Yixin Luo

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OBJECTIVE

I am seeking a full-time research or engineering position in the industry where I can use my expertise in storage systems and architectures to grow the company.

EDUCATION

Carnegie Mellon University, Pittsburgh, PA September 2012 to December 2017 (Expected)
PhD candidate, Computer Science Department
Relevant Courses: Database Systems, Operating Systems and Distributed Systems, Deep Reinforcement Learning, Machine Learning, Computer Architecture, Optimizing Compilers, Computer Networks

University of Michigan, Ann Arbor, MI May 2012
Bachelor of Science, Computer Engineering

Shanghai Jiao Tong University, Shanghai, China August 2012
Bachelor of Science, Electrical Engineering

EXPERIENCE

Seagate Technology, Lakeview, CA May to October 2016
Engineering intern
- Developed new experimental characterization software to collect and analyze NAND flash errors and threshold voltage distribution.
- Applied data mining and modeling techniques to the collected raw NAND data for understanding flash error behavior.
- Designed new flash management policies to improve performance and reliability.
- Modified SSD controller firmware to assist raw NAND data collection.

Seagate Technology, Lakeview, CA May to August 2015
Engineering intern
- Constructed and analyzed model of NAND flash memory errors and threshold voltage distribution.
- Applied statistical modeling techniques to the collected raw NAND data for understanding flash error behavior.
- Designed new flash management policies to improve performance and reliability.

Microsoft Research, Redmond, WA May to August 2013
Research intern in Sensing and Energy Research Group (SERG)
- Characterized memory error vulnerability of data-intensive applications that runs in datacenters.
- Explored cost-efficient ways of tolerating memory errors in both software and hardware.

PUBLICATIONS

- Yu Cai, Saugata Ghose, Erich F. Haratsch, Yixin Luo, and Onur Mutlu, "Error Characterization, Mitigation, and Recovery in Flash Memory Based Solid-State Drives", to appear in Proceedings of the IEEE, September 2017.
- Yu Cai, Saugata Ghose, Yixin Luo, Ken Mai, Onur Mutlu, and Erich F. Haratsch, "Vulnerabilities in MLC NAND Flash Memory Programming: Experimental Analysis, Exploits, and Mitigation Techniques", Proceedings of the 23rd International Symposium on High-Performance Computer Architecture (HPCA), February 2017.
- Aya Fukami, Saugata Ghose, Yixin Luo, Yu Cai, and Onur Mutlu, "Improving the Reliability of Chip-Off Forensic Analysis of NAND Flash Memory Devices", Proceedings of the Digital Forensics Research Conference Europe (DFRWS EU), March 2017. **(Best Paper Award)**
- Yixin Luo, Saugata Ghose, Yu Cai, Erich F. Haratsch, and Onur Mutlu, "Enabling Accurate and Practical Online Flash Channel Modeling for Modern MLC NAND Flash Memory", IEEE Journal on Selected Areas in Communications (JSAC), September 2016.
- Yixin Luo, Yu Cai, Saugata Ghose, Jongmoo Choi, and Onur Mutlu, "WARM: Improving NAND Flash Memory Lifetime with Write-hotness Aware Retention Management", Proceedings of the 31st International Conference of Massive Storage Systems and Technologies (MSST), June 2015.
- Yu Cai, Yixin Luo, Saugata Ghose, Erich F. Haratsch, Ken Mai, and Onur Mutlu, "Read Disturb Errors in MLC NAND Flash Memory: Characterization, Mitigation and Recovery", Proceedings of the 45th International Conference on Dependable Systems and Networks (DSN), June 2015.
- Yu Cai, Yixin Luo, Erich Haratsch, Ken Mai, Onur Mutlu, "Data Retention in MLC NAND Flash Memory: Characterization, Optimization and Recovery", Proceedings of the 21st International Symposium on High-Performance Computer Architecture (HPCA), February 2015. **(Best Paper Runner Up Award)**
- Yixin Luo, Sriram Govindan, Bikash Sharma, Mark Santaniello, Justin Meza, Aman Kansal, Jie Liu, Badriddine Khessib, Kushagra Vaid, and Onur Mutlu, "Characterizing Application Memory Error Vulnerability to Optimize Data Center Cost via Heterogeneous-Reliability Memory", Proceedings of the 44th International Conference on Dependable Systems and Networks (DSN), June 2014.
- Vivek Seshadri, Yoongu Kim, Chris Fallin, Donghyuk Lee, Rachata Ausavarungnirun, Gennady Pekhimenko, Yixin Luo, Onur Mutlu, Michael A. Kozuch, Phillip B. Gibbons, and Todd C. Mowry, "RowClone: Fast and Energy-Efficient In-DRAM Bulk Data Copy and Initialization", Proceedings of the 46th International Symposium on Microarchitecture (MICRO), December 2013.
- Justin Meza, Yixin Luo, Samira Khan, Jishen Zhao, Yuan Xie, and Onur Mutlu, "A Case for Efficient Hardware-Software Cooperative Management of Storage and Memory", Proceedings of the 5th Workshop on Energy-Efficient Design (WEED), Tel-Aviv, Israel, June 2013.
- Joseph L. Greathouse, Hongyi Xin, Yixin Luo, Todd M. Austin. "A Case for Unlimited Watchpoints", Proceedings of the 17th International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), March 2012.
- Arun Raghavan, Yixin Luo, Anuj Chandawalla, Marios C. Papaefthymiou, Kevin P. Pipe, Thomas F. Wenisch, Milo M. K. Martin. "Computational Sprinting", Proceedings of the 18th International Symposium on High-Performance Computer Architecture (HPCA), February 2012. **(Best Paper Award)**
  One of the 11 computer architecture papers of 2012 selected as Top Picks by IEEE Micro.

