

TILMAN WOLF

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Tilman Wolf is Professor of Electrical and Computer Engineering and Senior Vice Provost for Academic Affairs at the University of Massachusetts Amherst. His responsibilities include academic space, personnel reviews, and new initiatives, such as cohort-based international distance education programs and year-round university operation. As Associate Dean of Engineering, he led efforts to establish a new Department of Biomedical Engineering, for which he served as interim department head. He also developed a training program for graduate students who teach the college-wide freshman seminar. He is engaged in research and teaching in the areas of computer networks, cybersecurity, and embedded systems. He is a co-author of the book “Architecture of Network Systems” and has published extensively in peer-reviewed journals and conferences. His research has been supported by grants from NSF, DARPA, and industry. He has taught numerous courses on computer networks, embedded systems, programming, and digital design.

PROFESSIONAL APPOINTMENTS

Current

University of Massachusetts Amherst, MA

- **Senior Vice Provost** for Academic Affairs, September 2017 – present.
- **Professor** of Electrical and Computer Engineering, September 2012 – present.

Previous

University of Massachusetts Amherst, MA

- **Interim Department Head** of Biomedical Engineering, June 2019 – January 2021.
- **Senior Associate Dean** of Engineering, January 2017 – August 2017.
- **Associate Dean** of Engineering, January 2014 – December 2016.
- **Associate Professor** of Electrical and Computer Engineering, September 2007 – August 2012.
- **Assistant Professor** of Electrical and Computer Engineering, August 2002 – August 2007.

Institute IMDEA Networks, Madrid, Spain

- **Visiting Researcher**, July 2012 – December 2012.

IBM T. J. Watson Research Center, NY

- **Research Intern**, Pervasive and Embedded Networking Department, Summers 2000 and 2001.

Washington University in St. Louis, MO

- **Graduate Research Assistant**, Applied Research Laboratory, September 1998 – August 2002.
- **Research Intern**, Electronic Radiology Laboratory, School of Medicine, Summer 1997.

EDUCATION

Degrees

Washington University in St. Louis, MO

- **D.Sc. in Computer Science**, August 2002, Advisor: Jonathan S. Turner, Dissertation: “Design and Performance of Scalable High-Performance Programmable Routers.”
- **M.S. in Computer Engineering**, August 2000.
- **M.S. in Computer Science**, December 1998, Advisor: Guru M. Parulkar, Project: “Design of a Medical-Video-on-Demand System over ATM Networks,” Certificate in Networking and Communications.

Universität Stuttgart, Germany

- **Diplom in Informatik**, July 1998, Advisor: Kurt Rothermel, Thesis: “User Generated Annotations for WWW Documents.”

Professional Development

Harvard Institutes for Higher Education, Harvard Graduate School of Education, Cambridge, MA

- **Institute for Management and Leadership in Education (MLE)**, Summer 2018.
- **Management Development Program (MDP)**, Summer 2016.

National Science Foundation

- **Innovation Corps (I-Corps)**, Summer 2016.

AWARDS AND HONORS

External

- **Fulbright Specialist**, Bureau of Educational and Cultural Affairs, U.S. Department of State, 2019 – 2024.
- **IEEE Distinguished Lecturer**, IEEE Communications Society, 2014 – 2017 (renewed 2016).
- **Best Paper Award**, First IEEE Conference on Communications and Network Security, 2013.
- **Notable Article in Computing**, ACM Computing Reviews' Best of 2013.
- **Best Paper Award**, 12th IEEE International Conference on High Performance Switching and Routing, 2011.
- **CAREER Award**, National Science Foundation, 2005.
- **IBM Research Fellowship**, 2001 – 2002.
- **Fulbright Scholarship**, 1996 – 1997.

Internal

- **Distinguished Teaching Award**, University of Massachusetts, 2020.
- **Distinguished Graduate Mentor Award**, University of Massachusetts, 2017.
- **Outstanding Faculty Award**, IEEE/HKN Student Chapter, University of Massachusetts, 2010.
- **Outstanding Teaching Award**, College of Engineering, University of Massachusetts, 2008.
- Barbara H. and Joseph I. Goldstein **Outstanding Junior Faculty Award**, College of Engineering, University of Massachusetts, 2006.
- **Lilly Teaching Fellowship**, University of Massachusetts, 2004 – 2005.
- **Outstanding Thesis Award**, Universität Stuttgart, 1998.

ADMINISTRATIVE EXPERIENCE

Senior Vice Provost for Academic Affairs (September 2017 – present)

Responsibilities: I serve on the provost's leadership team with responsibility for several key functions in academic affairs: evaluation of faculty for tenure, promotion, and other personnel actions; coordination with facilities and campus planning to ensure effective use of academic spaces and the availability of suitable laboratory spaces for new hires; implementation of international distance education programs; and establishment of the new Department of Biomedical Engineering.

Key Achievements: I represent academic affairs for all space and campus planning decisions. I oversee the Infrastructure Support Group, which had members from environmental health and safety, animal care, information technology, and campus planning, and which meets with all faculty candidates who have infrastructure needs (approximately 110 candidates per year). Working with academic units, I have helped expand the international distance education to multiple locations in China and India. I initiated and oversee new campus-wide initiatives for space renovations, interdisciplinary research grants, and seed funds for center-level research initiatives. During the COVID-19 pandemic, I have served on the campus leadership team to plan the implementation of the Fall 2020 and Spring 2021 semesters; I am co-chairing the campus-wide planning group for Fall 2021.

Co-Leader of the Center for the Integration of Research, Teaching and Learning (CIRTL) (June 2013 – present)

Responsibilities: I serve as faculty co-leader of the UMass Center for the Integration of Research, Teaching and Learning, which is part of a national network of 43 research universities to provide training for

graduate students and postdoctoral researchers in STEM disciplines to prepare them for careers that involve teaching.

Key Achievements: I have co-coordinated on-campus programming for CIRTL, which includes 6 annual workshops and a 4-day summer teaching institute. I have worked to institutionalize the programmatic offerings on campus, which are the first to focus on teaching training in the STEM disciplines. I collaborate with the other institutions in the CIRTL network to coordinate, implement, and assess on-campus curriculum and network-wide offerings. Currently, I serve on the national leadership team for CIRTL.

Interim Department Head of Biomedical Engineering (June 2019 – January 2021)

Responsibilities: I led the recently created Department of Biomedical Engineering with ten faculty members, four staff members, and over 300 students.

Key Achievements: During my term, I led the department through its first growth phase, where eight faculty members joined the department and the department moved to new facilities in the Life Sciences Laboratory. The two tenure-track and two lecturer positions that I filled all helped in increasing the diversity of the faculty. I guided the implementation of the undergraduate curriculum, which culminated with the first students graduating with a B.S. in BME at the end of the Fall 2020 semester. I initiated the ABET accreditation process for the undergraduate program. I established essential department processes ranging from by-laws to the creation of a Diversity, Equity, and Inclusion committee. I resolved a variety of personnel issues. I initiated collaborations with the University of Massachusetts Medical School that enabled two faculty members to locate their research lab there.

Senior Associate Dean / Associate Dean for Research (January 2016 – August 2017)

Responsibilities: I served as associate dean responsible for research activities in the College of Engineering. I was responsible for creating a new department and degree programs in biomedical engineering, overseeing research activities, coordinating space use, ensuring compliance with environmental health and safety regulations, directing the information technology group, and conducting evaluations of academic personnel. I also co-led the implementation of a new cohort-based distance education program in the Department of Electrical and Computer Engineering.

Key Achievements: I led the efforts to establish an entirely new Department of Biomedical Engineering and B.S., M.S., and Ph.D. degree programs within the college (13 planned faculty hires, \$5M projected annual budget), which was approved by the Massachusetts Board of Higher Education. I worked with faculty members to identify new research initiatives. I reviewed and approved research proposals and external funding awards for the College (research expenditures grew from \$27.0M to \$31.5M). I coordinated how the limited research lab and office space in our college (230,000 sq. ft.) is used and how new hires could be accommodated in existing space or through renovations. I facilitated the funding and design of a renovation that created the Graduate Engineering Hub and the Engineering Community, Equity, and Inclusion Hub. I worked with faculty to ensure compliance with environmental health and safety regulations. I directly oversaw the staff of the college's information technology group (6 staff, \$500k budget). Together with the dean, I conducted all reappointment, tenure, and promotion evaluations of academic personnel (115 faculty members). I participated substantially in the strategic planning efforts of the college. I worked with colleagues in the Department of Electrical and Computer Engineering to pioneer the first distance education degree program offered by UMass Amherst Global. This M.S. in Electrical and Computer Engineering has been offered to cohorts of students abroad using synchronous teaching in an interactive studio since the summer of 2017.

Associate Dean for Graduate Studies and Operations (January 2014 – December 2015)

Responsibilities: I served as associate dean responsible for graduate studies and general operation in the College of Engineering. I was responsible for implementing a new Freshman Seminar program, coordinating graduate student fellowships, training graduate students for teaching, developing new degree programs, directing the information technology group, and conducting evaluations of academic personnel.

Key Achievements: I implemented a new Freshman Seminar program, which offers a small-class experience for all incoming undergraduate students and which is taught entirely by graduate student instructors.

