

Craig Gutterman

Electrical Engineering Department, Columbia University
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Education:

Columbia University, Fu Foundation of Engineering and Applied Science, New York, NY
Ph.D. Candidate in Electrical Engineering Sept. 2014 - Present
Advisor: Prof. Gil Zussman
GPA: 4.0

Columbia University, Fu Foundation of Engineering and Applied Science, New York, NY
M.S. in Electrical Engineering (Tesla Scholar) Sept. 2012 - Feb. 2014
Concentration: Wireless Communications, Networking
GPA: 4.14

Rutgers University, School of Engineering, New Brunswick, NJ
B.S. in Electrical Engineering, Minors: Economics, Math Sept. 2008 - May 2012
Concentration: Communications
GPA: 4.0 *Summa Cum Laude*

Honors & Awards:

Second Place Prize for a demo at the NYC Media Lab Summit 2015
NSF Graduate Research Fellowship 2014
NSF IGERT Fellowship, From Data To Solutions 2014
Columbia University Electrical Engineering M.S. Award of Excellence (given to less than 5% of the candidates for the M.S. degree to recognize outstanding achievement) 2014
Paper appeared in ACM MC2R as Best article from WinTECH 2012 workshop 2013
Columbia University Tesla Scholar (for top incoming Electrical Engineering M.S. Students) 2012
Rutgers University
John B. Smith Memorial Prize (highest ranking graduating senior in Dept. of Electrical Eng.) 2012
James J. Slade Scholar (prepared, submitted, and presented honors thesis) 2012
James and Edna Noe Engineering Scholarship (for outstanding academic achievement) 2010 - 2012
Dean's List (8 times) 2008 - 2012
N.J. Edward J. Bloustein Distinguished Scholar Award (highest achieving H.S. students from N.J.) 2008 - 2012
Rutgers University Scarlet Scholarship (for top incoming undergraduate students) 2008 - 2012

Research Experience:

Columbia University, Wireless and Mobile Networking Lab

Adaptive Multicast in WiFi (collaboration with Alcatel Lucent Bell Labs) Sept. 2012 - Present
Developing and evaluating rate adaption framework for efficiently sending multicast traffic in WiFi networks. The framework is based on selecting a subset of the nodes to report receiver channel quality. Implementing and evaluating the framework in the ORBIT testbed (400 WiFi nodes). Analyzing large datasets (tens of gigabytes) per experiment using Python and MATLAB. The research resulted in papers that were accepted to IEEE ICNP'13 and IEEE INFOCOM'16. Received 2nd place prize for a demo in the NYC Media Lab Summit. Selected to participate in the NYC Media Lab Combine.

Defragmentation in Optical Networks Sept. 2015 - Present
Designing and analyzing defragmentation and dynamic wavelength assignment algorithms for optical backbone and metro networks.

Energy Harvesting Active Networks Tags (EnHANTs) June 2012 - Aug. 2012
Analyzed human motion data to determine the amount of kinetic energy that can be obtained by a harvester carried by people during their daily activities. Developed signal processing algorithms to determine when

people move and how much energy can be harvested. Analyzed the data to determine the type of networking applications that could be supported by energy harvested from human motion.

Rutgers University, WINLAB

Cognitive Radio Communication System Design

Sept. 2011 - May 2012

Designed hardware and performed verification testing for the FPGA of the ORBIT Cognitive Radio kit (CRKIT). Designed the application test bench and communication applications (spectrum sensor and QPSK modulation receiver) for the WINLAB CRKIT framework using MATLAB/Simulink. Developed and implemented a rendezvous algorithm that allows two uncoordinated cognitive radios to establish communication in the presence of interference by opportunistically utilizing available spectrum. The research resulted in a paper presented in ACM WiNTECH'12 and published in ACM Mobile Computing and Communications Review.

Visual MIMO

May 2010 - Aug. 2010

Developed a mobile optical communication system which sends multiple optical signals (by the use of LEDs) and which receives the signals by multiple photo diodes (pixels on a camera sensor). Built and used hardware setup to complete experiments in order to confirm prior analytics. Employed real time object detection framework (Viola-Jones) in order to construct a software base for object (LED array) recognition.

Rutgers University, Department of Electrical Engineering

Coupling Light and Imaging the Optical Field

Sept. 2009 - May 2010

Learned optical alignment techniques for nanophotonic devices. Aligned fiber optic cable with silicon chips to couple light through nanostructure. Analyzed experimental results of light recovered to determine the efficiency of coupling.

