

George P. Nychis

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Education

M.S. Information Networking, Carnegie Mellon University, 2007. (*GPA: 3.8 / 4.0*)

B.S. Computer Science, University of Pittsburgh, 2005. *Cum Laude*

Work Experience

Research Staff May 2007 - Present
School of Computer Science Carnegie Mellon University
Developing a flexible platform for wireless MAC protocol development and the first contention based wireless MAC in GNU Radio and the Universal Software Radio Peripheral (USRP). The position is co-advised by Srinivasan Seshan and Peter Steenkiste.

Teaching Experience

Teaching Assistant, 15-441: Computer Networks, Carnegie Mellon University, Fall 2006.

Instructed by Srinivasan Seshan and David G. Andersen.

Gave full lecture, two recitations, designed homework and test questions, and was the project lead for one of two course projects.

Teaching Assistant, 18-842: Graduate Distributed Systems, Carnegie Mellon University, Spring 2007.

Instructed by Greg Ganger.

Designed quiz questions and was a mentor for the following projects: TATS - Time-Aware Transit System, D-VCS - Distributed Version Control System, and DeMSeL: Decentralization of the Metadata System in the Lustre File System.

Research Experience

Independent Research 2007-Present
Srinivasan Seshan and Peter Steenkiste Carnegie Mellon University
Designing a new wireless collision detection technique where 802.11 nodes can determine the cause of a loss by sacrificing a small amount of capacity only after a loss occurs. By determining the loss type, nodes can better schedule transmissions and backoff periods which increases the overall capacity of the network (i.e. nodes will not backoff to microwaves or path loss). Nodes can also detect when they are in asymmetric scenarios with other wireless nodes which is currently not possible in 802.11 networks.

Independent Research 2007-Present
Srinivasan Seshan and Peter Steenkiste Carnegie Mellon University
Implementing the first contention based wireless MAC protocol in GNU Radio and the USRP to demonstrate and evaluate the capabilities of the MAC protocol development framework built using the platform.

Independent Research 2007
Srinivasan Seshan and Peter Steenkiste Carnegie Mellon University
Developed in-band signaling for the GNU Radio architecture and the USRP to create a flexible environment for wireless MAC protocol development and per-packet control over the USRP. The work is considered the largest architectural change to GNU Radio and the USRP since their release in 2001, which will be included in the official 3.2 release of GNU Radio.

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- Master's Thesis 2006-2007
Hui Zhang and David G. Andersen Carnegie Mellon University
Discovered a strong correlation between many entropy-based network traffic metrics through a large trace analysis of CMU and Internet2 traffic. After developing an anomaly detection sensitivity analysis technique, I derived implications from the correlation found in the metrics based on the magnitude of the anomalies which has been previously unstudied.
- Independent Research 2007
David G. Andersen Carnegie Mellon University
Built the Datapository Anomaly Detection Testbed which provides a framework and storage facility to develop and test new anomaly detection methods, run current detection methods, generate synthetic attacks in to traffic, develop new attack models, label anomalies, and analyze network traffic features.
- Course Research Project 2006
Peter Steenkiste Carnegie Mellon University
Implemented and evaluated the FastPass network DDoS prevention system in true hardware by using the IXP2400 platform. The project was the first to test and evaluate DDoS prevention "network capabilities" in hardware, strengthening the plausibility of their deployment through the evaluation.
- Graduate Course Research Project 2006
Srinivasan Seshan Carnegie Mellon University
Discovered that XCP, a congestion control protocol developed for wired networks, achieves up to 200% of TCP's throughput when used in lossy wireless networks. We conjecture that XCP could achieve greater performance if adapted for wireless networks after showing its stability and fairness fail its inability to estimate wireless channel capacity.
- Graduate Course Research Project 2006
Hui Zhang Carnegie Mellon University
Captured live network traffic and generated controlled traffic over a month's period in home and campus-like network environments to study the affects of time insensitive network traffic such as P2P traffic, on time sensitive traffic such as HTTP. The evaluation of the affects can be used for future development of network QOS mechanisms.
- Graduate Course Research Project 2006
Greg Ganger and Tina Wong Carnegie Mellon University
Researched the ability of erasure coding to increase the scalability and performance of peer to peer disk backup systems by building the system and performing evaluation on the Emulab testbed. The project was done in conjunction with the Parallel Data Lab, which provided erasure coding libraries.
- Industry Research 2005-2006
Thomas Spears Westinghouse Research
Worked with an interdisciplinary group of four other students from Carnegie Mellon University to research wireless network deployment and performance within nuclear containment. Wireless device development and testing was done at Westinghouse's Waltz Mill research facility.

