

Danh Nguyen

WIRELESS SYSTEM PHD CANDIDATE · EMBEDDED SOFTWARE ENGINEER

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Summary

Final-year PhD candidate with 7 years' experience in research and development of hardware, software, and system components for modern wireless communication and networking systems. Fluent in embedded / FPGA development, C, Python, Matlab, and web frameworks (HTML, CSS, JS). Currently seeking full-time opportunities in the general areas of mobile computing and networking.

Education

Drexel University

PH.D. IN ELECTRICAL ENGINEERING (ADVISORS: K. R. DANDEKAR, N. KANDASAMY)

Thesis: "Agile Spectrum Sharing Wireless Systems using Software Radios and Reconfigurable Antennas"

Philadelphia, PA

2009–Exp. 4/2017

Drexel University

M.S. IN COMPUTER ENGINEERING

Hands-on experience in **computer architecture**, **hardware/software co-design**, and **telecommunications**

Philadelphia, PA

2009–2014

Drexel University

B.S. IN COMPUTER ENGINEERING

Graduated Summa Cum Laude, GPA: 3.96

Philadelphia, PA

2006–2009

Skills

Operating Systems

Unix / Linux (*proficient*), Windows, MAC OS

Programming

C / Python / Matlab (*proficient*), Java / C++ / C# (*intermediate*), PHP, HTML / CSS, Javascript

Libraries

NumPy / Jupyter / Matplotlib / Pandas (Python), GNU Radio (C++), lwIP / mac80211 (C), Unity, Vuforia AR

Hardware

Xilinx & Altera FPGA platforms (*proficient*), VHDL, Verilog, Xilinx System Generator, Modelsim

Version Control

Git (*proficient*), Mercurial, SVN

Web Framework

Node.JS with Express & MongoDB, Parse Server (mobile backend), Python Flask with MySQL, Drupal CMS

Wireless Standards

IEEE 802.11a/g/n, 802.11ac, 802.11ad, LTE-A, LTE Direct, WiMAX, MIMO, mmWave

Other Skills

Vim, Tmux, Terminal Shell (Bash / Zsh), Latex, Markdown, Pandoc, Microsoft Office, Inkscape, GIMP

Experience

Drexel Wireless System Laboratory

GRADUATE RESEARCH FELLOW

Philadelphia, PA

9/2009–Present

- Led the development of a **mobile augmented reality framework** based on Unity game engine & Vuforia (frontend), with Parse & Python middleware (backend), to visualize and control RF transmissions in wireless networks in real time. See [C2,5,7] for publications. Demo video: <http://beamviewer.io>
- Designed and implemented a **synchronous directional wireless architecture** that leverages time synchronization and dynamic antenna directionality to perform autonomous, machine learning-based beamsteering for optimizing network throughput. Built a real-time system prototype on the WARP software-defined radio platform. Four publications [C3,4,7; W1] and a patent [P3]
- Developed an **FPGA-based software-defined radio testbed** for dynamic spectrum access research in wireless small cells, leveraging a frequency-agile frontend for flexible spectrum access. One publication [C8]
- Implemented a **real-time, protocol-aware reactive jammer** using GNU Radio and the low-cost USRP N210 software radio platform. Three publications [C9,10,12] and a patent [P1]
- Co-developed a **reconfigurable baseband hardware IP** for scalable ultra wide-band OFDM processing. Implemented VHDL RTL modules to interface the baseband pipeline with high-speed (1GSPS) ADC and DAC frontends. Verified hardware designs using Modelsim and Xilinx ChipScope. Two publications [C11,13]
- Gained working knowledge of modern wireless communication systems: OFDM, CDMA, LTE, and WiMAX
- Developed and maintained the lab website at <http://wireless.ece.drexel.edu>

InterDigital Communications, Inc.

