

Danh Nguyen

☎ (+1) 408-772-0602 | 📍 9 Cortland Dr., Stow, MA 01775 | ✉ danh@dnguyen.io | 🏠 www.dnguyen.io | 📱 dnguyen85

Education

Drexel University

Philadelphia, PA

B.S. / M.S. / PH.D. IN COMPUTER ENGINEERING

2006–2009 / 2009–2014 / 2014–2017

Thesis: “Agile Spectrum-Sharing Wireless Systems using Software Defined Radios and Reconfigurable Antennas”

Experience

Amazon Inc.

Boston, MA

SOFTWARE DEVELOPMENT ENGINEER II

01/2022–Present

- Developed embedded software, core OS platform, networking, and security features for Amazon Dash Cart

Qualcomm Inc.

Boxborough, MA

STAFF MODEM SYSTEMS ENGINEER (5G NR AND WiFi 802.11ax)

10/2017–01/2022

- Drove **high-level functional modem designs** according to 3GPP (Release 16) and IEEE 802.11ax standards. Evaluated architectural trade-offs. Delivered reference models and test vectors for hardware/software development. Supported pre-/post-silicon lab bring-ups, inter-operability testing, and field commercialization of wireless chipset products
- Defined, implemented, and unit-tested the multi-tier, fixed-point **C++/SystemC software functional models** of the wireless modem’s data paths and firmware microcode, specifically for WiFi 802.11ax (Hawkeye) and 5G NR (Snapdragon X65) modem chipsets
- Specialized in (i) receiver time-domain processing (AGC, packet detection, time and frequency synchronization, etc.) for WiFi 802.11ax, as well as (ii) PHY uplink data, control, and random-access channels, and associated Layer-1 control procedures for 5G modems. Resolved **5G NR systems issues** related to uplink BLER, random access procedure, and performance/peak throughput degradation. Debugged WiFi performance issues related to receiver sensitivity, spur mitigation, gain setting, and radar detection
- Developed large-scale **automation tools and testing infrastructure** for code-quality assurance and performance characterization of end-to-end wireless PHY hardware models using Matlab, Python, and Unix shell scripting
- Consolidated multiple fragmented, local log parsing tools into a **cloud-based data analytic and visualization platform** for modem log and IQ signal analyses. Deployed CI/CD pipeline for automated regression and deployment using GitHub webhooks and Jenkins. Applied containerization technology (Docker and Kubernetes) to enable horizontal scaling on Qualcomm’s internal cloud
- Clarified and contributed to **3GPP 5G NR RAN1 standards** in uplink control procedures for Ultra-Reliable, Low Latency Communications (URLLC). See patent [P1]

Drexel Wireless Systems Laboratory

Philadelphia, PA

GRADUATE RESEARCH FELLOW

9/2009–9/2017

- Designed and implemented a **synchronous directional wireless architecture** that uses reinforcement learning, time synchronization, and pattern-reconfigurable antennas to perform autonomous beamsteering for optimizing network throughput. Built a real-time 802.11 system prototype on the WARP software-defined radios. Authored 5 publications and a patent [P3]
- Handled backend development (cloud-controlled radios, gateway, and server software) of a **mobile augmented reality** framework to visualize and interact with wireless RF transmissions in real time. Authored 3 publications and a patent [P4]
- Developed **wideband spectrum sensing algorithms** in Matlab and FPGA hardware for cognitive radio operations in wireless small cells, leveraging a frequency-agile transceiver frontend for flexible spectrum access
- Implemented a **real-time, protocol-aware reactive jammer** using GNU Radio and the low-cost Ettus USRP N210 software-defined radio. Devised a hardware/software co-processing scheme to meet real-time deadlines while maintaining platform programmability. Authored 3 publications and 2 patents [P2, P5]
- Co-developed a **reconfigurable baseband hardware IP** for scalable ultra wide-band OFDM signaling at millimeter wave (mmWave) frequencies. Implemented VHDL RTL modules on Xilinx Virtex-6 FPGAs to interface the baseband pipeline with high-speed (1GSPS) ADC and DAC frontends. Verified hardware designs in Modelsim and Xilinx ChipScope. Authored 2 publications

InterDigital Communications, Inc.

