

Who's Who in CS Systems – University of Michigan

Presented by
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UMich - Computer Science Department

- 45 faculty members
- The first degree was awarded in 1959
- Part of the EECS department with over 90 faculty members

Systems Research - Labs

- [Advanced Computer Architecture Laboratory \(ACAL\)](#)
- [Real Time Computing Laboratory \(RTCL\)](#)
- [Center for Wireless Communications Research](#)
- [Software Systems Laboratory](#)
- [Artificial Intelligence Laboratory \(AI\)](#)

Systems Research - People

- Kang Shin – Networks
- Peter Chen – OS
- Brian Noble – OS, Pervasive Computing
- Jason Flinn – Pervasive Computing
- Farnam Jahanian - Networks
- Trevor Mudge - Architecture
- Todd Austin - Architecture
- Steven Reinhardt - Architecture
- Chandrasekhar Boyapati - Compilers

Kang Shin

- Kevin and Nancy O'Connor Professor of Computer Science
- Ph.D in Electrical Engineering from Cornell University in 1978
- Founding Director of the [Real-Time Computing Laboratory](#) (RTCL)
- Current research focus:
 - QoS-sensitive networking and computing as well as embedded real-time OS, middleware and applications, with emphasis on timeliness and dependability.
- Supervised 56 PhD theses, and authored/coauthored more than 650 technical papers (235 of which are in archival journals)
- Co-authored (jointly with C. M. Krishna) a textbook - Real-Time Systems, McGraw Hill, 1997.
- Fellow of IEEE and ACM
- Member of the Korean Academy of Engineering
- General Chair – MobiSys 2005

Kang Shin – Projects

- [Software Systems Group](#)
 - [Virtualization](#)
 - [Real-Time Embedded Systems](#)
- [Networking Group](#)
 - [Cognitive Radio Networks](#)
 - [Wireless Mesh and Mobile Community Networks](#)
 - [Wireless Sensor Networks](#)
 - [Internet QoS and Routing](#)
- [Security Group](#)

Kang Shin – Papers

- ⑩ Pradeep Padala, Xiaoyun Zhu, Mustafa Uysal, Zhikui Wang, Sharad Singhal, Arif Merchant, Kenneth Salem and Kang G. Shin. **Adaptive control of virtualized resources in utility computing environments.** *EuroSys 2007*
- Kyu-Han Kim and Kang G. Shin. **On Accurate Measurement of Link Quality in Multi-hop Wireless Mesh Networks.** *MOBICOM 2006.*
- ⑩ Kyu-Han Kim and Kang G. Shin. **Improving TCP Performance over Wireless Networks with Collaborative Multi-homed Mobile Hosts.** *MOBISYS 2005*
- Hai Huang, Wanda Hung, Kang G. Shin. **FS2: Dynamic Data Replication in Free Disk Space for Improving Disk Performance and Energy Consumption.** *SOSP 2005*
- Haining Wang, Abhijit Bose, Mohamed El-Gendy and Kang G. Shin. **IP Easy-pass: Edge Resource Access Control.** *INFOCOM 2004.*
- Padmanabhan Pillai and Kang G. Shin. **Real-Time Dynamic Voltage Scaling for Low-Power Embedded Operating Systems.** *SOSP' 2001*
- K. M. Zuberi, P. Pillai, and K. G. Shin. **EMERALDS: A Small-Memory Real-Time Microkernel.** *SOSP 1999*
- Sunghyun Choi and Kang G. Shin. **Predictive and Adaptive Bandwidth Reservation for Hand-Offs in QoS-Sensitive Cellular Networks.** *SIGCOMM' 1998*
- Sunghyun Choi and Kang G. Shin. **Uplink CDMA Systems with Diverse QoS Guarantees for Heterogeneous Traffic.** *MobiCom 1997*
- J. Rexford, J. Hall, and K. G. Shin. **A router architecture for real-time point-to-point networks.** *ISCA 1996*
- K. G. Shin and S. Daniel. **Analysis and implementation of hybrid switching.** *ISCA 1995*

Peter Chen

- **Arthur F. Thurnau Professor** (Awarded in 2007)
 - Ph.D. in Computer Science from the University of California at Berkeley in 1992.
 - Advisor – David Patterson
 - Worked on the RAID project
- Member of the Software Systems Lab, and the Advanced Computer Architecture Lab
- Research Interests:
 - operating systems, databases, and distributed systems
- Current research project:
 - Use of virtual machines to provide security services.
- Past research projects:
 - [Rio \(RAM I/O\)](#) - investigated how to implement and use reliable memory.
 - [ARMADA](#) - A Real-time Middleware Architecture for Distributed Applications
- Trivia:
 - Created a new course called *Microprocessors and Music*. In this course, four-person teams build a music synthesizer in one term.

