

Shuguang Feng

CONTACT INFORMATION

Advanced Computer Architecture Lab (ACAL)
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RESEARCH INTERESTS

My research interests include reliable, reconfigurable computer architecture, embedded systems, and compilers. I am particularly interested in exploiting the interaction between software (compilers, schedulers, hypervisors) and hardware (microarchitecture, system architecture, sensors) to develop systems with enhanced performance and reliability.

EDUCATION

University of Michigan **May 2007 - Present**
Ann Arbor, MI

Ph.D. candidate in Computer Science and Engineering

- Advisor: Scott Mahlke

University of Michigan **September 2005 - December 2006**
Ann Arbor, MI

M.S.E., Computer Science and Engineering (7.518/9.0 GPA, 1520 GRE)

University of Florida **August 2001 - May 2005**
Gainesville, FL

B.S., Computer Engineering (3.98/4.0 GPA, 1600 SAT)

- Graduated first in class

HONORS AND AWARDS

- EECS Graduate Fellowship, *University of Michigan*
- National Merit Scholar, *National Merit Scholarship Corporation*
- Robert C. Byrd Honors Scholar, *U.S. Department of Education (State of Florida)*
- Anderson Scholar (w/ highest distinction), *University of Florida*
- College of Engineering Dean's Scholar, *University of Florida*
- ECE Department Electric E Award (highest ECE award), *University of Florida*

ACADEMIC EXPERIENCE

University of Michigan **January 2006 - Present**
Research Assistant *Ann Arbor, MI*

Developing solutions for realizing affordable, fault-tolerant computing for commodity systems. Focusing on proactive, preventative measures that address silicon device wearout as well as compiler analyses to identify application properties that can be exploited to mitigate the threat of transient faults.

University of Michigan **September 2006 - December 2006**
Graduate Teaching Instructor *Ann Arbor, MI*

Teaching assistant for undergraduate computer architecture course. Responsibilities included teaching recitation sections, holding office hours, and developing homeworks/exams.

University of Florida Machine Intelligence Lab **May 2003 - August 2003**
Research Experience for Undergraduates *Gainesville, FL*

Participated in National Science Foundation funded research program focused on machine learning, computer vision, and robotic platform design.

- Integrated COTS and custom designed sensors (sonar, pressure, voice recognition) with a commercial microcontroller.
- Extensive use of CAD tools to design and manufacture custom printed circuit boards and an autonomous boat platform.

PROFESSIONAL
EXPERIENCE

IBM T.J. Watson Research Center **September 2008 - January 2009**
Graduate Intern, Power and Reliability Aware Architecture Group *Yorktown Heights, NY*
 Worked on soft-error reliability qualification.

- Performed exploratory statistical fault injection experiments on a communications processor.
- Proposed a new methodology for characterizing the reliability of large-scale systems.

Intel Corporation **June 2007 - August 2007**
Graduate Intern, Visual Computing Group *Hillsboro, OR*
 Prototyped a virtualization layer aimed at automatically exploiting the parallelism and redundancy available in heterogeneous, multi-core systems to improve performance and reliability.

- Designed and implemented a preliminary simulator.

Honeywell Space and Electronic Systems **May 2005 - August 2005**
Electrical Design Intern *Clearwater, FL*
 Interfaced with multiple electrical design teams assisting with project reviews and performing preliminary design space exploration.

- Conducted feasibility studies involving redesign of legacy avionics on the Space Shuttle.

University of Florida (IPPD) **August 2004 - May 2005**
Electrical Design Engineer *Gainesville, FL*
 Worked on an interdisciplinary team to develop a wireless medical monitoring system for the United States Special Operations Command.

- Integrated COTS sensors with a military-issue PDA using custom designed hardware.
- Delivered a working prototype complete with monitoring hardware and software.

Honeywell Space and Electronic Systems **May 2004 - August 2004**
Electrical Design Intern *Clearwater, FL*
 Provided engineering support for the Space Shuttle Main Engine Controller Single Board Computer group.

- Assisted lead electrical engineer in detailed design reviews of upgrades to the the Space Shuttle's health monitoring computer.

REFEREED
CONFERENCE
PUBLICATIONS

Erasing Core Boundaries for Robust and Configurable Performance.
 Shantanu Gupta, Shuguang Feng, Amin Ansari, and Scott Mahlke.
To appear in the Proceedings of the 43rd International Symposium on Microarchitecture (MICRO-43), December 2010.