I developed the course structure for this seminar and set up the training program for the graduate students to be able to teach as instructors of record. This program, which continues to date, involved 28 sections of a seminar and enhances the freshman experience of over 500 undergraduate students per year. I worked with graduate program directors of all engineering departments and the development office to award graduate fellowships. I started the planning for the new Department of Biomedical Engineering and its degree programs. I directly oversaw the staff of the college's information technology group (6 staff, \$500k budget). Together with the dean, I conducted all reappointment, tenure, and promotion evaluations of academic personnel (110 faculty members).

Director of Five-Year B.S./M.S. Program in Electrical and Computer Engineering (May 2009 – August 2015)

Responsibilities: I led the efforts to establish a new 5-year B.S./M.S. program in the Department of Electrical and Computer Engineering.

Key Achievements: I worked with a faculty committee and the Graduate School to set up a streamlined application, review, and admission process for qualified B.S. graduates. I successfully recruited, admitted, and advised six cohorts of students, totaling 76 applicants. This program continues to be a key pathway for retaining the best undergraduate students in electrical and computer engineering for graduate studies.

RESEARCH FUNDING

Government Funding

- G-15 **Planning Grant: Engineering Research Center for Ubiquitous and Unique Embedded Security**
PI: Wayne Burlison, Co-PI: **Tilman Wolf**, Russell Tessier
Sponsor: National Science Foundation, Engineering Research Centers, #1840420
Amount: \$100,000, September 2018 – August 2019.
- G-14 **TWC: Small: Hardware Security for Embedded Computing Systems**
PI: **Tilman Wolf**, Co-PI: Russell Tessier
Sponsor: National Science Foundation, Secure & Trustworthy Cyberspace, #1617458
Amount: \$512,523, August 2016 – July 2021.
- G-13 **I-Corps: Commercialization of Fault Detection and Traceback for Software-Defined Networks**
Sole-PI: **Tilman Wolf**
Sponsor: National Science Foundation, I-Corps Program, #1644434
Amount: \$50,000, August 2016 – January 2017.
- G-12 **EAGER: Collaborative Research: Enabling Economic Policies in Software-Defined Internet Exchange Points**
Lead-PI: **Tilman Wolf**, Co-PI: Anna Nagurney
Collaborating institutions: University of Kentucky
Sponsor: National Science Foundation, Networking Technology and Systems Program, #1551444
Amount: \$149,992, October 2015 – September 2018.
- G-11 **NeTS: Small: Abstractions and Algorithms for Control of Network Services**
PI: **Tilman Wolf**, Co-PI: Sriram Natarajan
Sponsor: National Science Foundation, Networking Technology and Systems Program, #1421448
Amount: \$499,581, October 2014 – September 2018.
- G-10 **NeTS: Large: Collaborative Research: Network Innovation through Choice**
Lead-PI: **Tilman Wolf**, Co-PI: Anna Nagurney
Collaborating institutions: University of Kentucky, North Carolina State University, University of North Carolina
Sponsor: National Science Foundation, Special Projects – CISE, #1111276
Amount: \$1,021,441 (\$2,844,483 total), September 2011 – August 2015.
- G-9 **TC: Small: Securing the Router Infrastructure of the Internet**
PI: **Tilman Wolf**, Co-PI: Russell Tessier
Sponsor: National Science Foundation, Trustworthy Computing Program, #1115999
Amount: \$512,000, September 2011 – August 2015.
- G-8 **EAGER: Exploring Security Issues in Next-Generation Networking Infrastructure**
Sole-PI: **Tilman Wolf**

Sponsor: National Science Foundation, Exploratory Research Program, #0952524
Amount: \$100,000, January 2010 – December 2011.

G-7 Principles for Intrinsically Assurable Network Operation (PIANO)

Lead: BAE Systems: PI: Brian DeCleene

Subcontract: University of Massachusetts: PI: **Tilman Wolf**, Co-PIs: James F. Kurose, Donald F. Towsley

Sponsor: DARPA, Space and Naval Warfare Systems Center San Diego, N66001-08-C-2013

Amount: \$471,523 UMass portion (\$8,496,201 total), December 2007 – June 2009.

G-6 NeTS-NBD: Packet Spacing in Small-Buffer Networks

PI: **Tilman Wolf**, Co-PI: Weibo Gong

Sponsor: National Science Foundation, Networking Technology and Systems Program, #0721790

Amount: \$458,000, August 2007 – July 2010.

G-5 FIND: Service-Centric End-to-End Abstractions in Network Architectures

Sole-PI: **Tilman Wolf**

Sponsor: National Science Foundation, Networking Technology and Systems Program, #0626690

Amount: \$357,881, September 2006 – August 2010.

G-4 Collaborative Proposal: Technologies for Improving Laboratory Experiences in Advanced Technical Education

PI: **Tilman Wolf**

Collaborating institution: Washington University in St. Louis (Lead-PI: Jonathan Turner)

Sponsor: National Science Foundation, Research and Evaluation on Education in Science and Engineering Program, #0632586

Amount: \$161,234 (\$600,854 total), September 2006 – August 2010.

G-3 NER: WISP: Wire-Streaming Processors in 2-D Nanoscale Fabrics

PI: Csaba A. Moritz, Co-PI: **Tilman Wolf**

Sponsor: National Science Foundation, Nanoscale: Exploratory Research Program, #0508382

Amount: \$99,991, August 2005 – November 2006.

G-2 CAREER: The Dynamics of Network Processing

Sole-PI: **Tilman Wolf**

Sponsor: National Science Foundation, Faculty Early Career Development Program, #0447873

Amount: \$409,600, June 2005 – May 2010.

G-1 ITR: Hyperion-Next Generation Measurement Infrastructure and Application Use

PI: James F. Kurose, Co-PIs: Lixin Gao, **Tilman Wolf**, Donald F. Towsley, Prashant Shenoy

Sponsor: National Science Foundation, Information Technology Research Program, #0325868

Amount: \$2,711,486, September 2003 – August 2009.

Foundation and Industry Funding

I-13 The CIRTL Network: 22 Research Universities Preparing a National Faculty to Advance Undergraduate Success

Lead: University of Wisconsin: PI: Robert Mathieu

Subcontract: PI: Elizabeth Jakob, Co-PI: **Tilman Wolf**

Sponsor: Great Lakes Higher Education Corporation

Amount: \$127,955, September 2014 – August 2017.

I-12 An Embedded System Laboratory for a General Education Computer Engineering Course

Sole-PI: **Tilman Wolf**

Sponsor: Intel Research Council

Amount: \$10,000, May 2014.

I-11 Toward Self-Directed Learning in an Embedded Computing Systems Course

Sole-PI: **Tilman Wolf**

Sponsor: Intel Research Council

Amount: \$25,000, July 2013.

I-10 Embedded Systems Projects for M5

Sole-PI: **Tilman Wolf**

Sponsor: Intel Research Council

Amount: \$25,000, May 2012.

I-9 Curriculum Development: Intel Atom in a First-Year Course

- Sole-PI: **Tilman Wolf**
Sponsor: Intel Research Council
Amount: \$30,000, April 2011.
- I-8 **Curriculum Development: Intel Atom in Embedded Systems Courses**
Sole-PI: **Tilman Wolf**
Sponsor: Intel Research Council
Amount: \$27,000, May 2010.
- I-7 **Reconfigurable Next Generation Network Monitoring**
PI: Russell Tessier, Co-PI: **Tilman Wolf**
Sponsor: Altera University Program
Amount: \$25,000, July 2009.
- I-6 **Runtime System Support for Packet Processing on Converged Architectures**
Sole-PI: **Tilman Wolf**
Sponsor: Intel Research Council
Amount: \$25,000, May 2008.
- I-5 **Analysis of Partitioning and Interface Abstractions on Converged IA/IXA Platforms**
Sole-PI: **Tilman Wolf**
Sponsor: Intel Research Council
Amount: \$25,000, May 2006.
- I-4 **TabletPCs in a Freshman Engineering Course: Lectures, Discussions, and Labs**
Sole-PI: **Tilman Wolf**
Sponsor: Hewlett-Packard
Amount: \$69,000, May 2006.
- I-3 **Edge Services on the IXP2350: Transparent TCP Acceleration**
Sole-PI: **Tilman Wolf**
Sponsor: Intel Research Council
Amount: \$28,000, May 2005.
- I-2 **Composable Online Network Measurement on IXP-Based Network Systems**
Sole-PI: **Tilman Wolf**
Sponsor: Intel Research Council
Amount: \$22,500, December 2004.
- I-1 **An IXP-based Measurement Node for Data-Center Traffic Analysis**
PI: **Tilman Wolf**, Co-PIs: James F. Kurose, Prashant Shenoy
Sponsor: Intel Research Council
Amount: \$75,000, July 2003.

PUBLICATIONS

Patents

- PT-1 Abhishek Dwaraki, Sriram Natarajan, **Tilman Wolf** and Srini Seetharaman. Versioning System for Network States in a Software-Defined Network. US 10,469,320 B2, United States Patent and Trademark Office, 5 November 2019.

