

Anthony J. Nicholson

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Research Interests

Mobile and ubiquitous computing, networking, security, operating systems

Education

University of Michigan

Ann Arbor, Michigan

Ph.D. (Computer Science and Engineering), August 2008

Dissertation: *Systems-Level Support for Mobile Device Connectivity*

Advisor: Brian Noble

University of Kansas

Lawrence, Kansas

B.S. (Computer Engineering), *summa cum laude*, May 1999

Honors

Best Paper Award Finalist, ACM Mobicom 2008

Outstanding Graduate Student Instructor, Winter 2005

University of Michigan, Department of Electrical Engineering and Computer Science

Outstanding Senior, May 1999

University of Kansas, Department of Electrical Engineering and Computer Science

Publications

A.J. Nicholson, S. Wolchok, and B.D. Noble. "Juggler: Virtual Networks for Fun and Profit."
To appear in *IEEE Transactions on Mobile Computing (TMC)*.

A.J. Nicholson and B.D. Noble. "BreadCrumbs: Forecasting Mobile Connectivity." In *Proceedings of the 14th Annual International Conference on Mobile Computing and Networking (MobiCom)*, September 2008, San Francisco, California. **Best Paper Award Finalist**. Acceptance rate: 11.7%.

A.J. Nicholson, Y. Chawathe, M.Y. Chen, B.D. Noble, and D. Wetherall. "Improved Access Point Selection." In *Proceedings of the Fourth International Conference on Mobile Systems, Applications and Services (MobiSys)*, June 2006, Uppsala, Sweden. Acceptance rate: 15.8%.

A.J. Nicholson, I.E. Smith, J. Hughes, and B.D. Noble. "LoKey: Leveraging the SMS Network in Decentralized, End-to-End Trust Establishment." In *Proceedings of the Fourth International Conference on Pervasive Computing (Pervasive)*, May 2006, Dublin, Ireland. Acceptance rate: 13.5%.

A.J. Nicholson, J. Han, D. Watson, and B.D. Noble. "Exploiting Mobility for Key Establishment." In *Proceedings of the Seventh IEEE Workshop on Mobile Computing Systems and Applications (HotMobile)*, April 2006, Blaine, Washington. Acceptance rate: 33.3%.

A.J. Nicholson, M.D. Corner, and B.D. Noble. "Mobile Device Security Using Transient Authentication." In *IEEE Transactions on Mobile Computing (TMC)*, Vol. 5, No. 11, November 2006

Professional Experience

Trading Technologies, Senior Engineer

Chicago, Illinois

August 2008—present

Architected and implemented low-latency, realtime networking software to enable electronic trading of commodities futures and other financial instruments. I was responsible for investigating and proposing new protocols and designs, as well as implementing code in C++.

University of Michigan, Graduate Research Assistant

Ann Arbor, Michigan

January 2003—August 2008

My work focused on issues pertaining to truly mobile network usage scenarios. I developed Juggler, a virtual link layer for Linux that connects to multiple WiFi access points simultaneously using only one radio. I leveraged Juggler to provide nearly instantaneous handoff between access points, aggregate the backhaul bandwidth of multiple APs to form one high-bandwidth logical pipe, and support an ad-hoc side-channel with nearby devices without impacting foreground, infrastructure bandwidth. I also developed BreadCrumbs, a system for forecasting the quality and availability of upcoming network connectivity for mobile devices. BreadCrumbs maintains a personalized mobility model on the handheld device, and probes the quality of network connectivity available at different locations. Combining the predictions of the mobility model with the past network quality results yields connectivity forecasts—estimates of the quality of Internet connection that will be available to the mobile device at a given point in the future. In addition to these two projects, I previously worked on secure encryption key establishment over insecure networks, and collaborated on Transient Authentication, a system that used a wearable token as proof of a device owner's presence and automatically secures all data on the device while its owner is away in case of loss or theft.

Intel Research, Graduate Intern

Seattle, Washington

May-August 2005

I worked with researchers both at Intel-Seattle and the University of Washington. We explored how to improve wireless access point discovery and selection for mobile devices, to bring improved connectivity quality and availability to users. We found that selecting access points based on link-layer signal strength often correlates poorly with application-visible connection quality. I developed Virgil, an access point selection system that quickly probes the user-visible quality of all available access points before settling on an AP. Our results were published in MobiSys 2006.

Comverse Network Systems, Technical Programmer

New York City

February 2001 – August 2002

Developed telephony applications in C/C++ on BSD and UNIX, for embedded, interactive voice response (IVR) devices.

Lucent Technologies, Member of Technical Staff

Holmdel, New Jersey

June 1999 – February 2001

Developed embedded control software for DSL access multiplexers (DSLAMs) in C/C++. Experience with wide-area networking over IP, ATM, and telephony networks.

Teaching

Introduction to Operating Systems (EECS 482), Fall 2004, Winter 2005

I led two discussion sections, each consisting of approximately 20 undergraduate and graduate students. In addition to planning and leading discussions, I developed homework assignments and exam questions. I was also responsible for holding office hours and grading student homework, projects, and exams. **I was named outstanding graduate student instructor for my work on this course.**

Supervisors: Peter Chen, Jason Flinn, Atul Prakash

Introduction to Computer Organization (EECS 370), Winter 2003

I led two discussion sections, each consisting of approximately 20 undergraduates. In addition to planning and leading discussions, I developed homework assignments and exam questions, held office hours and graded student homework, projects and exams.

Supervisors: Gary Tyson and Don Winsor

Introduction to Computer Systems (EECS 181), Fall 2002

The course was an introduction to basic computer skills for non-majors. I led two laboratory sections, each consisting of approximately 15 students. I had a wide range of students, from 17-year-old freshmen to adult non-traditional students. I taught basic skills in Microsoft Office, web design, and UNIX shell commands, and was responsible for grading homework assignments, projects, and exams, as well as holding office hours.

Supervisor: Karen Langona

Camp CAEN Instructor, Summer 2007

Camp CAEN is a U-M College of Engineering summer camp for junior high and high school students, consisting of several two-week sessions of computer programming classes. I developed the curricula from scratch for two different courses—Introduction to C++ and Intermediate C++. Course materials included student project descriptions, lecture slides, in-class programming worksheets, and take-home reference materials. I also developed programming libraries for each project, with which students linked their code.

Presentations

“BreadCrumbs: Forecasting Mobile Connectivity.” 14th Annual International Conference on Mobile Computing and Networking (MobiCom). San Francisco, California, September 2008.

“Considering the Big Picture of Mobile Device Connectivity.” Invited talk at Motorola Labs. Schaumburg, Illinois, August 2007.

“Improved Access Point Selection.” Fourth International Conference on Mobile Systems, Applications and Services (MobiSys). Uppsala, Sweden, June 2006.

“LoKey: Leveraging the SMS Network in Decentralized, End-to-End Trust Establishment.” Fourth International Conference on Pervasive Computing (Pervasive). Dublin, Ireland, May 2006.

“Exploiting Mobility for Key Establishment.” Seventh IEEE Workshop on Mobile Computing Systems and Applications (HotMobile). Blaine, Washington, USA, April 2006.

Service and Professional Activities

External Reviewer, IEEE Transactions on Mobile Computing, ACM Operating Systems Review, International Workshop on Peer-to-Peer Systems (IPTPS)

Graduate Committee, Department of Electrical Engineering and Computer Science
Graduate student representative, 2004-2005

Member, ACM, USENIX Computing Society, IEEE

References

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David Wetherall

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