

Jordan S. Besnoff

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Education

- Duke University** **Durham, NC**
Doctor of Philosophy (PhD), GPA: 3.94 *December 2014*
Dissertation Title: "Exploiting Near Field and Surface Wave Propagation for Implanted Devices"
Advisor: Matthew S. Reynolds
- Duke University** **Durham, NC**
Master of Science (MS), GPA: 3.94 *September 2012*
- Tufts University** **Meford, MA**
Bachelor of Science in Electrical Engineering (BSEE), summa cum laude *2005–2009*
Minor: Mathematics
GPA: 3.90

Awards and Honors

- 2013:** Student Competition Winner 2013 IEEE RFID Conference *"Rectenna Shootout"*
- 2012:** Best Paper Award 2012 IEEE RFID Conference *"Near Field Modulated Backscatter for in vivo Biotelemetry"*
- 2009:** Amos Emerson Dolbear Scholarship *Tufts University*
- 2006:** Howard Sample Physics Award *Tufts University*
- 2005:** Bausch and Lomb Science Award *Branford High School, Branford, CT*

Experience

- North Carolina State University (NCSU)** **Raleigh, NC**
Postdoctoral Research Scholar *October 2014–Present*
Worked in the lab of Dr. David Ricketts on wireless power transfer (WPT) systems, WPT enhancement using metamaterials, low-power high-bandwidth communications, and LF QAM systems.
- Low frequency (LF) Quadrature Amplitude Modulated (QAM) Systems
 - Developed theory for determining the loads for a desired QAM constellation on a LF carrier for magnetoquasistatic fields for a semi-passive communication device
 - Fabricated communication boards, and showed semi-passive communication rates up to 409.6 kbps on a 2.4 MHz carrier (17% bandwidth usage) at a distance of 0.5-coil diameter using loop antennas
 - Wireless Power Transfer (WPT) Enhancement
 - Aided in experimental demonstration of LF metamaterials – nominal frequency of 2.4 MHz – as a method of wireless power transfer enhancement
 - Demonstrated experimentally that magnetic resonant field enhancement (MR-FE) can provide a greater wireless power transfer efficiency enhancement than metamaterials under certain situations. MR-FE enhancement can provide a 15% efficiency enhancement over metamaterials in the LF frequency range.
- Duke University** **Durham, NC**
Research Assistant *2009–September 2014*

Worked in the lab of Matthew S. Reynolds on RFID, wireless power, high-bandwidth low-power RFID devices, low-power sensing, biotelemetry, and waveform aware harvesting

- High-bandwidth, low-power, passive wireless biotelemetry devices
 - Taking advantage of transition zone between near field and far field to achieve high-bandwidth backscatter communication for implanted devices
 - Designed specialized transmitting antenna for efficient operation in the UHF ISM band in the vicinity of high loss dielectrics
 - Proved through measurements that data transmission of 5 Mbps is possible using modulated backscatter in the radiating near field with a biotelemetry chip capable of sensing 16 simultaneous channels of data at 1.23 mW power consumption
- Single-wire RF transmission line in high loss dielectrics
 - Developed theory for insertion loss of single-wire RF transmission lines in highly lossy dielectrics
 - Designed efficient launching device for converting TEM signals to TM surface waves
 - Insertion loss theory and launcher efficiency verified through measurements; bend radius analyzed
- Waveform aware harvesting
 - Designed 1st generation distributed element matching network and single stage harvester for efficient harvesting of ambient WiFi energy at 2.45 GHz
- Localization and way finding for the visually impaired using a cane-mounted RFID antenna
 - Designed antenna to be placed on cane for localization purposes using floor mounted RFID tags
 - Developed software package for a bluetooth RFID reader to determine location and heading

MIT Lincoln Laboratory

Lexington, MA

Research Assistant

2008–2009

- Verified and tested S, C, and X-band RADAR receivers to be used in an array of receiving sensors for missile defense purposes
- Analyzed and improved phase noise in receiving units

Tufts Educational Day Care Center (TEDCC)

Medford, MA

Special Friends Counselor

2006–2009

- Acted as a role model for a specific kindergarten child each year by attending activities and guiding them each week as part of the Special Friends program.

Camp Laurelwood

Madison, CT

Supervisor (Division Head)

June–August 2006–2009

- Responsible for overseeing a division of approximately 35 children ages 6-10, as well as 10 staff members. Provided and developed activities and programming, as well as mediated conflicts.