Books

- B-1 Dimitrios Serpanos and **Tilman Wolf**. *Architecture of Network Systems*. Morgan Kaufmann Publishers, February 2011.

Book Chapters

- BC-6 Russell Tessier, **Tilman Wolf**, Kekai Hu, and Harikrishnan Chandrikakutty. Reconfigurable network router security. In Pierre-Emmanuel Gaillardon, editor, *Reconfigurable Logic: Architecture, Tools, and Applications*, chapter 13, pages 375–395. CRC Press, October 2015.
- BC-5 Anna Nagurney, Dong Li, Sara Saberi, and **Tilman Wolf**. A dynamic network economic model of a service-oriented internet with price and quality competition. In Valery A. Kalyagin, Panos M. Pardalos, and Themistocles M. Rassias, editors, *Network Models in Economics and Finance*, chapter 12, pages 239–264. Springer International Publishing, September 2014.

- BC-4 **Tilman Wolf**. Customizable in-network services. In Byrav Ramamurthy, George Rouskas, and Krishna Sivalingam, editors, *Next-Generation Internet – Architectures and Protocols*, chapter 9. Cambridge University Press, February 2011.
- BC-3 Ramaswamy Ramaswamy, Ning Weng, and **Tilman Wolf**. Application analysis and resource mapping for heterogeneous network processor architectures. In Mark A. Franklin, Patrick Crowley, Haldun Hadimioglu, and Peter Z. Onufryk, editors, *Network Processor Design: Issues and Practices, Volume 3*, chapter 13, pages 279–308. Morgan Kaufmann Publishers, February 2005.
- BC-2 Mark A. Franklin and **Tilman Wolf**. Power considerations in network processor design. In Mark A. Franklin, Patrick Crowley, Haldun Hadimioglu, and Peter Z. Onufryk, editors, *Network Processor Design: Issues and Practices, Volume 2*, chapter 3, pages 29–50. Morgan Kaufmann Publishers, November 2003.
- BC-1 Mark A. Franklin and **Tilman Wolf**. A network processor performance and design model with benchmark parameterization. In Patrick Crowley, Mark A. Franklin, Haldun Hadimioglu, and Peter Z. Onufryk, editors, *Network Processor Design: Issues and Practices, Volume 1*, chapter 6, pages 117–138. Morgan Kaufmann Publishers, October 2002.

Articles in Journals

- J-41 Bohan Zhao, Jin Zhao, Xin Wang, and **Tilman Wolf**. RuleTailor: optimizing flow table updates in OpenFlow switches with rule transformations. *IEEE Transactions on Network and Service Management*, 16(4):1581–1594, December 2019.
- J-40 Jiawei Li, Hongbin Luo, Shan Zhang, Shui Yu, and **Tilman Wolf**. Traffic engineering in information-centric networking: opportunities, solutions and challenges. *IEEE Communications Magazine*, 56(11):124–130, November 2018.
- J-39 Jay Aikat, Ilya Baldin, Mark Berman, Joe Breen, Richard Brooks, Prasad Calyam, Jeff Chase, Wallace Chase, Russell J. Clark, Chip Elliott, Jim Griffioen, Dijiang Huang, Julio Ibarra, Tom Lehman, Ibrahim Matta, Inder Monga, Christos Papadopoulos, Mike Reiter, Dipankar Raychaudhuri, Glenn Ricart, Robert Ricci, Paul Ruth, Ivan Seskar, Jerry Sobieski, Jacobus Van der Merwe, Kuang-Ching Wang, and **Tilman Wolf**. The Future of Distributed Network Research Infrastructure. *ACM SIGCOMM Computer Communication Review*, 48(2):46–51, April 2018.
- J-38 Xinming Chen, Brandon Jones, Michela Becchi, and **Tilman Wolf**. Picking pesky parameters: Optimizing regular expression matching in practice. *IEEE Transactions on Parallel and Distributed Systems*, 27(5):1430–1442, May 2016.
- J-37 Kekai Hu, Hari Krishnan Chandrikakutty, Zachary Goodman, Russell Tessier, and **Tilman Wolf**. Dynamic hardware monitors for network processor protection. *IEEE Transactions on Computers*, 65(3):860–872, March 2016.
- J-36 Luis Andres Marentes, **Tilman Wolf**, Anna Nagurney, and Yezid Donoso. Towards pricing mechanisms for delay tolerant services. *International Journal of Computers, Communications and Control*, 11(1):77–89, February 2016.
- J-35 **Tilman Wolf**, Hari Krishnan Kumarapillai Chandrikakutty, Kekai Hu, Deepak Unnikrishnan, and Russell Tessier. Securing network processors with high-performance hardware monitors. *IEEE Transactions on Dependable and Secure Computing*, 12(6):652–664, November 2015.
- J-34 Shashank Shanbhag, Arun Reddy Kandoor, Cong Wang, Ramgopal Mettu, and **Tilman Wolf**. VHub: Single-stage virtual network mapping through hub location. *Computer Networks*, 77:169–180, February 2015.
- J-33 Nauman Javed, Eric Lyons, Michael Zink, and **Tilman Wolf**. Adaptive wireless mesh networks: Surviving weather without sensing it. *Computer Communications*, 54:120–130, December 2014.
- J-32 Sara Saberi, Anna Nagurney, and **Tilman Wolf**. A network economic game theory model of a service-oriented internet with price and quality competition in both content and network provision. *Service Science*, 6(4):229–250, December 2014.
- J-31 Luis Marentes, **Tilman Wolf**, Anna Nagurney, Yezid Donoso, and Harold Castro. Overcoming economic challenges of internet operators in low income regions through a delay tolerant architecture with mechanic backhauls. *NETNOMICS: Economic Research and Electronic Networking*, 15(3):183–213, November 2014.
- J-30 Anna Nagurney and **Tilman Wolf**. A Cournot-Nash-Bertrand game theory model of a service-oriented internet with price and quality competition among network transport providers. *Computational Management Science*, 11(4):475–502, October 2014.

- J-29 **Tilman Wolf**, James Griffioen, Kenneth L. Calvert, Rudra Dutta, George N. Rouskas, Ilia Baldine, and Anna Nagurney. ChoiceNet: toward an economy plane for the Internet. *ACM SIGCOMM Computer Communication Review*, 44(3):58–65, July 2014.
- J-28 **Tilman Wolf**, Sriram Natarajan, and Kamlesh Vasudevan. High-performance capabilities for 1-hop containment of network attacks. *IEEE/ACM Transactions on Networking*, 21(6):1931–1946, December 2013.
- J-27 Anna Nagurney, Dong Li, **Tilman Wolf**, and Sara Saberi. A network economic game theory model of a service-oriented internet with choices and quality competition. *NETNOMICS: Economic Research and Electronic Networking*, 14(1–2):1–25, November 2013. (**Notable Article in Computing in 2013 by ACM Computing Reviews**)
- J-26 Anna Nagurney and **Tilman Wolf**. A Cournot-Nash-Bertrand game theory model of a service-oriented internet with price and quality competition among network transport providers. *Computational Management Science*, pages 1–28, August 2013.
- J-25 Y. Sinan Hanay, Abhishek Dwaraki, Kekai Hu, and **Tilman Wolf**. High-performance implementation of in-network traffic pacing for small-buffer networks. *Computer Communications*, 36(13):1450–1459, July 2013.
- J-24 Danai Chasaki and **Tilman Wolf**. Attacks and defenses in the data plane of networks. *IEEE Transactions on Dependable and Secure Computing*, 9(6):798–810, November 2012.
- J-23 Qiang Wu and **Tilman Wolf**. Runtime Task Allocation in Multi-Core Packet Processing Systems. *IEEE Transactions on Parallel and Distributed Systems*, 23(10):1934–43, October 2012.
- J-22 Shashank Shanbhag and **Tilman Wolf**. Automated composition of data-path functionality in the future internet. *IEEE Network*, 25(6):8–14, November 2011.
- J-21 Yan Cai, **Tilman Wolf**, and Weibo Gong. Delaying Transmissions in data communication networks to improve transport-layer performance. *IEEE Journal on Selected Areas in Communications*, 29(5):916–927, May 2011.
- J-20 **Tilman Wolf**, Russell Tessier, and Gayatri Prabhu. Securing the data path of next-generation router systems. *Computer Communications*, 34(4):598–606, April 2011.
- J-19 **Tilman Wolf**. In-network services for customization in next-generation networks. *IEEE Network*, 24(4):6–12, July 2010.
- J-18 Shufu Mao and **Tilman Wolf**. Hardware support for secure processing in embedded systems. *IEEE Transactions on Computers*, 59(6):847–854, June 2010.
- J-17 **Tilman Wolf**. Assessing student learning in a virtual laboratory environment. *IEEE Transactions on Education*, 53(2):216–222, May 2010.
- J-16 Ramaswamy Ramaswamy, Ning Weng and **Tilman Wolf**. Analysis of network processing workloads. *Journal of Systems Architecture*, 55(10):421–433, October 2009.
- J-15 Ning Weng and **Tilman Wolf**. Analytic modeling of heterogeneous network processors for parallel workload mapping. *ACM Transactions on Embedded Computing Systems*, 8(3):1–29, April 2009.
- J-14 Sameer Ladiwala, Ramaswamy Ramaswamy, and **Tilman Wolf**. Transparent TCP acceleration. *Computer Communication*, 32:691–702, March 2009.
- J-13 Shashank Shanbhag and **Tilman Wolf**. Accurate anomaly detection through parallelism. *IEEE Network*, 23(1):22–28, January 2009.
- J-12 Sri Parameswaran and **Tilman Wolf**. Embedded systems security – an overview. *Design Automation for Embedded Systems*, 12(3):173–183, September 2008.
- J-11 Xin Huang and **Tilman Wolf**. Evaluating dynamic task mapping in network processor runtime systems. *IEEE Transactions on Parallel and Distributed Systems*, 19(8):1086–1098, August 2008.
- J-10 Guy Gogniat, **Tilman Wolf**, Wayne Bursleson, Jean-Philippe Diguët, Lilian Bossuet, and Romain Vaslin. Reconfigurable hardware for high-security/high-performance embedded systems: the SAFES perspective. *IEEE Transactions on Very Large Scale Integration (VLSI) Systems*, 16(2):144–155, February 2008.
- J-9 **Tilman Wolf**, Ning Weng, and Chia-Hui Tai. Runtime support for multicore packet processing systems. *IEEE Network*, 21(4):29–37, July 2007.
- J-8 Ramaswamy Ramaswamy and **Tilman Wolf**. High-speed prefix-preserving IP address anonymization for passive measurement systems. *IEEE/ACM Transactions on Networking*, 15(1):26–39, February 2007.
- J-7 **Tilman Wolf** and Mark A. Franklin. Performance models for network processor design. *IEEE Transaction on Parallel and Distributed Systems*, 17(6):548–561, June 2006.
- J-6 **Tilman Wolf** and Sumi Y. Choi. Aggregated hierarchical multicast – a many-to-many communication paradigm using programmable networks. *IEEE Transactions on Systems, Man, and Cybernetics – Part*