Peter Chen – Projects and Papers

- **Virtual-machine based security services (formerly CoVirt)**
 - Samuel T. King, Peter M. Chen, Yi-Min Wang, Chad Verbowski, Helen J. Wang, Jacob R. Lorch, "[SubVirt: Implementing malware with virtual machines](#)", **IEEE Symposium on Security and Privacy 2006**
 - Ashlesha Joshi, Samuel T. King, George W. Dunlap, Peter M. Chen, "[Detecting past and present intrusions through vulnerability-specific predicates](#)", **SOSP 2005**
 - Samuel T. King, George W. Dunlap, Peter M. Chen, "[Debugging operating systems with time-traveling virtual machines](#)", **Annual USENIX Technical Conference 2005. Best Paper Award.**
 - Samuel T. King, Peter M. Chen, "[Backtracking Intrusions](#)", **SOSP 2003. Award paper.**
 - Samuel T. King, George W. Dunlap, Peter M. Chen, "[Operating System Support for Virtual Machines](#)", **Annual USENIX Technical Conference, 2003**
 - ⑩ George W. Dunlap, Samuel T. King, Sukru Cinar, Murtaza Basrai, Peter M. Chen, "[ReVirt: Enabling Intrusion Analysis through Virtual-Machine Logging and Replay](#)", **OSDI 2002**
 - ⑩ David E. Lowell, Subhachandra Chandra, Peter M. Chen "[Exploring Failure Transparency and the Limits of Generic Recovery](#)", **OSDI 2000**

Peter Chen – Projects and Papers

- ⑩ **Earlier work:**
 - ⑩ David E. Lowell, Peter M. Chen, "[Free Transactions with Rio Vista](#)", **Proceedings of the 1997 Symposium on Operating Systems Principles (SOSP), October 1997**
 - Wee Teck Ng, Peter M. Chen, "[Integrating Reliable Memory in Databases](#)", **International Conference on Very Large Data Bases (VLDB) 1997 Best Paper Award.**
 - ⑩ Peter M. Chen, Wee Teck Ng, Subhachandra Chandra, Christopher Aycock, Gurushankar Rajamani, David Lowell, "[The Rio File Cache: Surviving Operating System Crashes](#)", **ASPLOS 1996**
 - Peter M. Chen, Edward K. Lee, "[Striping in a RAID Level 5 Disk Array](#)", **SIGMETRICS 1995.**
 - ⑩ Ann L. Drapeau, Ken Shirriff, Edward K. Lee, Peter M. Chen, Garth A. Gibson, John H. Hartman, Ethan L. Miller, Srinivasan Seshan, Randy H. Katz, Ken Lutz, David A. Patterson, "[RAID-II: A High-Bandwidth Network File Server](#)", **ISCA 1994.**
 - ⑩ Peter M. Chen, David A. Patterson, "[A New Approach to I/O Performance Evaluation--Self-Scaling I/O Benchmarks, Predicted I/O Performance](#)", **SIGMETRICS 1993. Best Paper Award.**
 - ⑩ Peter M. Chen, David A. Patterson, "[Maximizing Performance in a Striped Disk Array](#)", **ISCA 1990.**
 - ⑩ Peter M. Chen, Garth A. Gibson, Randy H. Katz, David A. Patterson, "[An Evaluation of Redundant Arrays of Disks Using an Amdahl 5890](#)", **SIGMETRICS 1990.**
 - ⑩ Margo I. Seltzer, Peter M. Chen, John K. Ousterhout, "[Disk Scheduling Revisited](#)", **USENIX Technical Conference 1990. Best Student Paper Award.**
 - ⑩ David A. Patterson, Peter M. Chen, Garth Gibson, Randy H. Katz, "Introduction to Redundant Arrays of Inexpensive Disks (RAID)", **COMPCON 1989.**

Brian Noble

- Associate Professor
- Ph.D. in Computer Science from Carnegie Mellon University in 1998
 - Advisor – M Satyanarayanan
 - worked on the Odyssey and Coda projects
 - **Agile Application-Aware Adaptation for Mobility (Citations – 275/572 in Citeseer/Scholar r.ly.)**
 - Noble, B., Satyanarayanan, M., Narayanan, D., Tilton, J.E., Flinn, J., Walker, K. Proceedings of the 16th ACM Symposium on Operating System Principles, October 1997
- Research Focus:
 - software supporting mobile computing systems, measuring and monitoring such systems, and building toolkits to help make these tasks simpler

