Glenn Judd

(412) 606-1228
28A Minton Ave.
Chatham, NJ 07928

glennj@cs.cmu.edu
http://www.cs.cmu.edu/~glennj

RESEARCH INTERESTS

Wireless Networking and Communication, Networked Systems, Pervasive Computing

EDUCATION

Carnegie Mellon University, Pittsburgh, Pennsylvania.
Ph.D., Computer Science, October 2006.
Dissertation: *Using Physical Layer Emulation to Understand and Improve Wireless Networks*

Brigham Young University, Provo, Utah.
M.S., Computer Science, April 1999.
Thesis: *Distributed Object Group Management Architecture*

Brigham Young University, Provo, Utah.
B.S., *Magna Cum Laude*, Computer Science (Math Minor), August 1996.

AWARDS

Intel Foundation Ph.D. Fellowship. 2004-2005.

National Defense Science and Engineering Graduate Fellowship. 1999-2002.

BYU CS Department Incoming Graduate Student Assistantship

Four-year National Merit Scholarship.

PUBLICATIONS

Conference Papers

Using Physical Layer Emulation to Optimize and Evaluate Mobile and Wireless Systems. Peter Steenkiste, Mei-Hsuan Lu, Xiaohui Wang and Glenn Judd. Proceedings of Mobiquitous 2008. Dublin, Ireland. July 2008.

Efficient Channel-aware Rate Adaptation in Dynamic Environments. Glenn Judd, Xiaohui Wang, and Peter Steenkiste. Proceedings of MobiSys 2008. Breckenridge, Colorado. June 2008.

Understanding Link-level 802.11 Behavior: Replacing Convention with Measurement. Glenn Judd and Peter Steenkiste. **Best Paper**. Proceedings of WICON 2007. Austin, Texas. October 2007.

Design and Implementation of an RF Front End for Physical Layer Wireless Network Emulation. Glenn Judd and Peter Steenkiste. Proceedings of VTC 2007. Dublin, Ireland. April 2007.

Self-management in Chaotic Wireless Deployments. Aditya Akella, Glenn Judd, Srinivasan Seshan, and Peter Steenkiste. Proceedings of Mobicom 2005. Cologne, Germany. August 2005.

Using Emulation to Understand and Improve Wireless Networks and Applications. Glenn Judd and Peter Steenkiste. Proceedings of NSDI 2005. Boston, Massachusetts. May 2005.

A Measurement Study of a Rooftop 802.11b Mesh Network. Daniel Aguayo, John Bicket, Sanjit Biswas, Glenn Judd, Robert Morris. **Best Student Paper**. Proceedings of SIGCOMM 2004. Portland, Oregon. August 2004.

Context-aware Computing Using a Shared Contextual Information Service. Nancy Miller, Glenn Judd, Urs Hengartner, Fabien Gandon, Peter Steenkiste, I-Heng Meng, Ming-Whei Feng, Norman Sadeh. Proceedings of Pervasive 2004 Hot Spots. Vienna, Austria. April 2004.

Providing Contextual Information to Pervasive Computing Applications. Glenn Judd and Peter Steenkiste. Proceedings of Pervasive Computing 2003. Fort Worth, Texas. March 2003.

The DOGMA Approach to High-Utilization Supercomputing. Glenn Judd, Mark Clement, and Quinn Snell. Proceedings of the Seventh IEEE International Symposium on High Performance Distributed Computing (HPDC-7). Chicago, Illinois. July 1998.

Load Balancing in a Heterogeneous Supercomputing Environment. Quinn Snell, Glenn Judd, and Mark Clement. Proceedings of the International Conference on Parallel and Distributed Processing Techniques and Applications. July 1998.

Performance Surface Prediction for WAN-Based Clusters. Mark Clement, Glenn Judd, Joy Peterson, Bryan Morse, and Kelly Flanagan. Proceedings of the 31st Hawaii International Conference on System Sciences. January 1998.