Camp Laurelwood

Madison, CT

General Counselor

June–August 2003–2006

- Directly responsible for supervising and instructing a group of 6-8 children during daily programmed activities, during meal time, and at night. Worked with children ages 6-14, as well as aided in programming activities.

Teaching

Duke University

Durham, NC

Teaching Assistant (TA), Digital Communications

2011–2012

ECE 483: Introduction to Digital Communication Systems

- Provided weekly office hours
- Graded homework, exams, and final project
- Aided in development and structuring of hands-on final project

Tufts University Academic Resource Center (ARC)

Medford, MA

Head Tutor

2008–2009

- Held open office hours as well as private 1-on-1 tutoring sessions for students in physics, math, and engineering courses.
- Developed and ran additional study sessions.

Tufts University

Medford, MA

Lab Teaching Assistant (TA)

2007–2009

ES 3: Introduction to Electronics

ES4: Digital Logic Design

EE14: Microprocessor Architecture

- Aided in development of lab sessions and exit quizzes
- Ran and supervised lab sessions
- Provided sample VHDL and assembly code for M68HC12 microprocessor

Publications

Journal Papers.....

[J1] **J.S. Besnoff**, M.S. Reynolds, "Single-Wire RF Transmission Lines In Biological Tissue," in *Applied Physics Letters*, Submitted.

[J2] **J.S. Besnoff**, T. Deyle, S.J. Thomas, M.S. Reynolds, "Near Field Ultra-High Frequency (UHF) Backscatter Biotelemetry," in *Microwave Theory and Techniques*, Submitted.

Conference Papers.....

[C1] **J. S. Besnoff**, D. S. Ricketts, "Quadrature Amplitude Modulated (QAM) Communication Link for Near and Mid-Range RFID Systems," in *2015 IEEE International Conference on RFID (RFID)*, April 2015, *To Appear*.

[C2] **J. S. Besnoff**, M. S. Reynolds, "Single-Wire RF Transmission Lines for Implanted Devices," in *2013 IEEE Biomedical Circuits and Systems Conference (BioCAS)*, October 2013, pp. 222-225.

[C3] **J. S. Besnoff**, T. Deyle, R. R. Harrison, M. S. Reynolds, "Battery-Free Multichannel Digital ECG Biotelemetry Using UHF RFID Techniques," in *2013 IEEE International Conference on RFID (RFID)*, April 2013, pp. 16-22.

[C4] S. Thomas, **J. S. Besnoff**, M. Reynolds, "Modulated Backscatter for Ultra-Low Power Uplinks From Wearable and Implantable Devices," in *2012 ACM MedCOMM: Workshop on Medical Communication Systems*, pp. 1-6.

[C5][†] **J. S. Besnoff**, M. Reynolds, "Near Field Modulated Backscatter for *in vivo* Biotelemetry," in *2012 IEEE International Conference on RFID (RFID)*, April 2012, pp. 135-140.

[†] Indicates Best Paper Award

Poster Presentations

2014 IEEE International Conference on RFID (RFID)

- "Exploiting Near Field and Surface Wave Propagation for UHF Backscatter Biotelemetry"

2013 IEEE Biomedical Circuits and Systems Conference (BioCAS)

- "Single-Wire RF Transmission Lines for Implanted Devices"

2011 IEEE International Conference on RFID (RFID)

- "Near Field UHF Modulated Backscatter for *in vivo* Biotelemetry"

Professional Societies

January 2015–Present: Member, IEEE

2008–December 2014: Student Member, IEEE

2008–Present: Eta Kappa Nu (HKN) Association

2007–Present: Tau Beta Pi (TBII), Delta Chapter of Massachusetts

Programming Languages and Software

Programming Languages.....

Matlab, \LaTeX , VHDL, Verilog, Assembly, Python, C++

Software.....
Agilent Advanced Design System (ADS), CST Microwave Studio, High Frequency Structural Simulator (HFSS), Cadence

Other Activities

August 2014–October 2014: Head Coach, Durham Academy Middle School Boys JV Soccer Team

2010–Present: Volunteer at Animal Protection Society of Durham (APS)

- Walk and socialize dogs at local animal shelter to help them get adopted

2010–Present: Habitat for Humanity

- Experience with siding, shelving, and installing windows

2010–2011: Soccer coach, Rainbow Soccer based in Chapel Hill, NC

- Fall 2010 – U12 Assistant Coach
- Spring 2011 – U15 Assistant Coach
- Fall 2011 – U15 Head Coach