

Alex Shye

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| RESEARCH INTERESTS | <p>Main Research Area: Computer Architecture and Systems</p> <ul style="list-style-type: none">- <i>The User in Computer Architecture:</i> User perception of computer performance, understanding the user via empathic input devices, characterizing real user activity, user-aware power optimizations- <i>Hardware-software Interaction:</i> Hardware-supported performance monitoring, binary instrumentation, dynamic binary compilation, static and dynamic program analysis/optimization, software for multicore architectures- <i>Embedded/Mobile Architectures:</i> Power modeling, characterizing and modeling real usage activity, improving energy efficiency- <i>Memory Systems:</i> Memory systems performance, dynamic memory allocation- <i>Reliability:</i> Software-implemented fault tolerance, understanding the propagation of transient faults |
| EDUCATION | <p>Northwestern University – Evanston, IL 2007–2010 (expected) <i>Ph.D. candidate in Electrical and Computer Engineering</i></p> <ul style="list-style-type: none">- Doctoral Dissertation: Incorporating the End User into the Architectural Design Process- Adviser: Professor Gokhan Memik <p>University of Colorado – Boulder, CO 2005–2007 <i>Ph.D. student in Computer Engineering</i></p> <p>University of Colorado – Boulder, CO 2003–2005 <i>M.S. degree in Computer Engineering</i></p> <ul style="list-style-type: none">- M.S. Thesis: Exploring the Potential of Performance Monitoring Hardware to Support Run-time Optimization- Adviser: Professor Daniel A. Connors <p>University of Illinois – Urbana-Champaign, IL 1998–2002 <i>B.S. degree in Computer Engineering</i></p> |
| ACADEMIC EXPERIENCE | <p>Northwestern University – Evanston, IL Fall 2007–present <i>Research Assistant</i></p> <ul style="list-style-type: none">- Involved in ESP: Empathic Systems Project.- Exploring novel methods of leveraging the perception, physiological traits, and activity of the end user for characterizing and optimizing computer architectures. <p>University of Colorado – Boulder, CO Spring 2006, Spring 2007 <i>Research Assistant</i></p> <ul style="list-style-type: none">- Research on software-implemented transient fault tolerance. |
| TEACHING EXPERIENCE | <p>Northwestern University – Evanston, IL Winter 2008 <i>Teaching Assistant :: EECS 230 - Programming for Engineers</i></p> <ul style="list-style-type: none">- Introductory C++ programming class for non-computer engineers.- Hold recitation, creating programming assignments, hold office hours and grade assignments/tests. <p>University of Colorado – Boulder, CO Fall 2004, Spring 2005 <i>Teaching Assistant :: ECEN 2120 - Computers as Components</i></p> <ul style="list-style-type: none">- Basic computer organization and programming on a Motorola 68000.- Lead two lab sections in assembly programming course for the Motorola 68000, hold office hours, and grade assignments. |
| INDUSTRY EXPERIENCE | <p>Advanced Micro Devices Inc. – Boxborough, MA Summer 2008–present <i>Co-op, Computing Solutions Group</i></p> <ul style="list-style-type: none">- On advanced development team working on an x86 dynamic binary optimizer.- Work on improving region selection, patching regions, and program analysis/optimizations. |

Google Inc. – Mountain View, CA Summer 2007
Summer Intern, Cluster Performance Analysis Group

- Develop a profiling tool for using hardware performance monitoring and dynamic instrumentation to study the cache miss behavior of dynamically allocated memory.

Intel Corp. – Nashua, NH Summer–Fall 2006
Intern, Dynamic Optimization Laboratory

- Develop a profile-directed dynamic memory allocator that uses allocation characteristics and memory reference behavior to choose between specialized memory allocators.

IBM T.J. Watson Research Center – Yorktown Heights, NY Summer 2005
Summer Intern, Programming Models and Tools for Scalable Systems

- Explored several methods of detecting locality in a sampled data reference stream for allocating data to large pages.

JOURNAL PUBLICATIONS [TDSC] [Alex Shye](#), Joseph Blomstedt, Tipp Moseley, Vijay Janapa Reddi, and Daniel A. Connors. **PLR: A Software Approach to Transient Fault Tolerance for Multi-Core Architectures.** *IEEE Transactions on Dependable and Secure Computing*. April-June 2009 (vol. 6 no. 2) pp. 135-148.