King of Prussia, PA

RESEARCH INTERN - VIDEO OVER WIRELESS

6/2013–6/2014

- Optimized video streaming over WiFi networks leveraging IEEE 802.11e QoS support for traffic access categories
- Implemented a control algorithm for network-assisted rebuffering prevention through QoS elevation of distressed video streams
- Prototyped the experimental WiFi video delivery system using OpenWRT (on commercial routers) with modified Linux 802.11 drivers (`mac80211` and `nl80211` modules), and DASH video clients

Department of Electrical and Computer Engineering, Drexel University

Philadelphia, PA

TEACHING ASSISTANT

2009–2014

- Taught lectures and lab sessions on Matlab, digital logic design, Java programming, and embedded systems

Freedom Rings Partnership

Philadelphia, PA

WEB DEVELOPER

8/2012–8/2013

- Developed in Drupal CMS features for the Freedom Rings Partnership's KEYSLOT website (<https://www.phillykeyspots.org>). Responsible for static pages, news and blog posting workflow, training materials repository and search functionality, E-Learning portal, and KEYSLOT finder

MediaTech, Inc. (Vietnam)

Hanoi, Vietnam

TECHNICAL CONSULTANT

1–5/2012

- Designed and implemented a proof-of-concept PBX phone system for live-broadcast TV interactive games based on Asterisk
- Performed system latency tests using landline, cellular, and SIP-based soft phones

Drexel High Performance Computing Laboratory

Philadelphia, PA

RESEARCH ASSISTANT (ADVISOR: J. JOHNSON)

6–12/2009

- Investigated performance bottlenecks of static auto-tuning software (ATLAS and OSKI) in sparse matrix-vector multiplication
- Analyzed and tested a lab-built Multiply-Accumulate (MAC) hardware design on FPGA using Xilinx ISE Suite

Motorola Inc. - Home & Network Mobility Division (now ARRIS Group, Inc.)

Horsham, PA

SOFTWARE ENGINEER CO-OP

3/2008–6/2009

- Developed C++ features for the thin client software layer of set-top boxes to enhance digital video recording (DVR). Debugged and improved device drivers for external mass storage devices (eMSD) to handle DVR's external hard drive configuration process
- Implemented the System Test Program (STP) framework for automation of all design validation tests in the group

SAP America, Inc.

Newtown Square, PA

R/3 SYSTEM ADMINISTRATOR CO-OP

3–9/2007

- Provided R/3 basis technical support for SAP systems used for demo, training, and consulting purposes

Publications

CONFERENCE PROCEEDINGS

- [C1] **Enhancing Blind Interference Alignment with Reinforcement Learning**
S. Begashaw, D. H. Nguyen, K. R. Dandekar
Proc. of IEEE Global Communications Conf. (GLOBECOM '16 - to appear), 2016
- [C2] **Demo: WiART - Visualize and Interact with Wireless Networks using Augmented Reality**
D. H. Nguyen, J. Chacko, L. Henderson, A. Paatelma, H. Saarnisaari, N. Kandasamy, K. R. Dandekar
Proc. of 22nd Annu. Intl. Conf. on Mobile Computing and Networking (ACM MobiCom '16), 2016
- [C3] **Enabling Synchronous Directional Channel Access on SDRs for Spectrum Sharing Applications**
D. H. Nguyen, A. Paatelma, H. Saarnisaari, N. Kandasamy, K. R. Dandekar
Proc. of ACM Intl. Workshop on Wireless Network Testbeds, Experimental Eval., and Characterization (WiNTECH '16), 2016
- [C4] **Demo: Enhancing Indoor Spatial Reuse through Adaptive Antenna Beamsteering (**WinCool Best Demo Award**)**
D. H. Nguyen, A. Paatelma, H. Saarnisaari, N. Kandasamy, K. R. Dandekar
Proc. of ACM Intl. Workshop on Wireless Network Testbeds, Experimental Eval., and Characterization (WiNTECH '16), 2016
- [C5] **BeamViewer: Visualization of Dynamic Antenna Radiation Patterns using Augmented Reality**
D. H. Nguyen, L. Henderson, J. Chacko, C. Sahin, A. Paatelma, H. Saarnisaari, N. Kandasamy, K. R. Dandekar
Proc. of IEEE Conf. on Computer Communications Workshops (INFOCOM WKSHPS '16), 2016
- [C6] **Experimental Evaluation of a Reconfigurable Antenna System for Blind Interference Alignment**
S. Begashaw, J. Chacko, N. Gulati, D. H. Nguyen, N. Kandasamy, K. R. Dandekar