Interweaving Pipeline Stages into a Wearout and Variation Tolerant CMP Fabric.
 Shantanu Gupta, Amin Ansari, Shuguang Feng, and Scott Mahlke.
Proceedings of the 2010 International Conference on Dependable Systems and Networks (DSN), June 2010.

Necromancer: Enhancing System Throughput by Animating Dead Cores.
 Amin Ansari, Shuguang Feng, Shantanu Gupta, and Scott Mahlke.
Proceedings of the 37th International Symposium on Computer Architecture (ISCA-37), June 2010.

Shoestring: Probabilistic Soft-error Reliability on the Cheap.

Shuguang Feng, Shantanu Gupta, Amin Ansari, and Scott Mahlke.

Proceedings of the 15th International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS-15), March 2010.

Maestro: Orchestrating Lifetime Reliability in Chip Multiprocessors.

Shuguang Feng, Shantanu Gupta, Amin Ansari, and Scott Mahlke.

Proceedings of the 2010 International Conference on High Performance Embedded Architectures and Compilers (HiPEAC), January 2010.

ZerehCache: Armoring Cache Architectures in High Defect Density Technologies.

Amin Ansari, Shantanu Gupta, Shuguang Feng, and Scott Mahlke.

Proceedings of the 42nd International Symposium on Microarchitecture (MICRO-42), December 2009.

Adaptive Online Testing for Efficient Hard Fault Detection.

Shantanu Gupta, Amin Ansari, Shuguang Feng, and Scott Mahlke.

Proceedings of the 27th International Conference on Computer Design (ICCD-27), October 2009.

Enabling Ultra Low Voltage System Operation by Tolerating On-Chip Cache Failures.

Amin Ansari, Shuguang Feng, Shantanu Gupta, and Scott Mahlke.

Proceedings of the 2009 International Symposium on Low Power Electronics and Design (ISLPED), August 2009.

The StageNet Fabric for Constructing Resilient Multicore Systems.

Shantanu Gupta, Shuguang Feng, Amin Ansari, Jason Blome, and Scott Mahlke.

Proceedings of the 41st International Symposium on Microarchitecture (MICRO-41), November 2008.

A Reconfigurable Microarchitecture Building Block for Resilient CMP Systems.

Shantanu Gupta, Shuguang Feng, Amin Ansari, Jason Blome, and Scott Mahlke.

Proceedings of the International Conference on Compilers, Architecture, and Synthesis for Embedded Systems (CASES), October 2008.

Self-calibrating Online Wearout Detection.

Jason A. Blome, Shuguang Feng, Shantanu Gupta, and Scott Mahlke.

Proceedings of the 40th International Symposium on Microarchitecture (MICRO-40), December 2007.

Cost-Efficient Soft Error Protection for Embedded Microprocessors.

Jason A. Blome, Shantanu Gupta, Shuguang Feng, Scott Mahlke and Daryl Bradley.

Proceedings of the 2006 International Conference on Compilers, Architectures, and Synthesis for Embedded Systems (CASES), October 2006.

JOURNAL
PUBLICATIONS

A Reconfigurable Fabric for Constructing Dependable CMPs.

Shantanu Gupta, Shuguang Feng, Amin Ansari, and Scott Mahlke.

To appear in IEEE Transactions on Computers, 2010.

Maximizing Spare Utilization by Virtually Reorganizing Faulty Cache Lines.

Amin Ansari, Shantanu Gupta, Shuguang Feng, and Scott Mahlke.

To appear in IEEE Transactions on Computers, 2010.

WORKSHOP
PUBLICATIONS

Olay: Combat the Signs of Aging with Introspective Reliability Management.

Shuguang Feng, Shantanu Gupta, and Scott Mahlke.

The Workshop on Quality-Aware Design (W-QUAD) held in conjunction with ISCA-35, June 2008.

StageNet: A Reconfigurable CMP Fabric for Resilient Systems.

Shantanu Gupta, Shuguang Feng, Jason A. Blome, and Scott Mahlke.

The Second Annual Reconfigurable and Adaptive Architecture Workshop (RAAW-2) held in conjunction with MICRO-40, December 2007.

Online Timing Analysis for Wearout Detection.

Jason A. Blome, Shuguang Feng, Shantanu Gupta, and Scott Mahlke.

The Second Workshop on Architectural Reliability (WAR-2) held in conjunction with MICRO-39, December 2006.

RELEVANT
GRADUATE
COURSES

- EECS573: Microarchitecture
- EECS570: Parallel Computer Architecture
- EECS583: Advanced Compilers
- EECS427: VLSI
- EECS492: Artificial Intelligence