

# Joseph G. McMichael

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## CONTACT INFORMATION

Radar Science & Engineering Section  
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## EDUCATION

**Massachusetts Institute of Technology**, Cambridge, Massachusetts USA **June 2011**

S.M. in Electrical Engineering and Computer Science

- Advisor: Prof. Alan V. Oppenheim, Digital Signal Processing Group
- Thesis: *Timing Offset & Quantization Error Trade-off in Time-Interleaved ADCs*
- Irwin Mark Jacobs & Joan Klein Jacobs Presidential Fellowship
- TA for 6.003: Signals & Systems (taught weekly tutorials and three recitations)
- GPA: 4.70/5.00

Graduate Coursework

- 6.341: Discrete-Time Signal Processing
- 6.450: Digital Communications
- 6.438: Algorithms for Inference
- 6.345: Automatic Speech Recognition
- 6.431: Applied Probability

**Seattle University**, Seattle, Washington USA

**May 2009**

B.S. in Electrical Engineering

- GPA: 3.92/4.00

## PROFESSIONAL EXPERIENCE

**NASA Jet Propulsion Laboratory**, Pasadena, California USA **July 2014 - Present**

*Signal Analysis Engineer, Radar Algorithms and Processing Group*

- Develop advanced signal processing algorithms for a variety of space-based radar instruments, including synthetic aperture radar (SAR) and ocean altimeters.
- Developed signal processing algorithms for planetary radar tracks at “long-code” pseudo-noise waveform for Goldstone Solar System Radar (GSSR).

**MIT Lincoln Laboratory**, Lexington, Massachusetts USA

**Sept. 2011 - July 2014**

*Associate Technical Staff, Airborne Radar Systems and Techniques Group*

Research and implement novel signal processing algorithms for advanced wireless communication and radar systems.

- Research algorithms for intelligence, surveillance, and reconnaissance (ISR) systems that enhance detection, classification, and tracking, as well as robustness to electronic attack
  - Experience with moving target identification (MTI) and synthetic aperture radar (SAR)
- Develop tuning algorithms for analog self-interference cancellation to enable wideband full-duplex wireless communication
  - Experience with wireless channel estimation, convex optimization, LMS algorithm, gradient descent, sparse filter design, and adaptive MIMO antenna beamforming

**Bose Advanced Development**, Stow, Massachusetts USA

**Summer 2010**

*Research Intern, Active Noise Cancellation*

Designed and implemented tuning simulation for Bose’s automotive “Engine Harmonic Cancellation” system using C and Matlab. Project required thorough understanding of adaptive filtering and active noise cancellation. Responsible for dynamometer acoustic recordings to verify accuracy of simulation.

**Boeing Phantom Works**, Renton, Washington USA

**Summer 2008**

*Research Intern, Mathematics & Computing Technology*

Formally verified Boeing’s “Secure Network Server,” a highly-secure multi-level network guard for use in military aircraft. Created and proved formal mathematical model using Prototype Verification System (PVS) and Isabelle/HOL. Researched layers of abstraction (top-level and

low-level theories) and intra-level theory mapping. Project undergoing NSA security evaluation as first-ever EAL7 device of its kind.

**NASA Goddard Space Flight Center**, Greenbelt, Maryland USA **Summer 2007**  
*Research Intern, Microelectronics & Signal Processing Branch*

Programmed an adaptable engineering data system test that generates analog and digital stimuli and performs data collection and analysis using LabVIEW, Matlab, and Scilab for NASA's "Miniature Imager for Neutral Ionospheric Atoms and Magnetospheric Electrons." Helped design application-specific integrated circuit. Project launched aboard MidSTAR-2 satellite in 2011.

TEACHING  
EXPERIENCE

**Instructor, MIT Professional Education**, Cambridge, Massachusetts USA **2013**  
*"Build a Small Radar System"*

Taught lectures on radar detection theory and synthetic aperture radar (SAR) for MIT professional education course.

**Teaching Assistant, Massachusetts Institute of Technology**, Cambridge, MA USA **2011**  
*6.003: Signals & Systems*

Taught weekly tutorials and three recitations for 40 students.

**Teaching Assistant, Seattle University**, Seattle, Washington USA **2008**  
*ECE 320: Electronics I*

Grading and teaching support for junior-level course encompassing analysis and design of circuits with diodes and bipolar junction and field-effect transistors.