Workshop Papers

A Software Architecture for Physical Layer Wireless Network Emulation. Glenn Judd and Peter Steenkiste. Proceedings of the First ACM International Workshop on Wireless Network Testbeds Experimental evaluation and Characterization. Los Angeles, California. September, 2006.

A Simple Mechanism for Capturing and Replaying Wireless Channels. Glenn Judd and Peter Steenkiste. Proceedings of the Workshop on Experimental Approaches to Wireless Network Design and Analysis. Philadelphia, Pennsylvania. August, 2005.

Repeatable and Realistic Wireless Experimentation through Physical Emulation. Glenn Judd and Peter Steenkiste. Proceedings of the Second Workshop on Hot Topics in Networking (HotNets-II). Cambridge, Massachusetts. November 2003.

DOGMA: Distributed Object Group Management Architecture. Glenn Judd, Mark Clement, and Quinn Snell. ACM Workshop on Java for High-Performance Network Computing. Palo Alto, California. February 1998.

Journal Papers

Characterizing Link-level 802.11 Behavior. Glenn Judd and Peter Steenkiste. Mobile Networks and Applications. To appear.

Self-management in Chaotic Wireless Deployments. Aditya Akella, Glenn Judd, Srinivasan Seshan, and Peter Steenkiste. Wireless Networks. October. 2006.

DOGMA: Distributed Object Group Metacomputing Architecture. Glenn Judd, Mark Clement, and Quinn Snell. Concurrency: Practice and Experience, Vol. 10(1), 1-7 (1998).

The Performance Surface Paradigm for WAN-Based Computing. Mark Clement, Glenn Judd, Bryan Morse, and Kelly Flanagan. Journal of Supercomputing. March 1999.

Refereed Extended Abstracts

Channel-aware Rate Adaptation via Reciprocity. Glenn Judd, Xiaohui Wang, and Peter Steenkiste. Mobicom 2007. Montreal, Quebec, Canada. September 2007.

Refereed Poster Presentations

Fixing 802.11 Access Point Selection. Glenn Judd and Peter Steenkiste. SIGCOMM 2002. Pittsburgh, Pennsylvania. August 2002.

A Bandwidth Advisor for Wireless Networks. Glenn Judd and Peter Steenkiste. SIGCOMM 2001. San Diego, California. August 2001.

Non-Refereed Publications

MPI for Java: Position Document and Draft API Specification. Bryan Carpenter, Vladimir Getov, Glenn Judd, Tony Skjellum, and Geoffrey Fox. JGF-TR-2 (presented at the Java Grande Forum meeting at Supercomputing '98).

Java Grande Forum Report. JGF-TR-1 (presented at the Java Grande Forum meeting at Supercomputing '98).

SERVICE

Program committee Mobicom 2008.
Program committee WiNTECH 2008.
Program committee WiNTECH 2007.

RESEARCH PROJECTS

Wireless Network Emulator. November 2002–present. My dissertation research involved the development of a new technique for wireless network experimentation: physical layer network emulation. This approach combines much of the control and repeatability of simulation with much of the realism of a wireless testbed. I developed custom hardware and software demonstrating the power of this approach, and constructed a functional emulator that is in active use by other CMU researchers. This emulator is actively used by remote researchers.

Wireless Transmit Rate Selection. November 2006–present. Wireless devices are faced with a fundamental tradeoff between the rate at which they transmit data and the distance over which they can communicate. I am currently assisting in the supervision of a graduate student examining this problem. Unlike many previous efforts, our approach treats this problem as fundamentally that of wireless channel prediction. By leveraging latent channel information, analyzing channel measurements, and emulation-based experimentation we are developing a more robust rate selection algorithm.