Brian Noble - Papers

- Landon P. Cox and Brian D. Noble. [Samsara: Honor Among Thieves in Peer-to-Peer Storage](#). In the *19th ACM Symposium on Operating Systems Principles, 2003*
- Landon P. Cox, Christopher D. Murray, and Brian D. Noble. [Pastiche: Making Backup Cheap and Easy](#). In the *Fifth Symposium on Operating Systems Design and Implementation, 2002*
- M. Corner and B. D. Noble. [Protecting Applications with Transient Authentication](#). In the *First International Conference on Mobile Systems, Applications, and Services (MobiSys '03)*
- M. Corner and B. D. Noble. [Zero-Interaction Authentication](#). In the *Eighth ACM Conference on Mobile Computing and Networking (MobiCom '02)*
- Minkyong Kim, Landon P. Cox, and Brian D. Noble. [Safety, Visibility, and Performance in a Wide-Area File System](#). In the *First Conference on File and Storage Technologies. (FAST) 2002*

Jason Flinn

- Assistant Professor
- PhD from Carnegie Mellon University in 2001
 - Advisor – M Satyanarayanan
 - worked on the Odyssey project
 - *Energy-Aware Adaptation for Mobile Applications* Jason Flinn and M. Satyanarayanan SOSP 1999.
- Research Interests:
 - software systems for pervasive computing
 - novel storage architectures that provide consistency and reliability without compromising on performance
 - enabling demanding applications to run on small, mobile computers

Jason Flinn – Projects and Papers

- **Speculator: Generic support for speculative execution in the Linux kernel**
 - *Speculative Execution in a Distributed File System* Edmund B. Nightingale, Peter M. Chen, and Jason Flinn **SOSP 2005. Award paper.**
 - *Rethink the Sync* Edmund B. Nightingale, Kaushik Veeraraghavan, Peter M. Chen, and Jason Flinn **OSDI 2006. Best paper award.**
- **BlueFS: A distributed file system for pervasive computing**
 - *Energy-Efficiency and Storage Flexibility in the Blue File System* Edmund B. Nightingale and Jason Flinn **OSDI 2004.**
 - *EnsemBlue: Integrating Distributed Storage and Consumer Electronics* Daniel Peek and Jason Flinn **OSDI 2006.**
 - *Cobalt: Separating content distribution from authorization in distributed file systems* **FAST 2007.**

Jason Flinn – Projects and Papers

- **Self-tuning power management**
 - *Self-Tuning Wireless Network Power Management* Manish Anand, Edmund B. Nightingale, and Jason Flinn **MOBICOM 2003.**
 - *Ghosts in the Machine: Interfaces for Better Power Management* Manish Anand, Edmund B. Nightingale, and Jason Flinn **MOBISYS 2004. Best paper award.**
- **Slingshot: support for mobile services**
 - *Slingshot: Deploying Stateful Services in Wireless Hotspots* Ya-Yunn Su and Jason Flinn **MOBISYS 2005.**
- **Data staging**
 - *Data Staging on Untrusted Surrogates* Jason Flinn, Shafeeq Sinnamohideen, Niraj Tolia, and M. **FAST 2003.**



Farnam Jahanian

- Professor
- Ph.D. in Computer Science from the University of Texas at Austin.
- Co-founder [Arbor Networks, Inc.](#)
 - Based out of Lighthouse Project (late 90s – DARPA/Cisco) - flow-based system for detecting, backtracing and resolving network-wide anomalies such as DDoS attacks and routing exploits
- Affiliated with the [Software Systems Lab](#)
- Research focus
 - scalability, dependability and security of networked systems and applications
- Selected papers:
 - Craig Labovitz, Abha Ahuja, Abhijit Bose, and Farnam Jahanian, **An Experimental Study of BGP Convergence**, **SIGCOMM 2000**
 - G. Robert Malan and Farnam Jahanian, **An Extensible Probe Architecture for Network Protocol, Performance Measurement**, **SIGCOMM 1998**
 - Ⓜ C. Labovitz, G.R. Malan, and F. Jahanian, **"Internet Routing Instability," SIGCOMM 1997. Best Student Paper Award**