C: Applications and Reviews, 33(3):358–369, August 2003.

- J-5 **Tilman Wolf**, Prashanth Pappu, and Mark A. Franklin. Predictive scheduling of network processors. *Computer Networks*, 41(5):601–621, April 2003.
- J-4 Sumi Y. Choi, Jonathan S. Turner, and **Tilman Wolf**. Configuring sessions in programmable networks. *Computer Networks*, 41(2):269–284, February 2003.
- J-3 **Tilman Wolf**. Network processors: flexibility and performance for next-generation networks. *ACM SIGCOMM Computer Communication Review*, 32(1):65, January 2002.
- J-2 **Tilman Wolf** and Jonathan S. Turner. Design issues for high performance active routers. *IEEE Journal on Selected Areas of Communication*, 19(3):404–409, March 2001.
- J-1 Dan Decasper, Guru Parulkar, Sumi Y. Choi, John DeHart, **Tilman Wolf**, and Bernhard Plattner. A scalable, high performance active network node. *IEEE Network*, 13(1):8–19, January 1999.

Articles in Conference and Workshop Proceedings

- P-141 Puming Fang and **Tilman Wolf**. Enabling virtual network functions in named data networking. In *Proc. of the Global Internet Symposium (GIS) in conjunction with the IEEE Conference on Computer Communications (INFOCOM)*, May 2021.
- P-140 Hao Cai and **Tilman Wolf**. Implementation of Network Source Authentication and Path Validation Using Orthogonal Sequences. In *Proc. of the 29th IEEE International Conference on Computer Communications and Networks (ICCCN)*, Honolulu, HI, August 2020.
- P-139 Bohan Zhao, Rui Li, Jin Zhao and **Tilman Wolf**. Efficient and Consistent TCAM Updates. In *Proc. of the IEEE Conference on Computer Communications (INFOCOM)*, July 2020.
- P-138 **Tilman Wolf**, Christopher V. Hollot, Russell Tessier, Bryan Polivka, and Yadi Eslami. Scalable Synchronous Cohort-Based International Education. In *Proc. of the 127th Annual Conference of the American Society for Engineering Education (ASEE)*, Montreal, QB, June 2020.
- P-137 Abhishek Dwaraki, Shachi Kumar, and **Tilman Wolf**. Automated Event Identification from System Logs Using Natural Language Processing. In *Proc. of Workshop on Computing, Networking and Communications held in conjunction with the International Conference on Computing, Networking and Communications (ICNC)*, Kailua-Kona, HI, February 2020.
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- P-20 Ning Weng and **Tilman Wolf**. Profiling and mapping of parallel workloads on network processors. In *Proc. of The 20th Annual ACM Symposium on Applied Computing (SAC)*, pages 890–896, Santa Fe, NM, March 2005.
- P-19 Ramaswamy Ramaswamy, Ning Weng, and **Tilman Wolf**. A network processor based passive measurement node. In *Proc. of Passive and Active Measurement Workshop (PAM)*, pages 337–340, Boston, MA, March 2005.
- P-18 Ramaswamy Ramaswamy, Ning Weng, and **Tilman Wolf**. Characterizing network processing delay. In *Proc. of IEEE Global Communications Conference (GLOBECOM)*, pages 1629–1634, Dallas, TX, November 2004.
- P-17 Ning Weng and **Tilman Wolf**. Pipelining vs. multiprocessors – choosing the right network processor system topology. In *Proc. of Advanced Networking and Communications Hardware Workshop (ANCHOR 2004) in conjunction The 31st ACM/IEEE Annual International Symposium on Computer Architecture (ISCA 2004)*, Munich, Germany, June 2004. (12 pages)

- P-16 Ramaswamy Ramaswamy, Ning Weng, and **Tilman Wolf**. Application analysis and resource mapping for heterogeneous network processor architectures. In *Proc. of Network Processor Workshop in conjunction with Tenth IEEE International Symposium on High Performance Computer Architecture (HPCA-10)*, pages 103–119, Madrid, Spain, February 2004.
- P-15 Ramaswamy Ramaswamy and **Tilman Wolf**. PacketBench: A tool for workload characterization of network processing. In *Proc. of IEEE 6th Annual Workshop on Workload Characterization (WWC-6)*, pages 42–50, Austin, TX, October 2003.
- P-14 Ramaswamy Ramaswamy, Ning Weng, and **Tilman Wolf**. Considering processing cost in network simulations. In *Proc. of Workshop on Models, Methods and Tools for Reproducible Network Research (MoMeTools) in conjunction with ACM SIGCOMM*, Karlsruhe, pages 47–56, Germany, August 2003.
- P-13 Mark A. Franklin and **Tilman Wolf**. Power considerations in network processor design. In *Proc. of Network Processor Workshop in conjunction with Ninth IEEE International Symposium on High Performance Computer Architecture (HPCA-9)*, pages 10–22, Anaheim, CA, February 2003.
- P-12 Prashanth Pappu and **Tilman Wolf**. Scheduling processing resources in programmable routers. In *Proc. of the Twenty-First IEEE Conference on Computer Communications (INFOCOM)*, pages 104–112, New York, NY, June 2002.
- P-11 **Tilman Wolf** and Mark A. Franklin. Design tradeoffs for embedded network processors. In *Proc. of International Conference on Architecture of Computing Systems (ARCS) (Lecture Notes in Computer Science)*, volume 2299, pages 149–164, Karlsruhe, Germany, April 2002. Springer Verlag.
- P-10 Mark A. Franklin and **Tilman Wolf**. A network processor performance and design model with benchmark parameterization. In *Proc. of Network Processor Workshop in conjunction with Eighth IEEE International Symposium on High Performance Computer Architecture (HPCA-8)*, pages 63–74, Cambridge, MA, February 2002.
- P-9 **Tilman Wolf** and Mark A. Franklin. Locality-aware predictive scheduling for network processors. In *Proc. of IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS)*, pages 152–159, Tucson, AZ, November 2001.
- P-8 **Tilman Wolf** and Sumi Y. Choi. Aggregated hierarchical multicast for active networks. In *Proc. of the 2001 IEEE Conference on Military Communications (MILCOM)*, pages 899–904, McLean, VA, October 2001.
- P-7 Ralph Keller, Jeyashankher Ramamirtham, and **Tilman Wolf**. Active pipes: Program composition for programmable networks. In *Proc. of the 2001 IEEE Conference on Military Communications (MILCOM)*, pages 962–966, McLean, VA, October 2001.
- P-6 Sumi Y. Choi, Jonathan S. Turner, and **Tilman Wolf**. Configuring sessions in programmable networks. In *Proc. of the Twentieth IEEE Conference on Computer Communications (INFOCOM)*, pages 60–66, Anchorage, AK, April 2001.
- P-5 **Tilman Wolf** and Mark A. Franklin. CommBench – a telecommunications benchmark for network processors. In *Proc. of IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS)*, pages 154–162, Austin, TX, April 2000.
- P-4 **Tilman Wolf**, Dan Decasper, and Christian Tschudin. Tags for high performance active networks. In *Proc. of the Third IEEE Conference on Open Architectures and Network Programming (OPENARCH)*, pages 37–44, Tel Aviv, Israel, March 2000.
- P-3 **Tilman Wolf** and Jonathan S. Turner. Design issues for high performance active routers. In *Proc. of the International Zurich Seminar on Broadband Communications*, pages 199–205, Zurich, Switzerland, February 2000.
- P-2 **Tilman Wolf** and Dan Decasper. CPU scheduling for active processing using feedback deficit round robin. In *Proc. of the 37th Allerton Conference on Communication, Control, and Computing*, pages 768–769, Monticello, IL, September 1999.
- P-1 Sumi Y. Choi, Dan Decasper, John DeHart, Ralph Keller, John Lockwood, Jonathan S. Turner, and **Tilman Wolf**. Design of a flexible open platform for high performance active networks. In *Proc. of the 37th Allerton Conference on Communication, Control, and Computing*, pages 157–165, Monticello, IL, September 1999.