Industry Experience:

Gotenna

Brooklyn, NY

Network Engineer

Jan. 2014 - Aug. 2014

Designed proprietary mobile ad-hoc network (MANET) protocol for a new type of wireless device. Developed a protocol to allow for messaging within the user's local area when he/she does not have cell or data service (e.g., hiking, skiing, natural disaster). Built network simulation in Matlab to analyze network traffic and capacity under different scenarios. Designed scripts to plot experimental results on Google maps for visual analysis and extract data for system analysis.

Raytheon BBN Technologies

Cambridge, MA

Advanced Networking Intern

June 2013 - Aug. 2013

Explored the suitability of Android emulators, Virtual Machines, and Linux Containers for ad-hoc network emulation. Analyzed data synchronization overhead for Content Distributed Networks. The problem stems from a topology of a Content Distribution Network (CDN) defined by mobile ad hoc communities of nodes that are bound together and use cooperative storage in each community. Developed and simulated various data synchronization protocols for Content Distribution Network. Compared and contrasted results of alternative protocols to determine optimum use of network resources.

Schindler Elevator Corporation

Randolph, NJ

Intern

May 2011 - Aug. 2011

Designed electrical and electronic components for use within the elevator control system. Documented specifications for design details. Assisted project managers to assure specifications meet business needs and NEC standards.

Publications:

Yigal Bejerano, Jaime Ferragut, Katherine Guo, Varun Gupta, Craig Gutterman, Thyaga Nandagopal, Gil Zussman, "Scalable WiFi Multicast Services for Very Large Groups," under revision, in *IEEE/ACM Transactions on Networking*, 2016.

Varun Gupta, Craig Gutterman, Yigal Bejerano, and Gil Zussman, “Experimental evaluation of large scale WiFi multicast rate control,” in *Proc. IEEE International Conference on Computer Communications (IEEE INFOCOM’16)*, Apr. 2016.

Yigal Bejerano, Jaime Ferragut, Katherine Guo, Varun Gupta, Craig Gutterman, Thyaga Nandagopal, and G. Zussman, “Experimental evaluation of a scalable WiFi multicast scheme in the ORBIT testbed,” in *Proc. 3rd GENI Research and Educational Experiment Workshop (GREE’14)*, Mar. 2014.

Yigal Bejerano, Jaime Ferragut, Katherine Guo, Varun Gupta, Craig Gutterman, Thyaga Nandagopal, Gil Zussman, “Scalable WiFi Multicast Services for Very Large Groups,” in *Proc. of the 21st IEEE International Conference on Network Protocols (IEEE ICNP’13)*, Oct. 2013.

Khanh Le, Prasanthi Maddala, Craig Gutterman, Kyle Soska, Aveek Dutta, Dola Saha, Peter Wolniansky, Dirk Grunwald, and Ivan Seskar, “Cognitive Radio Kit Framework: Experimental Platform for Dynamic Spectrum Research,” *ACM Mobile Computing and Communications Review (ACM MC2R)* Vol. 17 No. 1 Pg 30-39, Jan. 2013. Selected as Best article from WinTECH 2012 workshop.

Khanh Le, Prasanthi Maddala, Craig Gutterman, Kyle Soska, Aveek Dutta, Dola Saha, Peter Wolniansky, Dirk Grunwald, and Ivan Seskar, “Cognitive Radio Kit Framework: Experimental Platform for Dynamic Spectrum Research,” in *Proc. 7th ACM International Workshop on Wireless Network Testbeds, Experimental Evaluation, and Characterization (ACM WiNTECH’12)*, Istanbul, Turkey, Aug. 2012.

Demonstrations:

V. Gupta, R. Norwitz, S. Petridis, C. Gutterman, G. Zussman, and Y. Bejerano, “WiFi multicast to very large groups – experimentation on the ORBIT testbed,” *Demo at IEEE LCN’15*, 2015.

V. Gupta, R. Norwitz, S. Petridis, C. Gutterman, G. Zussman, and Y. Bejerano, “WiFi multicast to very large groups – experimentation on the ORBIT testbed,” *Demo at NYC Media Lab Summit*, 2015. **(2nd place prize)**

Relevant Coursework:

Information Theory (A), Probability and Random Processes (A), Stochastic Signals (A), Communication System Design (A), Wireless Communication Systems (A), Digital Signal Processing (A), Computer and Communication Networks (A), Wireless and Mobile Networks (A), Algebraic Coding Theory (A), MIMO Wireless Communications (A), Analysis of Algorithms I (A), Detection and Estimation Theory (A), Convex Optimization (A), Stochastic Models (A), Machine Learning (A), Optimization II (A), Bayesian Modeling For Machine Learning (A)

Technical Skills:

Programming Languages: Python, MATLAB, C++

Operating Systems: Linux, Mac OS, Windows

Other: Eclipse, Photoshop, Visio, Visual Studio