- [C7] **Wireless Communications Engineering and Cybersecurity Education via Augmented Reality**
C. Sahin, **D. H. Nguyen**, S. Begashaw, B. Katz, J. Chacko, L. Henderson, J. Stanford, K. R. Dandekar
Proc. of IEEE Frontiers in Education Conf. (FIE '16), 2016
- [C8] **Leveraging an Agile RF Transceiver for Rapid Prototyping of Small-Cell Systems**
D. H. Nguyen, M. Rauhanummi, H. Saarnisaari, N. Kandasamy, K. R. Dandekar
Proc. of IEEE Vehicular Technology Conf. (VTC-Fall '15), 2015
- [C9] **Wireless Cybersecurity Education via a Software Defined Radio Laboratory**
C. Sahin, **D. Nguyen**, J. Chacko, K. R. Dandekar
Proc. of IEEE Frontiers in Education Conf. (FIE '15), 2015
- [C10] **A Real-Time and Protocol-Aware Reactive Jamming Framework Built on Software-Defined Radios**
D. Nguyen, C. Sahin, B. Shishkin, N. Kandasamy, K. R. Dandekar
Proc. of ACM Workshop on Software Radio Implementation Forum (SRIF '14), 2014
- [C11] **FPGA-Based Latency-Insensitive OFDM Pipeline for Wireless Research**
J. Chacko, C. Sahin, **D. Nguyen**, D. Pfeil, N. Kandasamy, K. R. Dandekar
Proc. of IEEE High Performance Extreme Computing Conf. (HPEC '14), 2014
- [C12] **Real-Time , Channel-Aware Reactive Jamming in 802 . 11 Networks**
D. Nguyen, B. Shishkin, C. Sahin, D. Dorsey, N. Kandasamy, K. Dandekar
Proc. of 2013 Wireless @ Virginia Tech Annu. Symp. 2013
- [C13] **SDC Testbed: Software Defined Communications Testbed for Wireless Radio and Optical Networking**
B. Shishkin, D. Pfeil, **D. Nguyen**, K. Wanuga, J. Chacko, J. Johnson, N. Kandasamy, T. P. Kurzweg, K. R. Dandekar
Proc. of Intl. Symp. on Modeling and Optimization in Mobile, Ad Hoc, and Wireless Networks (WiOPT '11), 2011

WORKING PAPERS (Unpublished)

- [W1] **LinkPursuit: An Adaptive Pursuit Learning Method to Mitigate Small-Cell Interference through Directionality**
D. H. Nguyen, A. Paatelma, H. Saarnisaari, N. Kandasamy, K. R. Dandekar
Submitted (unsuccessfully) to ACM MobiCom '16. Under revision, 2016

PATENT / PATENT APPLICATIONS

- [P1] **Real-Time, Channel-Aware Reactive Jamming in Wireless Networks**
B. Shishkin, **D. H. Nguyen**, C. Sahin, K. R. Dandekar, N. Kandasamy, D. J. Dorsey
US Patent No. 9,531,497. Issued December 27, 2016
- [P2] **Beam Visualization and STEM Education using Augmented Reality**
K. R. Dandekar, C. Sahin, L. J. Henderson, **D. H. Nguyen**, J. J. Chacko, X. R. Rey
US Provisional Patent Application No. 62/403,415. Filed October 3, 2016
- [P3] **An Adaptive Pursuit Learning Method to Mitigate Small-Cell Interference through Directionality**
D. H. Nguyen, A. Paatelma, H. Saarnisaari, N. Kandasamy, K. R. Dandekar
US Provisional Patent Application No. 62/402,671. Filed September 30, 2016

TECHNICAL REPORTS (Available at <http://wireless.ece.drexel.edu>)