RESEARCH  
PUBLICATIONS

McMichael, J.G.; Kolodziej, K.E., "**Optimal tuning of analog self-interference cancellers for full-duplex wireless communication,**" 2012 50th Annual Allerton Conference on Communication, Control, and Computing, pp. 246-251, 1-5 Oct. 2012.

McMichael, J.G.; Maymon, S.; Oppenheim, A.V., "**Exploiting cross-channel quantizer error correlation in time-interleaved analog-to-digital converters,**" 2011 Conference Record of the Forty-Fifth Asilomar Conference on Signals, Systems and Computers, pp. 525-529, 6-9 Nov. 2011.

RESEARCH  
PRESENTATIONS

"**Analog self-interference cancellers for full-duplex wireless communication**" Oct. 2012  
*Allerton Conference on Communication, Control, and Computing, Monticello, Illinois USA*

"**Exploiting cross-channel quantizer error corr. in time-interleaved ADCs**" Nov. 2011  
*Asilomar Conference on Signals, Systems and Computers, Pacific Grove, California USA*

"**Exploiting cross-channel quantizer error corr. in time-interleaved ADCs**" Apr. 2011  
*MIT EECS Masterworks Symposium, Cambridge, Massachusetts USA*

"**Formal Verification of Boeing's Secure Network Server**" **August 2008**  
*Boeing Phantom Works Research Branch, Renton, Washington USA*  
*Advisor: Hugh Taylor, Ph.D.*

"**Miniature Imager for Neutral Ionospheric Atoms and Magnetospheric Electrons Engineering Data System Test**" **August 2007**  
*NASA Goddard Space Flight Center, Greenbelt, Maryland USA*  
*Advisors: Duane Armstrong & George Suarez*

HONORS AND  
AWARDS

**Irwin Mark Jacobs & Joan Klein Jacobs Presidential Fellowship** **2009**  
*Massachusetts Institute of Technology*

**First Place, IEEE Northwest Paper Competition** (Washington, Oregon, & Alaska) **2009**  
*Title: Centralized Tracking & Guidance of Multiple Robots*  
*Co-authors: Dean Hoaglan & Renaud Chauvin-Martin*

**Space Grant Recipient** **2009**

**Barr Scholar** **2009**

*Scottish Rite Scholarship Foundation of Washington*

Honored as top applicant in all of Washington State on a basis of academic achievement, career goals, community service, and field experience.

**Bannan Scholar** **2008-2009**

*Seattle University*

Outstanding students chosen on the basis of academic achievement and commitment to service to the campus and greater community.

**Eagle Scout** **2004**

*Boy Scouts of America*

**Sigma Xi, Scientific Research Society** **2011**

**Tau Beta Pi - Engineering Honor Society** **2009**

**Completed two senior undergraduate engineering group projects:** **2009**

- **Centralized Tracking & Guidance of Multiple Robots:** Implemented a centralized method for simultaneously tracking and guiding 21 large robots which roam an indoor space. Employed MIT Cricket Indoor Location System to measure distance from transmitting reference beacons, and embedded wireless network to communicate with central laptop. Personally developed intelligent trilateration algorithm to calculate three-dimensional position, using Newton-Raphson Method.
- **Phasor Measurement Unit Simulator:** Served as engineering advisor for team designing a phasor measurement unit (PMU) simulator for French power distribution company Areva.

PROJECTS

**Globe Genie ([www.globegenie.com](http://www.globegenie.com))** **2010**

*Creator*

Created website that virtually “teleports” users to random latitude/longitude locations using Google Streetview. The first of its kind, the site was mentioned in the New York Times, BBC, Guardian, USA Today, New Yorker, National Geographic, and Today Show, among others. The site has received more than 850,000 unique visitors and 1.4 million pageviews.

**Media Coverage:**

- New York Times, “Global Entertainment”, December 30, 2010.
- BBC, “Webscape: Globe trotting,” January 7, 2011.
- The Guardian, “Chatroulette, GuardianRoulette, ...,” September 7, 2010.
- Slice of MIT, “Best Way to ProcrastinateEver!,” September 21, 2010.
- USA Today, “Google Street View available on all continents,” September 30, 2010.
- New Yorker, “Digital Pick: World View,” October 14, 2010.
- The Telegraph, “Teleport function for Google Street View,” October 23, 2010.
- National Geographic, “Google Street View Teleporter,” September 8, 2010.
- Mashable, “Travel the World with Chatroulette-Inspired Street View Hack,” Sept. 16, 2010.
- Today Show, “Heard it on TODAY,” June 23, 2012.