Blog Posts

- BP-4 **Tilman Wolf**. Sacrificing interoperability for information security: containing data loss and malware propagation. In *ACM SIGARCH Blog*, August 2018.
- BP-3 **Tilman Wolf**. Cloud, fog, virtual network functions: Toward a continuum of computation and

communication. In *ACM SIGARCH Blog*, April 2018.

BP-2 **Tilman Wolf**. Blockchains considered harmful: Is brute-force processing replacing good design? In *ACM SIGARCH Blog*, November 2017. (**3rd most-viewed ACM SIGARCH blog post of 2017**)

BP-1 **Tilman Wolf**. Freedom vs. security in computer systems. In *ACM SIGARCH Blog*, June 2017.

INVITED PRESENTATIONS

Keynote Speeches

- **The Eighth IEEE Latin-American Conference on Communications (LATINCOM)**, Medellin, Colombia, November 2016.
- **Comunicaciones, Computación, Tecnologías de Información, Electrónica y Electricidad (COM²TIEE)**, IEEE Section Guatemala, Antigua, Guatemala, November 2015.
- **International Workshop on Computer and Networking Experimental Research using Testbeds (CNERT)**, Raleigh, NC, October 2014.
- **The Third Future Network Development and Innovation Forum**, Nanjing, China, December 2013.

Invited Courses

- **Indian Institute of Science**, Bangalore, India
4-Day Course “Design of Next-Generation Network Processors and Networking Gear,” August 2015.
- **University of Konstanz**, Konstanz, Germany
3-Day Course “Computer Networks,” April 2015.

Invited Seminars

- **Universidad Técnica del Norte**, World Communication Day, Ibarra, Ecuador, May 2021 (virtual).
- **University of New South Wales**, Sydney, Australia, March 2019.
- **La Universidad Politécnica Salesiana**, Cuenca, Ecuador, November 2016.
- **Universidad Técnica del Norte**, Ibarra, Ecuador, November 2016.
- **Universidad Católica Santo Domingo**, Santo Domingo, Dominican Republic, November 2016.
- **IEEE Comsoc Puerto Rico and Caribbean Chapter**, San Juan, PR, November 2016.
- **University of Connecticut**, Comcast Center of Excellence for Security Innovation, October 2016.
- **Memorial University of Newfoundland**, Department of Electrical and Computer Engineering, St. John's, NL, April 2016.
- **Dalhousie University**, Faculty of Computer Science, Halifax, NS, April 2016.
- **University of New Brunswick**, Department of Electrical and Computer Engineering, Fredericton, NB, April 2016.
- **University of Maine**, Department of Electrical and Computer Engineering, Orono, ME, April 2016.
- **IEEE Comsoc New Hampshire Chapter**, Manchester, NH, April 2016.
- **IEEE Panama Section**, Panama City, Panama, November 2015.
- **University of El Salvador**, San Salvador, El Salvador, November 2015.
- **IEEE El Salvador Section**, San Salvador, El Salvador, November 2015.
- **Federal Communications Commission**, Washington, DC, June 2015.
- **IEEE Washington Section**, Columbia, MD, May 2015.
- **IEEE Eastern North Carolina Section**, North Carolina State University, Raleigh, NC, May 2015.
- **IEEE Central North Carolina Section**, North Carolina A&T State University, Greensboro, NC, May 2015.
- **IEEE Charlotte Section**, University of North Carolina, Charlotte, NC, May 2015.
- **IEEE Jamaica Section**, University of Technology Jamaica, Kingston, Jamaica, May 2015.
- **Huawei R&D Center**, Santa Clara, CA, Huawei Strategy & Technology Workshop, March 2014.
- **Tsinghua University**, Beijing, China, Institute for Network Sciences and Cyberspace, December 2013.
- **Chinese Academy of Sciences**, Beijing, China, Institute of Computing Technology, December 2013.
- **Universidad de los Andes**, Departamento de Ingeniería de Sistemas y Computación, Bogotá, Colombia, April 2013.
- **Telefónica Research Lab**, Barcelona, Spain, November 2012.
- **Universidad Carlos III de Madrid**, Science Week, Leganes, Spain, November 2012.

- **Karlsruhe Institute of Technology**, Institute for Telematics, Karlsruhe, Germany, October 2012.
- **Bell Labs Research**, Stuttgart, Germany, July 2012.
- **Rochester Institute of Technology**, Department of Computer Engineering, October 2011.
- **IBM T.J. Watson Research Center**, Yorktown, NY, August 2011.
- **Cisco Systems, Inc.**, Technical Speaker Series, July 2011.
- **Worcester Polytechnic Institute**, Department of Electrical and Computer Engineering, February 2011.
- **Georg-August-Universität Göttingen**, Germany, Institute for Informatik, November 2010.
- **University of Arkansas**, Department of Computer Science and Computer Engineering, April 2010.
- **Technische Universität Berlin**, Germany, School of Electrical Engineering and Computer Sciences, June 2009.
- **Stanford University**, Department of Computer Science, November 2008.
- **University of Connecticut**, Department of Electrical and Computer Engineering, October 2008.
- **Universität Konstanz**, Germany, Department of Computer and Information Science, July 2008.
- **Huawei Technologies Corporation**, China, Beijing Research Center, May 2008.
- **Tsinghua University**, Beijing, China, Department of Computer Science and Technology, May 2008.
- **Fudan University**, Shanghai, China, School of Software, May 2008.
- **University of Patras**, Greece, Department of Electrical and Computer Engineering, March 2008.
- **University of Edinburgh**, United Kingdom, School of Informatics, March 2008.
- **University of Massachusetts Lowell**, Department of Computer Science, September 2007.
- **University of Kentucky**, Department of Computer Science, January 2006.
- **Polytechnic University**, Brooklyn, NY, Department of Computer and Information Sciences, December 2005.
- **Eidgenössische Technische Hochschule (ETH)**, Zurich, Switzerland, Department of Information Technology and Electrical Engineering, November 2005.
- **IBM Research**, Zurich, Switzerland, April 2002.
- **University of British Columbia**, Vancouver, BC, Department of Electrical and Computer Engineering, March 2002.
- **University of Massachusetts Amherst**, Department of Electrical and Computer Engineering, March 2002.
- **IBM T.J. Watson Research Center**, Hawthorne, NY, March 2002.
- **Lucent Technologies**, Holmdel, NJ, March 2002.

Panels and Invited Presentations

- **Society for College and University Planning Annual Meeting**, virtual
Presenter “Face to Face: Essential Instructional Delivery During and After COVID,” July 2021.
- **American Council on Education (ACE) Annual Meeting**, Philadelphia, PA
Invited Speaker “Outside the Brick and Mortar Box: Connecting Universities to International Demand,” March 2019.
- **IEEE Annual International Conference on Computer Communications (INFOCOM)**, Honolulu, HI
Panel Moderator “Machine Learning in Networking,” April 2018.
- **N²Women Event at IEEE Annual International Conference on Computer Communications (INFOCOM)**, Honolulu, HI
Panelist “Diversity and Leadership,” April 2018.
- **National Academy of Engineering**, Irvine, CA
Invited Participant, Frontiers of Engineering Education (FOEE) Symposium, October 2014.
- **ACM/IEEE Symposium on Architectures for Networking and Communication Systems (ANCS)**, San Jose, CA
Panelist “Future Trends in Networking,” October 2013.
- **International Conference on Computer Communications and Networks (ICCCN)**, Nassau, Bahamas
Panel Moderator “Trends in Network Architecture,” August 2013.
- **Workshop on Optimization of Computing at the Edge of Network (EON)**, Tampere, Finland
Invited Speaker “Hardware Support for Security and Virtualization in High-Performance Network Processors,” October 2012.

- **IEEE Annual International Conference on Computer Communications (INFOCOM)**, Orlando, FL
Panelist “Future Internet Design,” March 2012.
- **Data Center and Cloud Computing Technologies Workshop**, New York University Abu Dhabi
Invited Speaker “Security Issues in Software-Defined Networking,” March 2012.
- **International Conference on emerging Networking EXperiments and Technologies (CoNEXT)**, Tokyo, Japan
Panelist “Interdisciplinary opportunities for networking researchers,” December 2011.
- **Intel Embedded & Communications Education Summit**, Chandler, AZ
Invited Speaker “Application-Layer Offloading using the IXP2850,” February 2008.
- **Internet 2 Meeting**, Arlington, VA
Invited Speaker “Firewalls: Can’t Live With or Without Them,” April 2007.
- **Intel IXA University Summit**, Hudson, MA
Invited Speaker “Online Anomaly Detection using the IXP2400,” October 2006,
Panelist “Intel IXA Curriculum Development,” October 2005,
Invited Speaker “An IXA-Based Network Measurement Node,” October 2004.
- **Intel Network Measurement and Security Workshop**, Portland, OR
Invited Speaker “Real-time Network Measurement using the IXP2400 Network Processor,” November 2005.
- **International Conference on Computer Communications and Networks (ICCCN)**, Miami, FL
Panelist “Network Processor Benchmarking: Benchmarking a Diverse and Evolving Industry,” October 2002.

