Eric W. Anderson

eric@ewa.xyz (mobile) +1-412-726-3560

Goals

To develop a sustainable research program centering the interaction of wireless communication and "higher-layer" networking protocols and systems. Within that space, to significantly advance the state of communication and information systems for connectivity-challenged tactical, emergency, and disaster environments.

Research Interests

Cross-layer wireless networks, network architecture, wireless communication, mobile and vehicular networking, resource management, emergency and disaster communications, public safety technology, mathematical programming and optimization, simulation and modeling, distributed algorithms, network security, programming languages and logic, and social-technical interactions.

Education

- **Carnegie Mellon University**, Pittsburgh, Pennsylvania USA
  Postdoctoral Fellowship, Electrical and Computer Engineering, 2013.
  Mentor: Peter Steenkiste.
- **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.
- **Carleton College**, Northfield, Minnesota USA
  B.A., Computer Science, May 2001.
  Advisor: Jeffrey Ondich.

Research Experience

- **National Institute of Standards and Technology (NIST)**, Boulder, CO USA
  Public Safety Communications Research Division (PSCR, 671)
  Senior Scientist, Electronics Engineer **2016 – 2019**

  Co-developed PSCR's extramural funded research program, covering both technical and programmatic aspects. Co-developed and managed PSCR's flagship research funding opportunity, the $38M *Public Safety Innovation Accelerator Program (PSIAP) 2017*, serving as the sole developer and manager of 3 out of 6 technical areas. Lead the *resilient systems* portfolio area, and served as the federal program officer for awards in the *resilient systems* and *research and prototyping platforms* areas.
  My primarty technical foci were: Architectures for disruption, disconnection, and degradation-tolerant communication and computing for public safety personnel; internal research capacity building for PSCR; and external research community development around information and communication technology for public safety.
- **Carnegie Mellon University**, Computer Science, Pittsburgh, PA USA
  Systems Scientist (Computer Science) **2013 – 2016**
  Postdoctoral Fellow (Electrical and Computer Engineering) **2010 – 2013**

  Worked in several areas in wireless networking; main topics were vehicular networking, efficient resource management in dense networks, and characterization and realistic simulation of radio environments. Re-designed the *Carnegie Mellon University Wireless Emulator*, an FPGA-based system for *network-scale* real-time emulation of radio propagation.

Led the vehicular networking thrust of the *eXtensible Internet Architecture (XIA)* project. Researched secure and low-latency authentication, discovery, and mobility protocols.

◇ **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 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, Carnegie Mellon University**
Co-taught *Computer Networks* for the Computer Science Department. Created new sections on software-defined networking and data center networks, and updated wireless networking material.

◇ **Consulting Faculty, Carnegie Mellon University**
Consulted for the M.S. in Information Technology *eBusiness Technology* program. Served as a project advisor, and designed and taught the networking task in Fall of 2015.

◇ **Industry Advisor, University of Colorado**
Advised M.S. capstone project teams for the Interdisciplinary Telecommunications Program.

◇ **NSF Graduate Teaching Fellow in K-12 Education, University of Colorado**
Developed and taught a "computational geography" curriculum within Boulder Valley School District high school geography courses.

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

◇ **Teaching Assistant, Universities of Oregon and Colorado**

◇ **Tutor and Lab Assistant, Carleton College**

Federal Documents 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

- Yao Ma, William Young, **Eric W. Anderson**, and Jason Coder. Probability of coexistance of LTE-LAA and WLAN systems based on delay constraints. In *The 27th International Conference on Computer Communication and Networks (ICCCN 2018)*. IEEE, 2018. To appear.
- 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 & Non-Peer-Reviewed

- **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

- "Reinventing Mobile Communications for Emergency Responders," *Electrical Engineering Research Colloquium*, University of Washington, 2017.
- "NIST Public Safety Innovation Accelerator," *GENI Network Innovators Community Event (NICE)*, 2016.
- "Edge Computing for Public Safety: A NIST Perspective," *First IEEE/ACM Symposium on Edge Computing (SEC)*, 2016.
- "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

- **TPC Member**, ACM/IEEE Symposium on Edge Computing (SEC), IEEE Southern Programmable Logic (SPL), IEEE Symposium on Computers and Informatics (ISCI), IEEE/CIC International Conference on Communications in China (ICCC).

- **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*.
- **Reviewer and Division Sponsor**, NIST Boulder Editorial Review Board.
- **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.

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.