential to revolutionize storage software (e.g., file systems and databases) by offering a unique combination of disk-like durability with the performance of main-memory. I designed new computer architectures, programming interfaces, and systems software to fully leverage the benefits of these technologies.

I am the recipient of the 2018 ACM SIGARCH/IEEE CS TCCA Outstanding Dissertation Award. My work has resulted in multiple research papers and paper honors at top-tier computer architecture and systems venues like SOSP, ISCA, MICRO, and ASPLOS.

## PROFESSIONAL EXPERIENCE

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<b>Pennsylvania State University</b> , State College, PA Assistant Professor, Computer Science and Engineering	<i>Aug 2018 – Present</i>
<b>VMware Research</b> , Palo Alto, CA Post-doc Researcher	<i>Aug 2017 – Aug 2018</i>
<b>Parabricks</b> , Ann Arbor, MI Software Genomics Engineer	<i>May 2017 – Aug 2017</i>
<b>Google</b> , Madison, WI Software Engineering Intern	<i>May 2016 – Aug 2016</i>
<b>HP Labs</b> , Palo Alto, CA Research Intern	<i>May 2015 – May 2016</i>
<b>ARM</b> , Cambridge, UK Research Intern	<i>May 2013 – Dec 2013</i>

## EDUCATION

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<b>PhD, Computer Science and Engineering</b> <i>Advisor:</i> Prof. Thomas F. Wenisch <i>Dissertation Title:</i> Architecting Persistent Memory Systems	<i>Univ. of Michigan, Ann Arbor, May 2017</i>
<b>MSc, Computer Science and Engineering</b>	<i>Univ. of Michigan, Ann Arbor, May 2013</i>
<b>BE, Electrical and Electronics + MSc, Economics</b> <i>Thesis Advisor:</i> Prof. Rajeev Balasubramonian, University of Utah <i>Thesis Title:</i> Cacheline Information-based Cache Partitioning	<i>BITS-Pilani, India, May 2011</i>

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## HONORS AND AWARDS

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1. Best Paper Award - SYSTOR [\[Link\]](#) 2019
2. BITS Pilani Alumni Association Global 30 Under 30 Award [\[Link\]](#) 2019
3. Paper selected as IEEE Micro Top Picks in Computer Architecture [\[Link\]](#) 2018
4. ACM SIGARCH/IEEE CS TCCA Outstanding Dissertation Award [\[Link\]](#) 2018
5. Best Paper Award Nomination - MICRO [\[Link\]](#) 2016
6. Rackham Graduate Fellowship, University of Michigan 2011

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## CONFERENCE PUBLICATIONS

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1. S. Liu, K. Seemakhupt, Y. Wei, T. Wenisch, **A. Kolli**, S. Khan. “Cross-Failure Bug Detection in Persistent Memory Programs” International Conference on Architectural Support for Programming Languages and Operating Systems (**ASPLOS**), Apr 2020 [**To Appear**].
2. R. Kadekodi, S.K. Lee, S. Kashyap, T. Kim, **A. Kolli**, V. Chidambaram. “SplitFS: Reducing Software Overhead in File Systems for Persistent Memory” Symposium on Operating System Principles (**SOSP**), Oct 2019.
3. S. Novakovic, Y. Shan, **A. Kolli**, M. Cui, Y. Zhang, H. Eran, L. Liss, M. Wei, D. Tsafirir, M. Aguilera. “Storm: a fast transactional dataplane for remote data structures” International Systems and Storage Conference (**SYSTOR**), Jun 2019.  
**\*Received best paper award.**
4. S. Liu, K. Seemakhupt, G. Pekhimenko, **A. Kolli**, S. Khan. “Janus: Optimizing Memory and Storage Support for Non-Volatile Memory Systems” International Symposium on Computer Architecture (**ISCA**), Jun 2019.
5. S. Liu, Y. Wei, J. Zhao, **A. Kolli**, S. Khan. “PMTTest: A Fast and Flexible Testing Framework for Persistent Memory Programs” International Conference on Architectural Support for Programming Languages and Operating Systems (**ASPLOS**), Apr 2019.
6. V. Gogte, **A. Kolli**, S. Diestelhorst, W. Wang, P. M. Chen, S. Narayanasamy, T. F. Wenisch. “Software Wear Management for Persistent Memories” Usenix Conference on File and Storage Technologies (**FAST**), Feb 2019.
7. S. Liu, **A. Kolli**, J. Ren, S. Khan. “Crash Consistency in Encrypted Non-Volatile Main Memory Systems” International Symposium on High Performance Computer Architecture (**HPCA**), Feb 2018.
8. **A. Kolli**, V. Gogte, A. Saidi, S. Diestelhorst, P. M. Chen, S. Narayanasamy, T. F. Wenisch. “Language-level persistency” International Symposium on Computer Architecture (**ISCA**), Jun 2017.  
**\*Selected as an IEEE Micro Top Picks in Computer Architecture 2018 paper.**
9. **A. Kolli**, J. Rosen, S. Diestelhorst, A. Saidi, S. Pelley, S. Liu, P. M. Chen, T. F. Wenisch. “Delegated Persist Ordering”. International Symposium on Microarchitecture (**MICRO**), Oct 2016.  
**\*Nominated for best paper award.**
10. V. Gogte, **A. Kolli**, M. J. Cafarella, L. D’Antoni, T.F. Wenisch. “HARE: Hardware acceleration for regular expressions”. International Symposium on Microarchitecture (**MICRO**), Oct 2016.