King of Prussia, PA

RESEARCH ENGINEER - VIDEO OVER WIRELESS

6/2013–6/2014

- Prototyped an experimental WiFi video delivery system using OpenWRT with modified Linux 802.11 drivers (**mac80211** and **n180211** modules), and DASH (Dynamic Adaptive Streaming over HTTP) video clients
- Optimized H.264 video streaming over WiFi networks leveraging IEEE 802.11e QoS support for traffic access categories
- Implemented control algorithms for network-assisted rebuffering prevention through QoS elevation of distressed video streams

Freedom Rings Partnership

WEB DEVELOPER

Philadelphia, PA

8/2012–8/2013

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

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

SOFTWARE ENGINEER COOP

Horsham, PA

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 (DVTs) in the group

Skills

Programming	C / C++ / Python / Matlab (<i>proficient</i>), Java (<i>intermediate</i>), HTML / CSS, Javascript
Libraries	NumPy / Pandas (Python), GNU Radio / Intel IPP (C++), lwIP / liquid-dsp (C), Unity engine (C#)
Web Framework	Python Django / Flask / Nikola, PHP, Bootstrap, Drupal CMS, Node.JS Express
Infrastructure	Jenkins, GitHub, Gitlab CI/CD, Docker, Kubernetes, shell scripting
Hardware	Xilinx & Altera FPGA platforms, VHDL, Verilog, Xilinx ISE, Modelsim, JTAG debugging
CPU Architectures	x86-64, ARM Cortex-M4/7, Xilinx Microblaze, Atmel AVR
Operating Systems	Unix / Linux, OpenWRT / FreeRTOS (embedded), TinyOS / Contiki (wireless sensors)
Wireless Standards	IEEE 802.11ac/ad/ax (WiFi), 802.15.4 (ZigBee), Bluetooth, UMTS/W-CDMA, 4G LTE Advanced, 5G NR

Publications

CONFERENCE PROCEEDINGS (SELECTED 4 OF 15)

- [1] **Sub-Microsecond Network Synchronization for Distributed Wireless PHY Protocols**
D. H. Nguyen, A. Paatelma, H. Saarnisaari, N. Kandasamy, and K. R. Dandekar
Proc. ACM Wireless of the Students, by the Students, and for the Students Workshop (S3), 2017
- [2] **Reinforcement Learning System to Mitigate Small-Cell Interference Through Directionality**
A. Paatelma*, D. H. Nguyen*, H. Saarnisaari, N. Kandasamy, and K. R. Dandekar (*Co-primary authors)
Proc. IEEE Intl. Symp. on Personal, Indoor, and Mobile Radio Communications (PIMRC), 2017
- [3] **Demo: WiART - Visualize and Interact with Wireless Networks using Augmented Reality**
D. H. Nguyen, J. Chacko, L. Henderson, A. Paatelma, H. Saarnisaari, N. Kandasamy, and K. R. Dandekar
Proc. ACM Intl. Conf. on Mobile Computing and Networking (ACM MobiCom), 2016
- [4] **Demo: Enhancing Indoor Spatial Reuse through Adaptive Antenna Beamsteering (WinCool Best Demo Award)**
D. H. Nguyen, A. Paatelma, H. Saarnisaari, N. Kandasamy, and K. R. Dandekar
Proc. ACM Intl. Workshop on Wireless Network Testbeds, Experimental Eval., and Characterization (WiNTECH), 2016

PATENTS

- [P1] **Physical Uplink Control Channel Transmission for Low-Latency Communication Deployments**
US Patent Application No. 17/303,217. Filed May 24, 2021
- [P2] **Energy-Efficient Reactive Jamming of Frequency-Hopping Spread Spectrum (FHSS) Signals using Software-Defined Radios**
US Patent No. 10,985,861. Granted Apr. 20, 2021
- [P3] **An Adaptive Pursuit Learning Method to Mitigate Small-Cell Interference through Directionality**
US Patent No. 10,694,526. Granted Jun. 23, 2020
- [P4] **Beam Visualization and Using Augmented Reality for Control and Interaction**
US Patent No. 10,515,483. Granted Dec. 24, 2019
- [P5] **Real-Time and Protocol-Aware Reactive Jamming in Wireless Networks**
US Patent No. 9,531,497. Granted Dec. 27, 2016

Honors & Awards

- 2017 **IEEE Philadelphia Section Student Project Award**, (for BeamViewer Augmented Reality framework)
- 2017 **Frank and Agnes Seaman Endowed Fellowship**, Drexel ECE Department
- 2016 **WinCool Best Demo**, ACM WiNTECH '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)