TEACHING EXPERIENCE

Undergraduate Teaching

- **ENGIN 112 – Introduction to Electrical and Computer Engineering**
First year introduction course on digital logic
Instructor Fall 2004 (lectures, 136 students), Fall 2005 (lectures, 115 students), Fall 2006 (discussions, 110 students), Fall 2007 (discussions, 95 students), Fall 2015 (lectures, 177 students), Fall 2016 (lectures, 189 students), Fall 2017 (lectures, 176 students), Fall 2018 (lectures, 142 students), Fall 2019 (lectures, 161 students), Fall 2020 (lectures, 163 students).
- **ENGIN 100 – Introduction to Engineering** (previously ENGIN 197E)
First year introduction course on digital logic
Instructor Fall 2017 (lectures, 65 students).
- **ECE 197SA – ECE Systems Appreciations**
First year course on electrical and computer systems and their societal impact
Instructor Spring 2010 (60 students), Spring 2011 (62 students), Spring 2012 (54 students), Spring 2014 (104 students).
- **ECE 242 – Data Structures and Algorithms**
Sophomore level course on programming data structures and algorithms in JAVA
Instructor Fall 2011 (discussions, 92 students), Fall 2013 (lectures, 96 students).
- **ECE 354 – Computer Systems Lab II**
Junior level microcontroller lab course
Instructor Spring 2003 (43 students), Spring 2004 (34 students).
- **ECE 415 & ECE 416 – Senior Design Project I & II**
Senior level capstone project course
Instructor AY 2007/08 (60 students), AY 08/09 (52 students), AY 2010/11 (50 students).
Team Advisor AY 2002/03, AY 2003/04, AY 2004/05, AY 2005/06, AY 2006/07, AY 2007/08, AY 2008/09, AY 2009/10, AY 2010/11, AY 2011/12, AY 2012/13, AY 2013/14, AY 2014/15, AY 2015/16, AY 2016/17, AY 2017/18, AY 2018/19, AY 2019/20, AY 2020/21 (3–4 students each year).
- **CS 423 – Introduction to Computer Networks**
Senior and graduate level course on computer networks (Washington University in St. Louis)
Instructor Fall 2001 (64 students).

Graduate Teaching

- **ECE 697AM – Applied Machine Learning for the Internet of Things**
Graduate level course on machine learning
Instructor Spring 2021 (45 students)
- **ECE 671 – Computer Networks** (previously ECE 697AA)
Graduate level Ph.D. core course on computer networks
Instructor Spring 2005 (20 students), Spring 2006 (22 students), Spring 2007 (29 students), Spring 2008 (21 students), Fall 2008 (15 students), Fall 2010 (43 students), Fall 2011 (36 students).
- **ECE 697J – Advanced Topics in Computer Networking**
Graduate level research course on network system design
Instructor Fall 2002 (10 students), Fall 2003 (9 students).
- **ENGIN 697T – Teaching Seminar**
Graduate level seminar for freshman seminar instructors
Instructor Fall 2015 (12 students), Fall 2016 (13 students).

Other Teaching Experience

- **Several courses** at Washington University in St. Louis and Universität Stuttgart
Teaching Assistant 1994 – 2000.

ADVISING

Doctoral Students

- **Ning Weng, Ph.D.**, “Application Profiling and Mapping for Network Processing Systems,” July 2005. First position: Assistant Professor, ECE Department, University of Southern Illinois at Carbondale.
- **Ramaswamy Ramaswamy, Ph.D.**, “An Embedded High-Performance Network Measurement Architecture,” August 2006. First position: Cisco Systems, Inc.
- **Xin Huang, Ph.D.**, “Protocol and System Design for a Service-Centric Network Architecture,” September 2009. First position: Deutsche Telekom R&D Lab USA.
- **Qiang Wu, Ph.D.**, “Dynamic Resource Management for High-Performance Many-Core Packet Processing Systems,” December 2010. First position: Juniper Networks, Inc.
- **Yan Cai, Ph.D.**, “Queue Length Based Pacing of Internet Traffic,” May 2011. First position: Cisco Systems, Inc. Co-advised with Weibo Gong.
- **Sinan Hanay, Ph.D.**, “Improving Network Performance through Pacing,” July 2011. First position: Post-doctoral Researcher, Advanced Network Architecture Research Laboratory, Osaka University, Japan.
- **Shashank Shanbhag, Ph.D.**, “On Data-Path Customization in Next-Generation Networks,” September 2011. First position: Nimbula, Inc.
- **Danai Chasaki, Ph.D.**, “Security Issues in Networked Embedded Devices,” April 2012. First position: Assistant Professor, Villanova University.
- **Sriram Natarajan, Ph.D.**, “Security Issues in Network Virtualization for the Future Internet,” July 2012. First position: NTT Multimedia Communication Labs.
- **Nauman Javed, Ph.D.**, “Interpreting Sensor Information in Large-Scale Distributed Cyber-Physical System,” October 2013. First position: Department of Avionics Engineering, National University of Sciences and Technology, Pakistan. Co-advised with Michael Zink.
- **Jeremy Gummesson, Ph.D.**, “Exploiting Energy Harvesting for Passive Embedded Computing Systems,” November 2013. First position: Hewlett Packard Labs. Co-advised with Deepak Ganesan.
- **Xinming Chen, Ph.D.**, “Design and Implementation of an Economy Plane for the Internet,” June 2015. First position: Google, Inc.
- **Thiago Teixeira, Ph.D.**, “Service Competition and Data-Centric Protocols for Internet Access,” August 2019. First position: Brightcove, Inc. Co-advised with Michael Zink.
- **Arman Pouraghily, Ph.D.**, “Trustworthy Systems and Protocols for the Internet of Things,” September 2019. First position: Department of Electrical and Computer Engineering, University of Massachusetts Amherst.
- **Abhishek Dwaraki, Ph.D.**, “Improving Computer Network Operations Through Automated Interpretation of State,” April 2020. First position: Department of Computer Science and Engineering,

Washington University in St. Louis.

- **Hao Cai, Ph.D.**, “Design and Implementation of Path Finding and Verification in the Internet,” May 2020. First position: Palo Alto Networks, Inc.
- **Puming Fang**, expected May 2023.

Masters Students

- **Ning Yang, M.S.**, “Design and Implementation of an On-line Query System for Network Measurement,” December 2005.
- **Chia-Hui Tai, M.S.**, “Analysis of Network Processing Delay,” July 2006. First position: Ph.D. student, EE Department, Stanford University.
- **Siddhartha Bunga, M.S.**, “Online Passive Network Measurement,” July 2006. First position: Cisco Systems, Inc.
- **Shulin You, M.S.**, “Design of Transparent TCP Acceleration using Network Processors,” August 2006. First position: eloomberg, China.
- **Sameer Ladiwala, M.S.**, “Implementation of Transparent TCP Acceleration on Network Processor System,” August 2006. First position: Cisco Systems, Inc.
- **Shashank Shanbhag, M.S.**, “Design and Implementation of Parallel Anomaly Detection,” August 2007. First position: Ph.D. student, ECE Department, University of Massachusetts.
- **Soumya Mahadevan, M.S.**, “Performance Analysis of Offloading Application-Layer Tasks to Network Processors,” August 2007. First position: Cisco Systems, Inc.
- **Aditya Nemmaluri, M.S.**, “Sherlock: RFID Localization for Pervasive Multimedia,” January 2008. First position: Cisco Systems, Inc. Co-advised with Prashant Shenoy.
- **Shufu Mao, M.S.**, “Hardware Support for Secure Processing in Embedded Systems,” January 2008. First Position: WorldQuant, LLC.
- **Pooja Subramanya, M.S.**, “Implementation of an Online Query Management System for Network Measurement,” January 2008. First position: Cisco Systems, Inc.
- **Sivakumar Ganapathy, M.S.**, “Implementation of a Service-Oriented Network Architecture,” May 2008. First position: Airvana, Inc.
- **Wei Chen, M.S.**, “Task Partitioning and Mapping Algorithms for Multi-Core Packet Processing Systems,” September 2008. First position: Nvidia Corp.
- **Danai Chasaki, M.S.**, “Design and Evaluation of Path Recording Techniques in Secure MANET,” December 2008. First position: Ph.D. student, ECE Department, University of Massachusetts.
- **Santosh Proddatoori, M.S.**, “Implementation of Network Services Supporting Multi-Party Policies,” June 2009. First position: Cisco Systems, Inc.
- **Kamlesh Vasudevan, M.S.**, “Implementation of Data Path Credentials for High-Performance Capabilities-Based Networks,” July 2009. First position: RSA, The Security Division of EMC.
- **Anindya Misra, M.S.**, “Simulation of Packet Pacing in Small-Buffer Networks,” November 2009. First position: RSA, The Security Division of EMC.
- **Jeremy Gummeson, M.S.**, “Leveraging Multi-Radio Communications for Wireless Sensor Networks,” September 2010. First position: Ph.D. student, ECE Department, University of Massachusetts. Co-advised with Prashant Shenoy.
- **Arun Reddy Kandoor, M.S.**, “Algorithms and Benchmarking for Virtual Network Mapping,” December 2010. First position: Qualcomm, Inc.
- **Abhishek Dwaraki, M.S.**, “Hardware Implementation of Queue Length Based Pacing for Small-Buffer Networks,” March 2011. First position: RSA, The Security Division of EMC.
- **Cong Wang, M.S.**, “Virtual Network Mapping with Traffic Matrices,” August 2011. First position: Ph.D. student, ECE Department, University of Massachusetts.
- **Karthikeswar Ivaturi, M.S.**, “Design of a Mapping Algorithm for Delay Sensitive Virtual Networks,” March 2012. First position: RSA, The Security Division of EMC.
- **Vikram Desai, M.S.**, “Techniques for Detection of Malicious Packet Drops in Networks,” May 2012. First position: Cisco Systems, Inc.
- **Jin Zhu, M.S.**, “Benchmarking Virtual Network Mapping Algorithms,” July 2012. First position: Cisco Systems, Inc.
- **Peng Wu, M.S.**, “Stack Protection Mechanisms in Packet Processing Systems,” November 2012. First position: Cisco Systems, Inc.
- **Xianglong Kong, M.S.**, “Analysis of Sensor Data in Cyber-Physical Systems,” May 2013. First posi-