CONFERENCE PUBLICATIONS [SIGMETRICS] [Alex Shye](#), Ben Scholbrock, Gokhan Memik, Peter A. Dinda. **Characterizing and Modeling User Activity on Smartphones.** *ACM Intl. Conf. on Measurement and Modeling of Computer Systems*. New York, NY. June 14-18, 2010. [Poster paper] Acceptance Rate: 28.9% (29 regular + 24 poster/184)

[MICRO] [Alex Shye](#), Ben Scholbrock, Gokhan Memik. **Into the Wild: Studying Real User Activity Patterns to Guide Power Optimizations for Mobile Architectures.** *42nd IEEE/ACM Intl. Symp. on Microarchitecture*. New York, NY. December 12-16, 2009. Acceptance Rate: 24.8% (52/210)

[MICRO] [Alex Shye](#), Yan Pan, Ben Scholbrock, J. Scott Miller, Gokhan Memik, Peter A. Dinda, and Robert P. Dick. **Power to the People: Leveraging Human Physiological Traits to Control Microprocessor Frequency.** *41st IEEE/ACM Intl. Symp. on Microarchitecture*. Lake Como, Italy. December 1-5, 2008. Acceptance Rate: 19.0% (40/210)
* *Best Paper Award Nominee* (Top 8 papers selected by PC)

[ISCA] [Alex Shye](#), Berkin Ozisikyilmaz, Arindam Mallik, Gokhan Memik, Peter A. Dinda, Robert P. Dick, and Alok N. Choudhary. **Learning and Leveraging the Relationship between Architecture-Level Measurements and Individual User Satisfaction.** *35th ACM/IEEE Intl. Symp. on Computer Architecture*. Beijing, China. June 21-25, 2008. Acceptance Rate: 14.3% (37/259)

[AHS] Dan Fay, [Alex Shye](#), Sayantan Bhattacharya, Steve Wichmann and Daniel A. Connors. **An Adaptive Fault-Tolerant Memory System for FPGA-based Architectures in the Space Environment.** *3rd NASA/ESA Conf. on Adaptive Hardware Systems*. Edinburgh, UK. August 5-8, 2007.

[DSN] [Alex Shye](#), Tipp Moseley, Vijay Janapa Reddi, Joseph Blomstedt and Daniel A. Connors. **Using Process-Level Redundancy to Exploit Multiple Cores for Transient Fault Tolerance.** *37th IEEE/IFIP Intl. Conf. on Dependable Systems and Networks*. Edinburgh, UK. June 25-28, 2007. DCCS Session Acceptance Rate: 25.0% (53/212)

[CGO] Tipp Moseley, [Alex Shye](#), Vijay Janapa Reddi, Dirk Grunwald and Ramesh Peri. **Shadow Profiling: Hiding Instrumentation Costs with Parallelism.** *IEEE/ACM Intl. Symp. on Code Generation and Optimization*. San Jose, CA. March 11-14, 2007. Acceptance Rate: 32.1% (27/84).
* *Runner-up for Best Paper Award* (Voted by conference attendees)

[AADEBUEG] [Alex Shye](#), Matthew Iyer, Vijay Janapa Reddi, Daniel A. Connors. **Code Coverage Testing Using Hardware Performance Monitoring Support.** *6th ACM Intl. Symp. on Automated and Analysis-Driven Debugging*. Monterey, CA. September 19-21, 2005. Acceptance Rate: 60.0% (18/30)

[CF] Tipp Moseley, [Alex Shye](#), Vijay Janapa Reddi, Matthew Iyer, Dan Fay, Dave Hodgdon, Joshua L. Kihm, Alex Settle, Dirk Grunwald, Daniel A. Connors. **Dynamic Run-time Architecture Techniques for Enabling Future Multithreaded Multiprocessors.** *2nd ACM Intl. Conf. on Computing Frontiers*. Ischia, Italy. May 4-6, 2005. Acceptance Rate: 40.6% (43/106)