Scalable Cluster Resource Management. June 2007-Present. Clusters and supercomputers are traditionally governed by a centralized, monolithic scheduling/resource management system that manages the fine-grained details of tasks running on the system. As clusters scale into thousands and tens of thousands of nodes, however, this paradigm breaks down. Too often, the scheduler itself becomes a computational bottleneck. Moreover, traditional schedulers are inflexible and suited only to scheduling a single type of resource, typically a host or CPU. I have developed a scalable resource management system that allows a flexible, hierarchical management of resources, seamlessly scheduling CPUs, hosts, racks, or any other resource. This system decouples resource management from job scheduling and has demonstrated efficient scaling to thousands of nodes.

Scalable Cluster Storage. April 2008-Present. Large scale clusters are a commonly-used means of enabling high-performance computation. Too often, however, thousands of computers lie idle while they contend for a common storage resource. I am developing novel techniques for utilizing the local storage on each compute node to form a cohesive federated storage system with high aggregate throughput that scales with the number of nodes in the system.

Chaotic Networks. July 2004–May 2007. The massive uncoordinated deployment of unmanaged wireless devices in unlicensed spectrum creates the potential for widespread interference and contention for the wireless medium. I have recently investigated the characteristics of such *chaotic wireless*

networks, and I have developed means of reducing the interference between devices in them.

Contextual Information Service. July 2001–September 2003. Pervasive computing applications need access to environmental information in order to provide intelligent behavior to end users. As part of CMU's Project Aura, I developed a contextual information service that provides programmers declarative, energy-efficient access to contextual information while allowing freeing information provides from the complexity of processing declarative queries.

WLAN Access Point Load Balancing. June 2002–May 2003. This work demonstrated through traces and simulation that 802.11's minimal support for access point selection supported only one viable selection policy: select the access point with the best SNR. This resulted in extremely poor load balancing and thwarted network administrators' efforts to improve performance by adding access points. I developed a load sensitive access point selection solution to overcome these shortcomings, and demonstrated its effectiveness at balancing access point load without introducing oscillations.

Wireless Network Bandwidth Advisor. March 2000–September 2003. Developed a wireless network bandwidth advisor capable of providing applications with past and present wireless network performance. In addition, this bandwidth advisor provided applications with predictions of wireless network performance based in recently observed performance or historical averages. Thus, the bandwidth advisor enabled network-aware applications to modify their behavior according to the environment in which they were currently operating or the environment in which they would shortly be operating.

PATENTS

Device and Method for Programmable Wideband Network Emulation. Glenn Judd and Peter Steenkiste. United States Patent Application Number 11/274,530.

TEACHING

Teaching Assistant. Carnegie Mellon University. Operating System Design and Implementation (15-412). January 2001–May 2001.

Teaching Assistant. Carnegie Mellon University. Introduction to Telecommunication Networks. (18-345). September 2000–December 2000.

Teaching Assistant. Brigham Young University. Operating Systems Design (CS 345). January 1997–April 1997.

Teaching Assistant. Brigham Young University. Introduction to Programming (CS 142). September 1993–February 1994.

Teaching Assistant. Brigham Young University. Introduction to Assembly Language (CS 143). September 1993–February 1994.

MENTORING

Undergraduates
Scott Stork – Created software and FPGA code for modeling fast-fading channels in the wireless emulator.
Supaporn Erjongmanee – Integrated Service Location Protocol with Project Aura's Contextual Information Services.

Ph.D. Student
Xiaohui Wang – Investigating wireless transmit rate selection.

Masters Students
Swathi Koundinya – Developed control software for the wireless emulator.
Xia Geng – Developed contextual information synthesizer for Project Aura.

EMPLOYMENT

Strategist
Morgan Stanley, New York, New York
May 2007–Present

Postdoctoral Researcher
Carnegie Mellon University, Pittsburgh, Pennsylvania
October 2006–May 2007

Software Developer
IBM, Provo, Utah
August 1995–February 1997

Software Developer
AutoSimulations Inc., Provo, Utah.
February 1994–August 1995