tion: BroadVision, Inc.

- **Yunsheng Qi, M.S.**, “Design and Implementation of a Network Service Marketplace,” June 2014. First position: Epic Systems Corporation.
- **Pengcheng Wang**, “Design and Implementation of Digital Information Security for Physical Documents,” February 2015. First position: VMTurbo, Inc.
- **Shuai Chen**, “Evaluation of Two-Dimensional Codes for Digital Information Security in Physical Documents,” April 2015. First position: Hughes Network Systems LLC.
- **Xue Yu**, “Design and Implementation of a Digital Information Security Service for Physical Documents,” May 2015. First position: Amazon.com, Inc.
- **Padmaja Duggisetty**, “Design and Implementation of a High-Performance Network Processor with Dynamic Workload Management,” June 2015. First position: Intel Corporation.
- **Chunqiu Liu**, “Infrastructure-Free Secure Pairing of Mobile Devices,” August 2016. First position: OriginLab Corporation.
- **Jingrui Li**, “Protecting Controllers Against Denial-of-Service Attacks in Software-Defined Networks,” August 2016. First position: Xiaomi Technology.

Undergraduate Students

- **Andrew Maxwell**, Research Experiences for Undergraduates (for G-1), “Highly Accurate Time Stamping for Network Measurements,” Summer 2004.
- **Brian Roberts**, Honors Thesis, “Application-Layer Routing Overlay Network,” May 2006.
- **Nafis Azad**, Research Experiences for Undergraduates (for G-2), “Development of Workload Scenarios for Network Processor Run-time Environments,” Summer 2006.
- **Ernard Nicolas**, Research Experiences for Undergraduates (for G-2), “Design and Implementation of an XML Interface for an Application Partitioning and Mapping Tool,” Summer 2006.
- **Edmar Gonçalves**, Research Experiences for Undergraduates (for G-6), “Application-Layer Measurement of Pacing Effects,” Summer 2011.
- **Joel Jean-Claude**, Research Experiences for Undergraduates (for G-6), “Application of Pacing to Network Protocol Design,” Summer 2011.
- **Zachary Goodman**, Research Experiences for Undergraduates (for G-9), “Runtime Optimization for a Secure Router Infrastructure,” Summer 2013.
- **Noah Pell**, Research Experiences for Undergraduates (for G-9), “Improved Monitoring for FPGA-Based Network Processors,” Summer 2013.
- **Cameron Foss**, Research Experiences for Undergraduates (for G-10), “Video Streaming Application for the ChoiceNet Infrastructure,” Summer 2013.
- **William Sullivan**, Research Experiences for Undergraduates (for G-10), “Video Streaming Application for the ChoiceNet Infrastructure,” Summer 2013.
- **Ashton Gray**, Research Experiences for Undergraduates (for G-14) “Exploring Machine Learning for System Security,” Summer 2021.
- **Jessica Peters**, Research Experiences for Undergraduates (for G-14) “Exploring Machine Learning for System Security,” Summer 2021.
- **Alon Trogan**, Research Experiences for Undergraduates (for G-14) “Securing Systems in the Internet of Things,” Summer 2021.

Visiting Researchers

- **Luis Andres Marentes Cubillos**, Universidad de los Andes, Colombia, August 2013 – August 2014.
- **Lei Shi**, Waterford Institute of Technology, Ireland, January 2014 – November 2014.
- **Jin Zhao**, Fudan University, China, February 2014 – February 2015.
- **Nizar Ben Neji**, University of Carthage, Tunisia, February 2015 – April 2015.
- **Souhaib Yousfi**, University of Carthage, Tunisia, September 2018 – July 2019.

PROFESSIONAL SERVICE

Editorships

- **IEEE Networking Letters**
Associate Editor, June 2018 – present.

- **IEEE Micro**
Associate Editor, November 2005 – April 2016.
- **IEEE/ACM Transactions on Networking**
Associate Editor, September 2007 – March 2012.
- **Computer Networks** (Elsevier)
Guest Editor, Special Issue on Architectures and Protocols for the Future Internet, Volume 55, Number 4, March 2011.
- **International Journal on Design Automation for Embedded Systems** (Springer)
Guest Editor, Special Issue on Embedded System Security, Volume 12, Number 3, September 2008.

Leadership in Professional Societies

- **ASEE Graduate Studies Division**
Director, August 2021 – present.
- **IEEE Communications Society Technical Committee on Computer Communications (TCCC)**
Vice Chair, July 2019 – present.
- **IFIP Working Group 6.2: Network and Internetwork Architectures**
Full Member, January 2019 – present.
- **IEEE Communications Society Awards Committee**
Member, January 2016 – December 2018.
- **ACM Special Interest Group on Communication (SIGCOMM)**
Treasurer, June 2005 – June 2013 (re-elected 2007 and 2009).
- **Internet Research Task Force (IRTF) End Middle End (EME) Research Group**
Co-Chair, October 2006 – February 2008.

Advisory Boards and Steering Committees

- **Steering Committee of IEEE/ACM Transactions on Networking**
Chair, July 2013 – June 2014, *Member*, April 2012 – present.
- **Advisory Board of the Center for International Education (CIE)**, College of Education, University of Massachusetts Amherst
Member, May 2019 – present.
- **National Leadership Team of the Center for the Integration of Research, Teaching and Learning (CIRTL)**
Member, August 2019 – July 2021.
- **Steering Committee of the First IEEE INFOCOM Workshop on Networking Algorithms (WNA)**
Member, April 2020.
- **Steering Committee of ACM/IEEE Symposium on Architectures for Networking and Communication Systems (ANCS)**
Member, October 2012 – present.
- **Steering Committee of Global Internet Symposium (GI)**
Member, March 2010 – December 2016.
- **External Advisory Board, Department of Computer Science and Engineering, Washington University in St. Louis**
Member, 2010 – 2013.

Conference Organization and Technical Program Committees

- **Annual Joint Conference of the IEEE Computer and Communications Societies (INFOCOM)**
Technical Program Co-Chair 2019, *Panel Co-Chair* 2015, *Area Chair* 2015, 2016, 2017, 2018, 2020, 2021, 2022, *Technical Program Committee Member* 2003, 2004, 2006, 2008, 2009, 2010, 2011, 2012.
- **ACM/IEEE Symposium on Architectures for Networking and Communication Systems (ANCS)**
General Chair 2012, *Technical Program Co-Chair* 2011, *Finance Chair* 2010, *Technical Program Committee Member* 2005, 2006, 2007, 2008, 2009, 2010, 2013, 2017.
- **IEEE International Conference on Computer Communications and Networks (ICCCN)**
General Co-Chair 2010, *Technical Program Co-Chair* 2009, *Track Co-Chair* 2008, *Technical Program Committee Member* 2007, 2008, 2012.

