Eric W. Anderson

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Goal To solve interesting technical problems with meaningful societal benefits.

Research Interests Wireless communication, mobile and vehicular networking, resource management, mathematical programming and optimization, simulation and modeling, distributed algorithms, network security, programming languages and logic, and social-technical interactions.

Education

- **University of Colorado**, Boulder, Colorado USA
  Ph.D., Computer Science, December 2010.
  Dissertation: *Integrated Scheduling and Beam Steering for Spatial Reuse in Dense Wireless Networks.*
  Advisors: Douglas Sicker and Dirk Grunwald.
- **University of Colorado**, Boulder, Colorado USA
  Graduate Certificate in Science and Technology Policy.
- **University of Oregon**, Eugene, Oregon USA
  Began Ph.D. program; left in 2004.
  Research topics: Detection of Internet worms and access control in peer-to-peer networks.
  Advisor: Jun Li.
- **Carleton College**, Northfield, Minnesota USA
  B.A., Computer Science, May 2001.
  Advisor: Jeffrey Ondich.

Research Experience

- **Carnegie Mellon University**, Computer Science, Pittsburgh, PA USA
  Systems Scientist (Computer Science) **2013 – present**
  Postdoctoral Fellow (Electrical and Computer Engineering) **2010 – 2013**

  Working in several areas in wireless networking; main topics are vehicular networking, characterization and realistic simulation of radio environments, and efficient resource management in dense networks. Re-designed the *Carnegie Mellon University Wireless Emulator*, an FPGA-based system for *network-scale* real-time emulation of radio propagation.
  Currently researching authentication, discovery, and mobility protocols for vehicular networking in the *eXtensible Internet Architecture (XIA)* project.
- **University of Colorado**, Department of Computer Science, Boulder, CO USA
  Ph.D. Student **2004 – 2010**

  Conducted research in wireless networking, including management of interference in large networks, integration of physical-layer control and measurement, experimental characterization of radio signal propagation, and simulation and modeling techniques. This research has been directed toward the design of new protocols for high-performance high-density wireless networks. Designed and built the CU *Wide Area Radio Testbed*, a campus-wide testbed for experimenting with steerable and directional antennas. Designed and implemented (with Caleb Phillips and Gary Yee) the *Effective Directivity Antenna Model* framework for realistically simulating the effects of directional antennas in real environments. Developed and proved (with Michael Buettner and Gary Yee) the adaptive optimal duty-cycled sensor networking MAC protocol *X-MAC*.

◇ **Vanu, Inc.**, Cambridge, MA USA
Research Intern **2005**

Worked on infrastructure for software-defined radio (SDR) systems, specifically integrating processing between reconfigurable FPGA systems and general-purpose CPUs.

◇ **University of Oregon**, Department of Computer Science, Eugene, OR USA
Ph.D. Student **2002 – 2004**

Researched Internet-scale network security issues, especially the automatic recognition and detection of network worms, and securing content in peer-to-peer redistribution systems. Designed and produced initial implementation of *SWORD* worm detection framework. Worked with prof. Michal Young to design the *NonceMail* secure disposable e-mail address service. Worked on NSF IGERT grant proposal *Training next generation computer networking scientists for research within a societal context.*

Teaching Experience

◇ **Co-Instructor**
Co-taught Computer Networks (15-441) with Professor Peter Steenkiste. Created new sections on software-defined networking and data center networks, and updated wireless networking material.

◇ **Consulting Faculty**
CMU MSIT eBusiness Technology program. Served as a project advisor; designing and teaching networking task in Fall of 2015.

◇ **NSF Graduate Teaching Fellow in K-12 Education**
Developed and taught a "computational geography" curriculum within high school geography courses.

◇ **Primary Instructor**
Developed and taught a new graduate seminar on electronic voting security at the University of Oregon.

◇ **Teaching Assistant**
Led recitations, graded, and developed course materials for: Non-majors' introduction to computer science (University of Oregon), and undergraduate programming languages (University of Colorado).

◇ **Tutor and Lab Assistant**
Tutored computer science undergraduates and taught introductory programming to middle-school students (Carleton College).

Journal Papers

◇ Xiaohui Wang, **Eric W. Anderson**, Peter Steenkiste, and Fan Bai. Improving the accuracy of environment-specific channel modeling. *IEEE Transactions on Mobile Computing*, 2015.

◇ **Eric W. Anderson**, Caleb Philips, Doug Sicker, and Dirk Grunwald. Optimization decomposition for scheduling and system configuration in wireless networks. *ACM/IEEE Transations on Networking*, 22:271 – 284, February 2014.