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Industry Research 2005
Erik Riedel Seagate Research
Built a prototype of a cost efficient wireless home sensor network device through hardware and firmware modifications to WAP54G Linksys access points. The prototype was later used by another group of students in a project course at Carnegie Mellon University for further research and development with Seagate.

Independent Research 2005
Michael Bigrigg The University of Pittsburgh
Designed a stateless sensor network access management protocol and performed an evaluation of the protocol in the Emulab testbed. A prototype of the system is also deployed in the ICES department of Carnegie Mellon University.

Works In Progress for Submission

An Empirical Analysis of Entropy-based Traffic Anomaly Detection. G. Nychis, V. Sekar, D. Andersen, and H. Zhang, Carnegie Mellon University.

Support for Development and Evaluation of Wireless MAC Protocols in a Software-defined Radio Architecture. G. Nychis, T. Hottelier, P. Steenkiste, and S. Seshan. Carnegie Mellon University.

Completed Non-Peer Reviewed Works

Analysis of XCP in a Wireless Environment. G. Nychis, G. Sardesa, and S. Seshan. Carnegie Mellon University, 2007.

P2PeuR: Peer to Peer Disk Backup using Erasure Coding. G. Nychis, A. Andreou, A. Giamas, and D. Chheda. Carnegie Mellon University, 2006.

Network QOS for Time Sensitive Applications. G. Nychis, D. Licata, and H. Zhang. Carnegie Mellon University, 2006.

Honors and Awards

One of six invited by the founders of GNU Radio and the USRP to spend two weeks at Virginia Polytechnic Institute developing the platforms.

Received an overall rating of “excellent” from TA evaluations for 15-441: Computer Networks.

Selected by the University of Pittsburgh Computer Science Department to participate in the:

- National ACM Collegiate Programming Competition at Carnegie Mellon University, Pittsburgh, PA (2004)
- Computer Science Competition at McGill University in Montreal, Canada (2004)
- Carnegie Mellon University Invitational Programming Competition, Pittsburgh, PA (2005)
- Computer Science Competition at Laval University in Quebec, Canada (2005)

Programming Languages and Tool Experience

Experience is ranked from 1 to 5

Programming Languages: C(5), C++(4), Java(3), Python(2), Ruby(4), and Matlab(3).

Tools: Emulab(5), NS-2(2), CMU Wireless Emulator(2), NetEm Network Emulator(2), and Ethernal(5).

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Noteable Courses Taken During Masters

- 15-744: Graduate Computer Networks, Hui Zhang.
- 15-849D: Graduate Wireless Networks, Srinivasan Seshan.
- 15-849E: Hot Topics in Computer Networks, Srinivasan Seshan.
- 18-342: Embedded Systems, Rajeev Ghandi.
- 18-544: Network Design and Evaluation, Peter Steenkiste.
- 18-756: Packet Switching in Computer Networks, Ozan Tonguz.
- 18-842: Graduate Distributed Systems, Greg Ganger.

Noteable Courses Taken During Undergraduate

- 15-441: Computer Networks, Srinivasan Seshan and David Andersen. (cross-registered at CMU)
- 39-650: Sensor Network Design, Michael Bigrigg. (cross-registered at CMU)
- 1538: Modeling and Building Simulation Systems, John Ramirez.
- 1571: Introduction to Artificial Intelligence, Rebecca Hwa.

Service

- 1 of 10 official developers for the GNU Radio project, 2007-Present.
- Perform in 25+ shows a year, Greek dancing for the Grecian Odyssey Dancers of Ypapanti Church, 2004-Present.
- Designed and maintain the Grecian Odyssey Dancers' website, 2006-Present.