

# ANDREW THORNBURG

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## EDUCATION

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### University of Texas, Austin

Ph.D in Electrical Engineering

Advisor: Dr. Robert W. Heath Jr.

Wireless Networking and Communications Group

Microelectronics and Computer Development Fellowship

Innovative Signal Analysis Fellowship 2014

*expected 2017*

### University of Texas, Austin

M.S. in Electrical Engineering

Master's Report Title: *Coverage and Capacity of mmWave Ad Hoc Networks*

*May 2014*

### University of Pittsburgh

B.S. in Electrical Engineering

Minor in Economics

Outstanding Senior of 2010 Electrical Engineering Class

Department of Defense SMART Scholarship

*May 2010*

## PUBLICATIONS AND COURSEWORK

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### Publications

**A. Thornburg**, T. Bai, and R. W. Heath, Jr., "Performance Analysis of mmWave Ad Hoc Networks", *submitted to IEEE Transactions of Signal Processing*, Available at <http://arxiv.org/abs/1412.0765>.

**A. Thornburg**, T. Bai, and R. W. Heath, Jr., "MmWave Ad Hoc Network Coverage and Capacity", *to appear in Proc. of the IEEE Int. Conf. on Communications*, London, UK, June 8-12, 2015.

**A. Thornburg**, T. Bai, and R. W. Heath, Jr., "Interference Statistics in a Random mmWave Ad Hoc Network", *to appear in Proc. of the IEEE Int. Conf. on Acoustics, Speech, and Signal Processing*, Brisbane, AUS, April 19-24, 2015.

**A. Thornburg**, A. C. Bovik, and R. W. Heath, Jr., "Multi-User Real-Time Wireless Video with Perceptual Constraints", *Proc. of the IEEE Asilomar Conf. on Signals, Systems, and Computers*, Pacific Grove, CA, November 3-6, 2013.

W. Chen, J. Brownlow, E. Brownlow, J. Phibbs, C. Lane, **A. Thornburg**, and J. Tartaglino, "Multi-path Fading Cancellation: Using a Tap Delay to Improve Signal Spectrum", *ITEA Journal of Test & Evaluation*, vol. 32:3, pp. 341, 2011.

### Graduate Coursework

Wireless Communication Lab, Probability & Stochastic Processes, Wireless Communication, Data Mining, Applied Optimization, Markov Decision Processes, Space-Time Communication, Advanced Telecomm Networks, Information Theory

## EXPERIENCE

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### Wireless Networking and Communications Group

*Graduate Research Assistant*

August 2012 - Present

*Austin, TX*

- Analytically characterized the capacity of a mmWave ad hoc network using stochastic geometry.

- Investigated the optimization of video transmission over wireless networks with perceptual quality constraints. A theoretical framework is used to optimize transmission via both 802.11 & USRP physical layers. A demonstration platform was developed that, in real-time, encodes a raw video with H.264/SVC, parses the bitstream, quantifies the perceptual quality, thins the bitstream, and decodes the received bitstream over WLAN & USRP equipment.
- A testbed was developed to analyze realistic vehicular channels for 802.11p. LabVIEW was used to implement a 2x2 MIMO system with geometry-based stochastic channel model. The testbed can be used to test physical layer equalization and estimation algorithms.

**Hong Kong University of Science and Technology**

May 2014 - August 2014

*Graduate Research Intern*

*Hong Kong*

- Worked with Dr. Matthew McKay in the field of random matrix theory and MMSE filter design. Work is on-going in development of a practical, finite-sample MMSE filter was designed using the Krylov subspace for use in ad hoc networks. Previous work on Krylov subspace filters performs poorly in an ad hoc network setting.

**Air Force Flight Test Center**

June 2010 - July 2012

*Electronic Warfare Engineer*

*Edwards, CA*

- Primary project involved leading a team to develop a unique datalink test asset for use within the Department of Defense. Significant in-circuit analysis and debugging was required to complete the task. Personally developed a custom serial interface circuit board, FSK/PSK FPGA modem, and corresponding interface software. Development included many open-air ground-to-air RF tests.
- Other duties involved providing feedback on testing of various Air Force platforms, including F-16, C-130, and Global Hawk, and attending electronic warfare short courses.

**Air Force Flight Test Center**

May 2009 - July 2009

*Intern*

*Edwards, CA*

- Developed and executed a test plan for a F-16 simulator. Flight plans were developed and flown to test various aerodynamic properties of the F-16. Large data files were analyzed to produce a simulated F-16 flight envelope.

**Westinghouse Electric Company**

May 2008 - August 2008

*Intern*

*Pittsburgh, PA*

- Provided testing on repair, replacement, and automation test units for nuclear power plant reactors. Responsibilities included replacing units, testing control electronics, and circuit component selection.

**Mascaro Sustainability Initiative Research**

May 2007 - August 2007

*Undergraduate Research Assistant*

*Pittsburgh, PA*

- Created a self-powered occupancy sensor under the guidance of Dr. William Clark in the Mechanical Engineering department of the University of Pittsburgh. A piezo-electric beam was modeled and prototyped in order to harvest energy from a door. A microcontroller was powered in order to remotely control the lights of a room.

**Undergraduates Teaching Undergraduates**

August 2007 - December 2008

*Undergraduate Teaching Assistant*

*Pittsburgh, PA*

- Served as a teaching assistant for first year chemistry students. Responsibilities included preparing for a short, 30 minute lecture prior to lab, helping students throughout the lab period, and grading lab reports.

**TECHNICAL STRENGTHS**

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<b>Computer Languages</b>	C/C++, MATLAB, LabVIEW, R, Verilog, Python
<b>Protocols &amp; APIs</b>	802.11, LTE, H.264/SVC, UDP, TCP/IP, OpenCV, Qt, Django
<b>Tools</b>	USRP SDR, SVN, Mercurial, L <sup>A</sup> T <sub>E</sub> X, Eagle PCB Design
<b>Other</b>	U.S Citizen, Inactive DoD Top Secret/SCI clearance with CI-Polygraph