11. **A. Kolli**, S. Pelley, A. Saidi, P. M. Chen, T.F. Wenisch. “High-performance Transactions for Persistent Memories”. International Conference on Architectural Support for Programming Languages and Operating Systems (**ASPLOS**), Apr 2016.
12. J. Izraelevitz, T. Kelly, **A. Kolli**. “Failure-Atomic Persistent Memory Updates via JUSTDO Logging”. International Conference on Architectural Support for Programming Languages and Operating Systems (**ASPLOS**), Apr 2016.
13. A. Hansson, N. Agarwal, **A. Kolli**, A. N. Udiipi, T. F. Wenisch. “Simulating DRAM controllers for future system architecture exploration”. International Symposium on Performance Analysis of Systems and Software (**ISPASS**), Mar 2014.
14. **A. Kolli**, A. Saidi, T. F. Wenisch. “RDIP: Return-address-stack Directed Instruction Prefetching”. International Symposium on Microarchitecture (**MICRO**), Dec 2013.

## JOURNAL PUBLICATIONS

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1. **A. Kolli**, V. Gogte, A. Saidi, S. Diestelhorst, W. Wang, P. M. Chen, S. Narayanasamy, T. F. Wenisch. “Language Support for Memory Persistency”. IEEE Micros Top Picks in Computer Architecture journal (**Top Picks**), May 2019.

## REFEREED WORKSHOP PUBLICATIONS

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1. I. Calciu, I. Puddu, **A. Kolli**, A. Nowatzyk, J. Gandhi, O. Mutlu, P. Subrahmanyam. “Project PBerry: FPGA Acceleration for Remote Memory”. Workshop on Hot Topics in Operating Systems (**HotOS**), May 2019.
2. I. Calciu, **A. Kolli**, J. Gandhi, S. Novakovic, M. Aguilera, R. Venkatasubramanian and P. Subrahmanyam. “Resource Disaggregation for the 99%”. Workshop on Warehouse-scale Memory Systems (**WAMS**), Mar 2018.
3. **A. Kolli**, J. Gandhi, I. Calciu, S. Novakovic. “Remote Memory Persistency”. Workshop on Warehouse-scale Memory Systems (**WAMS**), Mar 2018.
4. **A. Kolli**, V. Gogte, A. Saidi, S. Diestelhorst, P. M. Chen, S. Narayanasamy, T. F. Wenisch. “TARP: Translating Acquire-Release Persistency”. Non-Volatile Memory Workshop (**NVMW**), Mar 2017.
5. **A. Kolli**, S. Pelley, A. Saidi, P. M. Chen, T. F. Wenisch. “Persistency programming 101”. Non-Volatile Memory Workshop (**NVMW**), Mar 2015.

## NON-REFEREED PUBLICATIONS

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1. A. Tavakkol, **A. Kolli**, S. Novakovic, K. Razavi, J. Gomez-Luna, H. Hassan, C. Barthels, Y. Wang, M. Sadrosadati, S. Ghose, A. Singla, P. Subrahmanyam, O. Mutlu. “Enabling Efficient RDMA-based Synchronous Mirroring of Persistent Memory Transactions”. arXiv:1810.09360 [[Link](#)], Oct 2018.

## POSTERS

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1. R. Kadekodi, S. K. Lee, **A. Kolli**, V. Chidambaram. “Ledger: Increasing Performance of POSIX Applications on Persistent Memory”. Symposium on Operating Systems Design and Implementation (**OSDI**), Oct 2018.

2. P. Fernando, I. Calciu, J. Gandhi, A. Gavriloska, **A. Kolli**. “Persistence and Synchronization: Friends or Foes?”. Symposium on Operating Systems Principles (**SOSP**), Oct 2017.

## BOOKS

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1. V. Gogte, **A. Kolli**, T.F. Wenisch. “A Primer on Memory Persistency”. Morgan and Claypool Publishers. [**Under Preperation**]

## PATENTS

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1. I. Calciu, J. Gandhi, P. Fernando, **A. Kolli** “Using TSX to speedup transactions in NVM”
2. I. Calciu, **A. Kolli** “Cacheline persistence indicator for NVM using coherence states”
3. T.P. Kelly, C.B. Morrey III, D. Chakrabarti, **A. Kolli**, Q. Cai, A.C. Walton, J. Izraelevitz, “Register store”
4. J. Izraelevitz, **A. Kolli**, T.P. Kelly, C.B. Morrey III, “Resuming execution in response to a failure”
5. S. Diestelhorst, **A. Kolli**, A. Saidi, P.M. Chen, T.F. Wenisch. “Controlling memory access to non-volatile memory”
6. A. Saidi, T.F. Wenisch and **A. Kolli**. “Prefetching based upon return addresses”