- **IEEE International Symposium on Local and Metropolitan Area Networks (LANMAN)**
General Co-Chair 2020, Technical Program Co-Chair 2019, Technical Program Committee Member 2008, 2014, 2015, 2016.
- **IEEE International Conference on Network Protocols (ICNP)**
Technical Program Co-Chair 2013, Technical Program Committee Member 2008, 2009, 2010, 2011, 2017, 2021.
- **IEEE Conference on Communications and Network Security (CNS)**
Technical Program Co-Chair 2016, Area Chair 2014, 2015, 2017 Technical Program Committee Member 2013, 2019, 2020, 2021.
- **IFIP Networking**
Technical Program Co-Chair 2017, Technical Program Committee Member 2010, 2011, 2012, 2014, 2015, 2016, 2018, 2020, 2021.
- **International Conference on Parallel Processing (ICPP)**
Track Co-Chair 2014, Technical Program Committee Member 2003.
- **ACM Annual Conference of the Special Interest Group on Data Communication (SIGCOMM)**
Topic Preview Co-Chair 2021, Treasurer 2018, Student Travel Grant Chair 2004, 2014.
- **IEEE International Conference on Cloud Networking (CloudNet)**
Publicity Co-Chair 2018.
- **IEEE Conference on Open Architectures and Network Programming (OPENARCH)**
Publicity Chair 2003, Technical Program Committee Member 2003.
- **IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS)**
Publicity and Web Co-Chair 2001, Technical Program Committee Member 2010.
- **ACM International Conference on emerging Networking EXperiments and Technologies (CoNEXT)**
Treasurer 2021, Technical Program Committee Member 2015.
- **IEEE Conference on Network Function Virtualization and Software Defined Networks (NFV-SDN)**
Technical Program Committee Member 2015, 2016, 2017, 2018, 2019, 2020, 2021.
- **ASEE Annual Conference Graduate Studies Division**
Technical Program Committee Member 2020, 2021.
- **IEEE/ACM International Symposium on Quality of Service (IWQoS)**
Technical Program Committee Member 2021.
- **International Working Conference on Active Networks (IWAN)**
Technical Program Committee Member 2002, 2003, 2004, 2005, 2006.
- **ACM Symposium on Applied Computing (SAC), Special Track on Embedded Systems**
Technical Program Committee Member 2009, 2010, 2011, 2012, 2014.
- **IEEE International Conference on Communications (ICC)**
Technical Program Committee Member 2011, 2012, 2015, 2016.
- **IEEE International Conference on Internet-of-Things Design and Implementation (IoTDI)**
Technical Program Committee Member 2017, 2018.
- **ACM Symposium on Software-Defined Networking Research (SOSR)**
Technical Program Committee Member 2016, 2019.
- **International Teletraffic Congress (ITC)**
Technical Program Committee Member 2017.
- **IEEE Sensing, Communication and Networking (SECON)**
Technical Program Committee Member 2016.
- **IEEE Globecom – Next Generation Networking and Internet Symposium**
Technical Program Committee Member 2012.
- **IEEE International Conference on Communications in China (ICCC)**
Technical Program Committee Member 2012.
- **International Conference on Future Information Networks (ICFIN)**
Technical Program Committee Member 2009.
- **ISCA International Conference on Parallel and Distributed Computing and Communication Systems (PDCCS)**
Technical Program Committee Member 2008.
- **Passive and Active Measurement Conference (PAM)**
Technical Program Committee Member 2007.

- **Annual IEEE International Symposium on Workload Characterization (IISWC)**
Technical Program Committee Member 2005.

Workshop Organization and Technical Program Committees

- **Global Internet Symposium (GIS)** in conjunction with the IEEE Conference on Computer Communications (INFOCOM)
Workshop Co-Chair 2010, Technical Program Committee Member 2008, 2009, 2011, 2012, 2014, 2015, 2021.
- **Workshop on Re-Architecting the Internet (ReArch)** in conjunction with the ACM International Conference on emerging Networking EXperiments and Technologies (CoNEXT)
Workshop Co-Chair 2009, Technical Program Committee Member 2008, 2010.
- **Workshop on Performance Evaluation of Next-Generation Networks (NetEval)** in conjunction with the IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS)
Workshop Co-Chair 2009.
- **Workshop on Embedded System Security (WESS)** in conjunction with ACM EMSOFT
Workshop Co-Chair 2007, Technical Program Committee Member 2008, 2009, 2010, 2011.
- **Advanced Networking and Communications Hardware Workshop (ANCHOR)** in conjunction with The Annual International Symposium on Computer Architecture (ISCA)
Workshop Co-Chair 2006.
- **IEEE Workshop on Enabling the Future Service-Oriented Internet** in conjunction with IEEE Globecom
Technical Program Committee Member 2007, 2008, 2009, 2010.
- **Workshop on Heterogeneous and Unconventional Cluster Architectures and Applications (HUCAA)** in conjunction with International Conference on Parallel Processing (ICPP)
Technical Program Committee Member 2013, 2014.
- **Workshop on Secure Network Protocols (NPSec)**
Technical Program Committee Member 2014, 2015.
- **Workshop on Network Processors (NP)**
Technical Program Committee Member 2003, 2004.
- **International Workshop on the Network of the Future (FutureNet)**
Technical Program Committee Member 2011.
- **FTRA International Workshop on Security and Application for Embedded Smart Systems (SAE)**
Technical Program Committee Member 2011.
- **International Workshop on Security and Privacy in Cloud Computing (SPCC)**
Technical Program Committee Member 2010.
- **Workshop on the Influence of I/O on Microprocessor Architecture (IOM)**
Technical Program Committee Member 2009.
- **IEEE INFOCOM High-Speed Networks Workshop (HSN)**
Technical Program Committee Member 2008.

Reviews

- Numerous **IEEE and ACM conferences and journals**
Reviewer 2000 – present.
- **National Science Foundation**
Panelist 2003 – present.
- **International Funding Agencies:** Hong Kong, Ireland, Italy, Romania, Switzerland
Reviewer 2011 – present.

UNIVERSITY SERVICE

University Committees

- **Faculty Senate Graduate Council**
Member, AY 2015/16, AY 2016/17, AY 2017/18, AY 2018/19, AY 2019/20, AY 2020/21.
- **Faculty Senate Information and Communication Technology Council**
Member, AY 2014/15, AY 2015/16, AY 2016/17, AY 2018/19, AY 2019/20, AY 2020/21.

- **Faculty Senate Research Council**
Member, AY 2015/16, AY 2016/17.
- **Campus IT Executive Governance Council**
Member, AY 2017/18.
- **Teaching Commons Advisory Committee**
Member, AY 2010/11, AY 2011/12, AY 2012/13, AY 2013/14, AY 2014/15, AY 2015/16, AY 2016/17.

Departmental Committees

- **Department Personnel Committee**
Chair AY 2008/09, AY 2013/14 (January) Member AY 2004/05, AY 2005/06, AY 2010/11.
- **Department Instructional Offerings Committee**
Chair AY 2010/11, AY 2011/12, AY 2012/13 Member AY 2013/14.
- **Department Equipment Committee**
Chair AY 2007/08, AY 2008/09, AY 2009/10, AY 2010/11, Member AY 2002/03, AY 2003/04, AY 2004/05, AY 2005/06, AY 2006/07.
- **Department B.S./M.S. Committee**
Chair AY 2007/08, AY 2008/09.
- **Department Activities Committee**
Chair AY 2007/08, Member 2008/09.
- **Instructional Development Committee**
Member AY 2013/14, AY 2014/15, AY 2015/16, AY 2016/17.
- **Graduate Curriculum Committee**
Member AY 2003/04, AY 2004/05, AY 2005/06, AY 2006/07, AY 2009/10, AY 2010/11.
- **Graduate Admissions Committee**
Member AY 2002/03, AY 2003/04, AY 2004/05, AY 2007/08.
- **Comprehensive Exam Modification Committee**
Member AY 2003/04.

Student Group Advising

- **Massachusetts Zeta Chapter of Tau Beta Pi (Engineering Honor Society)**
Advisor, AY 2004/05, AY 2005/06, AY 2006/07.
- **Delta Eta Chapter of Eta Kappa Nu (Electrical Engineering Honor Society)**
Advisor, AY 2005/06.

Search Committees

- **Dean of the College of Nursing**
Co-Chair, 2019.
- **Vice Chancellor and Chief Information Officer**
Member, 2019.
- **Vice Provost for Faculty Development**
Chair, 2018.
- **Associate Provost and Director of the Center for Teaching Excellence & Faculty Development**
Chair, 2018.
- **Director of Academic Personnel Systems and Administration**
Member, 2018.
- **Director of Campus Planning**
Member, 2018.
- **Faculty Search Committee Department of Electrical and Computer Engineering**
Chair, 2016/17, Member, 2006/07, 2008/09, 2011/12.
- **Director of Institute of Applied Life Science**
Member, 2014.
- **Assistant Director of the Center for Teaching**
Member, 2008.

MEMBERSHIPS

Professional Societies

- **Institute of Electrical and Electronics Engineers (IEEE)**
Senior Member 2007 – present, Member 2002 – 2007, Student Member 2000 – 2002.
- **Association of Computing Machinery (ACM)**
Senior Member 2007 – present, Member 2002 – 2007, Student Member 2000 – 2002.
- **American Association for the Advancement of Science (AAAS)**
Member 2013 – present.
- **American Society for Engineering Education (ASEE)**
Member 2014 – present.
- **Biomedical Engineering Society (BMES)**
Member 2019 – 2021, Council of Chairs Member 2019 – 2021.

Honor Societies

- **Tau Beta Pi** (Engineering Honor Society)
Member 1998 – present.
- **Eta Kappa Nu** (Electrical and Computer Engineering Honor Society)
Member 2001 – present.

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