- [T1] **Radio Frequency Coordination at the Democratic National Convention**
D. H. Nguyen, M. Jacovic, I. Rasheed, K. R. Dandekar
Tech. Rep. No. 1, Drexel Wireless Systems Laboratory, 2016
- [T2] **Real Time Feature Detection and Threat Analysis with USRP SDR**
B. Shishkin, **D. Nguyen**, C. Sahin, C. Miller
Tech. Rep. No. 2, Drexel Wireless Systems Laboratory, 2012

Honors & Awards

- 2016 **WinCool Best Demo**, ACM WiTECH '16 (judged by a panel from industry and academia)
- 2009–Present **Graduate Research Fellow**, Drexel University
- 2008–2009 **Milton Rosenberg Scholar**, Drexel University (recognizing outstanding engineering students)
- 2009 **Senior Design Competition Winner**, Drexel ECE (for a real-time RFID-based product locating system)
- 2006–2009 **Dean's Scholarship Recipient**, Drexel University
- 2008 **Inductee**, Eta Kappa Nu National ECE Honor Society

Academic Projects

NACHOS EDUCATIONAL OPERATING SYSTEM IMPLEMENTATION

Fall 2011

- Implemented in Java various features of a modern operating system: paging, virtual memory, locks and semaphores, conditional variables, and multi-threaded operations

FAST FOURIER TRANSFORM (FFT) PERFORMANCE BENCHMARKING ON CPU AND GPU

Winter 2011

- Implemented and measured runtime performance of various FFT implementation in C and CUDA

MULTI-THREADED MATRIX OPERATIONS USING BLAS AND LAPACK

Winter 2011

- Wrote C programs to perform LU decomposition on large matrices, then parallelized the implementations using Pthreads, OpenMP, and Cilk

COMPILER CONSTRUCTION FOR SPL (SIGNAL PROCESSING LANGUAGE)

Spring 2010

- Constructed a scanner, parser, and interpreter for a Lisp-style language targeted for describing signal processing kernels called SPL, using Java Lex and Yacc

IMPLEMENTATION OF A 5-STAGE PIPELINED CPU ON FPGA

Winter 2010

- Implemented a 5-stage pipelined CPU supporting Load/Store, R-type instructions, branching, and context switches in VHDL. Performed FPGA synthesis and verification on the Xilinx Spartan 3E board

Other Activities

Journal and Conference Peer-Review

Philadelphia, PA

EXTERNAL REVIEWER

2012–Present

- Performed peer-review and provided publication recommendations for submitted manuscripts
- Journals: IEEE Trans. on Vehicular Technology, IEEE Trans. on Internet of Things
- Conferences: IEEE VTC '14 / '15, CROWNCOM '12

National Science Foundation (NSF) Research Grant Proposals

Drexel University

CONTRIBUTOR

2011–Present

- Performed literature survey, formulated research thrusts, and assisted the Principal Investigators (PIs) in writing grant proposals
- Awarded grants to PIs: CNS-1147838 (WiFiUS 2011), CNS-1422964 (NeTS-Small 2014), CNS-1457306 (WiFiUS 2014)

Local Professional Meetings and Conferences

Philadelphia, PA

STUDENT VOLUNTEER

2015–Present

- Worked registration desk and monitored presentation & poster sessions at IEEE ISPASS '15, IEEE CNS '16

Local Political Convention (Democratic National Convention)

Philadelphia, PA

RADIO FREQUENCY (RF) COORDINATION VOLUNTEER

7/2016

- Handled the RF coordination procedure: static allocation of available spectrum to media organizations, device inspection and tagging, floor sweep to monitor spectrum usage, troubleshoot interference incidents. Details summarized in a technical report [T1]

IEEE Student Branch

Drexel University

LOGISTICS CHAIR

2010

- Handled logistics operations in the organization: organize membership drives, book event venues, prepare refreshments and meeting materials, contact and schedule event speakers

GSA Education, Inc.

Hanoi, Vietnam

FOUNDING MEMBER

2008

- Co-founded a professional education service company in Vietnam. Services include tutoring and college application consulting
- Led the development of the company's web portal for customer relationship management