- WORKSHOP PUBLICATIONS [ASPLOS-WACI] [Alex Shye](#), Lei Yang, Xi Chen, Berkin Ozisikyilmaz, Arindam Mallik, Bin Lin, Gokhan Memik, Peter A. Dinda, and Robert P. Dick. **Empathic Computer Architectures and Systems**. *13th ACM Intl. Conf. on Architectural Support for Programming Languages and Operating Systems: Wild and Crazy Ideas Session*. Seattle, WA. March 3, 2008.
- [WBIA] [Alex Shye](#), Vijay Janapa Reddi, Tipp Moseley, Daniel A. Connors. **Transient Fault Tolerance via Dynamic Process-Level Redundancy**. *2nd Workshop on Binary Instrumentation and Applications in conjunction with ASPLOS-XII*. San Jose, CA. October 21-25, 2006.
- [INTERACT] [Alex Shye](#), Matthew Iyer, Tipp Moseley, David Hodgdon, Dan Fay, Vijay Janapa Reddi, Daniel A. Connors. **Analysis of Path Profiling Information Generated with Performance Monitoring Hardware**. *9th Workshop on Interaction between Compilers and Computer Architecture in conjunction with HPCA-11*. San Francisco, CA. February 12-14, 2005.
- TECHNICAL REPORTS [Alex Shye](#). **Exploring the Potential of Performance Monitoring Hardware to Support Runtime Optimization**. M.S. Thesis. Department of Electrical and Computer Engineering, University of Colorado. May, 2005.
- PATENTS Steven T. Tye, Michael Bedy, Richard L. Ford, [Alex Shye](#). **Selecting Regions of Hot Code in a Dynamic Binary Rewriter**. Patent pending.
- [Alex Shye](#), Yan Pan, Ben Scholbrock, J. Scott Miller, Gokhan Memik, Peter A. Dinda, and Robert P. Dick. **Power to the People: Leveraging Human Physiological Traits to Control Microprocessor Frequency**. Patent pending. 20817US01 (NU 29082)
- [Alex Shye](#), Berkin Ozisikyilmaz, Arindam Mallik, Gokhan Memik, Peter A. Dinda, Robert P. Dick, and Alok N. Choudhary. **Learning and Leveraging the Relationship between Architecture-Level Measurements and Individual User Satisfaction**. Patent pending. 20818US01 (NU 29083)
- TALKS/ POSTERS **Into the Wild: Studying Real User Activity Patterns to Guide Power Optimizations for Mobile Architectures**. *42nd IEEE/ACM Intl. Symp. on Microarchitecture (MICRO)*. New York, NY. December 14, 2009.
- Power to the People: Leveraging Human Physiological Traits to Control Microprocessor Frequency**. *41st IEEE/ACM Intl. Symp. on Microarchitecture (MICRO)*. Lake Como, Italy. November 11, 2008.
- Learning and Leveraging the Relationship between Architecture-Level Measurements and Individual User Satisfaction**. *35th ACM/IEEE Intl. Symp. on Computer Architecture (ISCA)*. Beijing, China. June 25, 2008.
- Empathic Computer Architectures and Systems**. *13th ACM Intl. Conf. on Architectural Support for Programming Languages and Operating Systems: Wild and Crazy Ideas Session (ASPLOS-WACI)*. Seattle, WA. March 3, 2008.
- Using Process-Level Redundancy to Exploit Multiple Cores for Transient Fault Tolerance**. *37th IEEE/IFIP Intl. Conf. on Dependable Systems and Networks (DSN)*. Edinburgh, UK. June 27, 2007.
- SNAKES: A Software Framework for Transparent, Replica-based, Transient Fault Tolerance**. *ACM Student Research Competition held at PLDI 2007 Poster Session in conjunction with FCRC/PLDI (ACM-SRC)*. San Diego, CA. June 10, 2007. [Poster]
- Attack of the Clones: Using Process Replicas in Multi-core Systems**. *Front Range Architecture Compilers Tools and Languages Workshop (FRACTAL)*. Fort Collins, CO. February 10, 2007. [Invited Talk]
- Transient Fault Tolerance via Dynamic Process-Level Redundancy**. *2nd Workshop on Binary Instrumentation and Applications in conjunction with ASPLOS-XII (WBIA)*. San Jose, CA. October 22, 2006.
- Code Coverage Testing Using Hardware Performance Monitoring Support**. *6th ACM Intl. Symp. on Automated and Analysis-Driven Debugging (AADEBUB)*. Monterey, CA. September 21, 2005.
- Analysis of Path Profiling Information Generated with Performance Monitoring Hardware**. *9th Workshop on Interaction between Compilers and Computer Architecture in conjunction with HPCA-11 (INTERACT)*. San Francisco, CA. February 13, 2005.

AWARDS **Nominee**, Best Paper Award – MICRO 2008 (Top 8 papers selected by PC)
Runner-up, Best Paper Award – CGO 2007 (Voted by conference attendees)
Recipient, Walter P. Murphy Fellowship – Northwestern University 2007

PROFESSIONAL **External Reviewer:**
ACTIVITIES – Intl. Conf. on Architectural Support for Programming Languages and Operating Systems (**ASPLOS**)
 – 2009
 – Intl. Symp. on Code Generation and Optimization (**CGO**) - 2006, 2007
 – Design, Automation, and Test in Europe (**DATE**) - 2009, 2010
 – Great Lakes Symp. on VLSI (**GLSVLSI**) - 2008
 – Intl. Conf. on Computer Design (**ICCD**) - 2005
 – Intl. Conf. on Parallel Processings (**ICPP**) - 2009
 – Workshop on Interaction between Compilers and Computer Architectures (**INTERACT**) - 2006
 – Symp. on Applied Computing (**SAC**) - 2008, 2009
 – IEEE Transactions on Computers (**TC**) - 2008
 – IEEE Transactions on Embedded Computing Systems (**TECS**) - 2006

Committee member, Northwestern Grads in EECS (GEECS) - 2007–present
Student member, IEEE, ACM, ACM SIGPLAN, ACM SIGARCH

PERSONAL **Citizen**, United States of America.
References, Available upon request.
Webpage, <http://www.ece.northwestern.edu/~ash451>