Trevor Mudge

- **Bredt Family Professor of Engineering**
- PhD from U Illinois
- Affiliated to the Advanced Computer Architecture Lab
- Research Focus:
 - Computer Architecture and Compilers focusing on ultra-low power computers and application specific computers.
- Selected Papers:
 - D. Ernst, S. Das, S. Lee, D. Blaauw, T. Austin, T. Mudge, N. S. Kim, and K. Flautner. [Razor: circuit-level correction of timing errors for low-power operation](#). *IEEE MICRO* 2004, Selected as a "Top pick" from the top microarchitecture conferences of 2003/4 (Micro-36, HPCA 10, ISCA 31, PACT 2004, ASPLOS XI).
 - K. Flautner and T. Mudge. [Vertigo: Automatic performance-setting for Linux](#). *OSDI* 2002
 - K. Flautner, S. Reinhardt, and T. Mudge. [Automatic performance setting for dynamic voltage scaling](#). *MOBICOM* 2001
 - V. Cuppu, B. Jacob, B. Davis, T. Mudge. [A performance comparison of contemporary DRAM architectures](#). *ISCA* 1999



Todd Austin

- Associate Professor
- PhD from Univ of Wisconsin, Madison
- Co-Founder, SimpleScalar LLC
- Co-Founder, InTempo Design LL
- Resilient System Design Thrust Leader, [Gigascale System Research Consortium](#)
- Selected Papers:
 - Kypros Constantinides, Smitha Shyam, Sujay Phadke, Valeria Bertacco and Todd Austin, "[Ultra Low-Cost Defect Protection for Microprocessor Pipelines](#)", *ASPLOS* 2006.
 - Leyla Nazhandali, Bo Zhai, Ryan Helfand, Michael Minuth, Javin Olson, Sanjay Pant, Anna Reeves, Todd Austin, and David Blaauw, "[Energy Optimization of Subthreshold-Voltage Sensor Processors](#)," *ISCA* 2005
 - Todd Austin, Eric Larson, and Dan Ernst, "[SimpleScalar: An Infrastructure for Computer System Modeling](#)," *IEEE Computer*, 2002.



Steven Reinhardt

- Associate Professor
- Ph.D., University of Wisconsin
- Currently on leave at [Reservoir Labs, Inc.](#)
- Current Projects:
 - *Network-Oriented System Architectures.*
 - *Novel Architectures for Large Caches.*
- Selected Recent Papers
 - *QoS Policies and Architecture for Cache/Memory in CMP Platforms.* R. Iyer, L. Zhao, F. Guo, R. Illikkal, S. Makineni, D. Newell, Y. Solihin, L. Hsu, and S. Reinhardt. *SIGMETRICS* 2007.
 - *PicoServer: Using 3D Stacking Technology To Enable A Compact Energy Efficient Chip Multiprocessor.* T. Kgil, S. D'Souza, A. Saidi, N. Binkert, R. Dreslinski, S. Reinhardt, K. Flautner, T. Mudge. *ASPLOS* 2006
 - *Integrated Network Interfaces for High-Bandwidth TCP/IP.* N. L. Binkert, A. G. Saidi, S. K. Reinhardt. *ASPLOS* 2006
 - *Techniques to Reduce the Soft Error Rate of a High-Performance Microprocessor.* C. Weaver, J. Emer, S. S. Mukherjee, and S. K. Reinhardt. *ISCA* 2004.



Chandrsekhar Boyapati

- Assistant Professor
- PhD from MIT, 2004
 - Advisor – Martin Rinard
 - Thesis: [SafeJava: A Unified Type System for Safe Programming](#)
- Research Focus:
 - Software Reliability: by means of developing programming languages with strong type systems and efficient software model checking techniques
- Selected Papers:
 - [Efficient Software Model Checking of Data Structure Properties](#), Paul Darga and Chandrasekhar Boyapati. OOPSLA 2006
 - [Ownership Types for Safe Region-Based Memory Management in Real-Time Java](#), Chandrasekhar Boyapati, Alexandru Salcianu, William Beebe, Martin Rinard. PLDI 2003.
 - [Ownership Types for Safe Programming: Preventing Data Races and Deadlocks](#), Chandrasekhar Boyapati, Robert Lee, Martin Rinard. OOPSLA 2002
 - [Korat: Automated Testing Based on Java Predicates](#), Chandrasekhar Boyapati, Sarfraz Khurshid, Darko Marinov. ISSTA 2002. **ACM SIGSOFT Distinguished Paper Award.**