◇ **Eric W. Anderson**, Caleb Phillips, Douglas Sicker, and Dirk Grunwald. Modeling environmental effects on directionality in wireless networks. *Mathematical and Computer Modeling*, 53:2078–2092, 2011.

Archival Conference Papers

◇ **Eric W. Anderson**, Caleb Philips, Douglas Sicker, and Dirk Grunwald. Signal quality pricing: Decomposition for spectrum scheduling and system configuration. In *New Frontiers in Dynamic Spectrum Access Networks (DySPAN), 2011 IEEE Symposium on*, pages 408 – 419, May 2011. doi: 10.1109/DYSPAN.2011.5936230.

◇ Michael Buettner, Gary V. Yee, **Eric W. Anderson**, and Richard Han. X-MAC: A short preamble MAC protocol for duty-cycled wireless sensor networks. In *SenSys '06: Proceedings of the 4th International Conference on Embedded Networked Sensor Systems*, pages 307–320, New York, NY, USA, 2006. ACM Press. Most-cited SenSys paper, 2005-present.

◇ Douglas C. Sicker, Dirk Grunwald, **Eric W. Anderson**, Christian Doerr, Brita Munsinger, and Anmol Sheth. Examining the wireless commons. In *Telecommunications Policy Research Conference (TPRC)*, 2006.

OTHER CONFERENCE PAPERS

◇ Xiaohui Wang, **Eric W. Anderson**, Fan Bai, and Peter Steenkiste. Simulating spatial cross-correlation in vehicular networks. In *Vehicular Networking Conference (VNC)*, 2014.

◇ Xiaohui Wang, Kevin Borries, **Eric W. Anderson**, and Peter Steenkiste. Network-scale emulation of general wireless channels. In *The 74th IEEE Vehicular Technology Conference (VTC2011-Fall)*, 2011.

◇ **Eric W. Anderson**, Caleb Philips, Gary Yee, Douglas Sicker, and Dirk Grunwald. Challenges in deploying steerable wireless testbeds. In *Proc. 6th International conference on testbeds and research infrastructures for the development of networks and communities (TridentCom)*, 2010.

◇ **Eric W. Anderson**, Gary Yee, Caleb Phillips, Dirk Grunwald, and Douglas Sicker. The impact of directional antenna models on simulation accuracy. In *7th Intl. Symposium on Modeling and Optimization in Mobile, Ad Hoc, and Wireless Networks (WiOpt)*, June 2009.

◇ Kevin Bauer, Damon McCoy, **Eric W. Anderson**, Markus Breitenbach, Greg Grudic, Dirk Grunwald, and Douglas Sicker. The directional attack on wireless localization -or- how to spoof your location with a tin can. In *IEEE Global Communications Conference (Globecom)*, 2009.

◇ **Eric W. Anderson**, Caleb T. Phillips, Kevin S. Bauer, Dirk C. Grunwald, and Douglas C. Sicker. Modeling directionality in wireless networks. In *ACM SIGMETRICS*, June 2008. Extended Abstract.

◇ **Eric W. Anderson** and Jun Li. Aggregating detectors for new worm identification (extended abstract). In *USENIX 2004*. USENIX, June 2004.

WORKSHOP PAPERS

◇ Jason Matusiak, Richard Graham, Keith Taylor, **Eric W. Anderson**, and Brenton Walker. Using if-scale delays to emulate the effects of site-specific multipath in a digital wireless channel emulator. In *Proceedings of the 8th ACM international workshop on Wireless network testbeds, experimental evaluation & characterization*, WiNTECH '13, pages 41–48, New York, NY, USA, 2013. ACM. ISBN 978-1-4503-2364-2.

◇ Xiaohui Wang, **Eric W. Anderson**, Peter Steenkiste, and Fan Bai. Improving the accuracy of environment-specific vehicular channel modeling. In *WiNTECH '12*, 2012.

◇ **Eric W. Anderson**, Caleb Philips, Harold Gonzales, Kevin Bauer, Douglas Sicker, and Dirk Grunwald. SniffMob: Inferring human contact patterns using wireless devices. In *Hot Topics of Planet-scale Mobility Measurements (HotPlanet)*, 2009a.

◇ **Eric W. Anderson**, Caleb Phillips, Douglas Sicker, and Dirk Grunwald. Modeling environmental effects on directionality in wireless networks. In *5th Intl. Workshop on Wireless Network Measurements (WiNMee)*, June 2009b.

◇ Michael Buettner, **Eric W. Anderson**, Gary Yee, Dola Saha, Douglas C. Sicker, and Dirk Grunwald. A phased array antenna testbed for evaluating directionality in wireless networks. In *System Evaluation for Mobile Platforms Metrics, Methods, Tools and Platforms (MobiEval)*, San Juan, Puerto Rico, USA, June 2007. ACM.