## PRESS

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1. Baking Specialization into Hardware Cools CPU Concerns [[Link](#)] *Next Platform, Sep 2016*

## GRADUATE ADVISING

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1. Muhammad Talha Imran, PhD candidate, Pennsylvania State University *Fall 2018 - Present*
2. Sara Mahdizadeh Shahri, PhD candidate, Pennsylvania State University *Fall 2018 - Present*
3. Yi Zheng, PhD candidate, Pennsylvania State University *Winter 2019 - Present*
4. Chirag Satish, MS student, Pennsylvania State University *Fall 2019 - Present*

## UNDERGRADUATE ADVISING

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1. Lukas Marcelis, Pennsylvania State University *Winter 2019 - Present*

## TEACHING

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1. Fundamentals of Computer Architecture (CSE 530, [G]) *Fall 2019*  
Pennsylvania State University
2. Introduction to Computer Architecture (CMPEN 431, [UG]) *Winter 2019*  
Pennsylvania State University (Score: 5/7)
3. Fundamentals of Computer Architecture (CSE 530, [G]) *Fall 2018*  
Pennsylvania State University (Score: 6.07/7)
4. Introduction to Computer Organization (EECS 370, [UG]) *Fall 2016*  
Instructor, University of Michigan (Score: 4.6/5)

5. Parallel Computer Architectures (EECS 570, [G]) *Winter 2016*  
 Graduate Student Instructor, University of Michigan

## SERVICE

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### Conference Program Committee Member

- HPCA, ISPASS, ISCA *2020*
- HPCA, ICDCS, USENIX ATC, MICRO, ICCD *2019*
- ISPASS *2018*

### Journal Reviewer

- Computer Architecture Letters *2016 - 19*
- Transactions on Computers *2019*

### Finance Chair

- IISWC *2018*

### Workshop Organizer

- Young Architect Workshop (YArch) – **Founded a new mentoring workshop** [[Link](#)] *2019*

## OUTREACH ACTIVITIES

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**Why should one do a PhD?** *Nov 2017*  
 Alumni seminar, BITS-Pilani

**CS KickStart Hardware Lab**, Organizer *Sep 2016*  
 Workshop aimed at improving female enrollments in CS at the Univ. of Michigan

**CELAB Reading Group**, Moderator *2015-2016*  
 University of Michigan

## PRESENTATIONS

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**Remote Memory Persistency** *Mar 2018*  
 - Workshop on Warehouse-scale Memory Systems (WAMS)

**Language-level Persistency** *Jun 2017*  
 - International Symposium on Computer Architecture (ISCA)

### Architecting Persistent Memory Systems

- Yale University *November 2019*
- Pennsylvania State University *September 2018*
- VMware Research *May 2017*
- University of Pennsylvania *Apr 2017*
- University of Rochester *Apr 2017*
- Stony Brook University *Mar 2017*
- Pennsylvania State University *Mar 2017*
- Virginia Tech *Mar 2017*
- Simon Fraser University *Mar 2017*
- Microsoft Research, Redmond *Feb 2017*
- North Carolina State University *Feb 2017*
- Snowflake Computing *Jan 2017*
- University of Utah *Jan 2017*

**Invited guest lecture on Persistent Memory Systems**

- Data Centric Systems (EECS 598 at Univ. of Michigan) by Prof. Reetuparna Das *Oct 2016*

**Delegated Persist Ordering**

- International Symposium on Microarchitecture (MICRO) *Oct 2016*

**Gearing up for the advent of persistent memory**

- Google, Madison *July 2016*

**High-performance transactions for persistent memories**

- International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS) *Apr 2016*

- Non-Volatile Memories Workshop (NVMW) *Mar 2016*

**Persistency programming 101**

- Non-Volatile Memories Workshop (NVMW) *Mar 2015*

**RDIP: Return-address-stack Directed Instruction Prefetching**

- International Symposium on Microarchitecture (MICRO) *Dec 2013*

**REFERENCES**

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1. Prof. Thomas F. Wenisch  
Professor of EECS, University of Michigan
2. Prof. Peter M. Chen  
Arthur F. Thurnau Professor of EECS, University of Michigan
3. Prof. Remzi Arpaci-Dusseau  
Grace Wahba Professor and Chair of Computer Sciences, University of Wisconsin at Madison
4. Prof. Rajeev Balasubramonian  
Professor, School of Computing, University of Utah
5. Dr. Parthasarathy Ranganathan  
Distinguished Engineer, Google
6. Prof. Satish Narayanasamy  
Professor of EECS, University of Michigan
7. Prof. Vijay Chidambaram  
Assistant Professor, University of Texas, Austin and Affiliated Researcher, VMware Research
8. Prof. Chitaranjan Das  
Distinguished Professor and Head of the Department, CSE, Penn State University