TECHNICAL TALKS

- "Online Flash Channel Modeling and Its Applications", Flash Memory Summit (FMS), 2016.
- "Data Retention in MLC NAND Flash Memory", Flash Memory Summit (FMS), 2015.
- "WARM: Improving NAND Flash Memory Lifetime with Write-hotness Aware Retention Management", International Conference on Massive Storage Systems and Technology (MSST), 2015.

- "Read Disturb Errors in MLC NAND Flash Memory", International Conference on Dependable Systems and Networks (DSN), 2015.
- "Data Retention in MLC NAND Flash Memory", IEEE Symposium on High Performance Computer Architecture (HPCA), 2015. **(Best Paper Session)**
- "Optimizing Datacenter Cost via Heterogeneous Reliability Memory", International Conference on Dependable Systems and Networks (DSN), 2014.

PROJECTS

Research Projects

Architectural Techniques for Improving NAND Flash Memory Reliability

- Developed new experimental characterization software to record and analyze NAND flash memory errors and threshold voltage distribution.
- Applied various data mining and modeling techniques to study raw NAND data.
- Designed new flash management policies to improve performance and reliability.

Heterogeneous Reliability Memory for Data Centers

- Developed a memory error injection and monitoring framework for data-intensive applications.
- Performed a case study of application memory error tolerance on three data-intensive applications.
- Explored the design space of heterogeneous-reliability memory systems.

Single-Level Storage

- Analyzed and simulated the performance, energy, and scalability improvement of a single-level storage system compared to a traditional two-level storage system.

Computational Sprinting

- Established a SPICE power model for power gating many-core processors.
- Developed a circuit-level method to reduce performance overhead for power gating.
- Performed SPICE circuit simulations to show the performance benefit of Computational Sprinting.

A Case for Unlimited Watchpoints

- Developed and simulated the performance benefits of applying the proposed hardware watchpoint support to a variety of software analyses.

Other Projects

CPU Architecture Design *(Bachelor Major Design Project)*

- Designed and implemented an out-of-order processor in SystemVerilog.

CPU Layout Design *(Bachelor Major Design Project)*

- Designed the circuit layout for an in-order processor and a 3-transistor eDRAM cache.

TEACHING EXPERIENCE

Teaching Assistant, Carnegie Mellon University Fall 2014
Research in Parallel Computer Architecture (18-742)

- Responsibilities include holding office hours, shepherding student projects.

Teaching Assistant, Carnegie Mellon University Spring 2014
Parallel Computer Architecture and Programming (15-418/15-618)

- Responsibilities include holding office hours, shepherding projects, preparing and grading homeworks.

TECHNICAL SKILLS

- *Lanuages:* `C/C++`, `Perl/Python`, `Linux Shell`, LaTeX, `Verilog`, `Windows Batch script`
- *Tools:* `Matlab`, `Intel Pin`, `HSPICE`, `Cadence tools`
- *Simulators:* `gem5`, `Multi2Sim`
- *Others:* `Hadoop`, `MySQL`