Technical Reports

- **Eric W. Anderson** and Jun Li. Cooperative policy control for peer-to-peer data distribution. Technical Report CIS-TR-2010-02, University of Oregon, March 2010. Preprint 2004.
- **Eric W. Anderson**, Caleb Phillips, Gary Yee, Douglas Sicker, and Dirk Grunwald. Challenges in deploying steerable wireless testbeds. Technical Report CU-CS-1068-09, Department of Computer Science, University of Colorado at Boulder, December 2009.
- **Eric W. Anderson**, Caleb T. Phillips, Dirk Grunwald, and Douglas Sicker. Modeling environmental effects on directionality in wireless networks. Technical Report CU-CS-1044-08, Department of Computer Science, University of Colorado at Boulder, July 2008.
- Michael Buettner, Gary Yee, **Eric W. Anderson**, and Richard Han. X-MAC: A short preamble MAC protocol for duty-cycled wireless sensor networks. Technical Report CU-CS-1008-06, University of Colorado at Boulder, 2006.

Invited Talks

- "Optimal Scheduling and Antenna Configuration,", Ph.D. Forum Talk, *ACM MobiSys*, 2010.
- "Integrating Beam Steering and Scheduling for Spatial Reuse,", Doctoral Consortium Talk, *Tenth Intl. Workshop on Mobile Computing Systems and Applications (HotMobile)*, 2009.
- "New Worm Detection and Analysis," Invited Talk, Department of Mathematics and Computer Science Colloquium, Carleton College, 2003.

Service

- **Reviewer** for conferences and journals including ACM SIGCOMM, ACM MobiSys, IEEE INFOCOM, IEEE DySPAN, ICST/EAI CrownCom, IEEE GLOBECOM, *IEEE Journal on Selected Areas in Communications*, *Springer Mobile Networks and Applications*, *IEEE Transactions on Wireless Communications*, *IEEE Transactions on Mobile Computing*, and *IEEE/ACM Transactions on Networking*.
- **TPC Member** IEEE Southern Programmable Logic (SPL), IEEE Symposium on Computers and Informatics (ISCI), IEEE/CIC International Conference on Communications in China (ICCC).
- **Committee Member**, departmental graduate education committee and undergraduate education committees (University of Colorado).

Students

- **Xiaohui Wang**, Ph.D. 2014, Electrical and Computer Engineering. Co-advised with Peter Steenkiste. Dissertation: "Environment Models for Realistic Simulation and Emulation of Wireless Networks"

Industry Experience

- **Lockheed Martin Air Traffic Management**, Edina, Minnesota USA
  Software Engineer **2001 – 2002**

  Maintained and extended the *Common ARTS* air-traffic control system. Worked on design, implementation, testing, and troubleshooting.
- **U.S. West Internet Service Operations**, St. Paul, Minnesota USA
  Intern **1999**

  Developed web-based document management system for group's internal use.
- **Carleton College**, Northfield, Minnesota USA
  Lab Assistant, Tutor, System Administrator **1997 – 2001**

  Helped undergraduates with introductory and mid-level computer science courses as a tutor and lab assistant. Served as one of three employees (one full-time, two students) managing all computing resources for the Department of Mathematics and Computer Science.

Volunteer Service

- **Transition Committee** **2013**

  Served on Pittsburgh Mayor William Peduto's transition committee, on the subcommittee for information systems.
- **Economic Governance for Health** **2009 – 2013**

  Responsible for overall information technology strategy, as well as some software development and system administration. Economic Governance for Health is an international policy advocacy organization largely centered in the U.K.

◇ **Election Incident Reporting System** **2004**

Contributed to the initial development. The Election Incident Reporting System (EIRS) is an on-line tool for tracking and researching voting irregularities. EIRS was a project of the Verified Voting Foundation in collaboration with other organizations including the Lawyers' Committee for Civil Rights Under Law and the People for the American Way Foundation.

◇ **Electronic Voting Security Class**, University of Oregon **2004**

Independently developed and taught graduate seminar course in the Computer and Information Science department.

SOCIETIES

◇ **Association for Computing Machinery (ACM)**, member.

◇ **Institute of Electrical and Electronics Engineers (IEEE)**, member.

HONORS

◇ **Financial Awards**. Received departmental travel awards and various grants, stipends, and fellowships from the University of Colorado and the University of Oregon.

◇ **Upsilon Pi Epsilon, University of Oregon chapter**. Elected 2004.

◇ **Sigma Xi, Carleton College chapter**. Elected 2001.