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James D. Rosenthal

Education

2018–Present **University of Washington**, Seattle, WA,
Ph.D. in Electrical & Computer Engineering,
Graduate Certificate in Neural Engineering.
Advisor: Prof. Matthew S. Reynolds
Dissertation: The NeuroDisc: A Wireless Neural Recorder Leveraging Ultra-low-power Backscatter Communication (Publications J1-J3, C4-C9)

2016-2018 **University of Washington**, Seattle, WA,
Master's of Science in Electrical & Computer Engineering.

2008-2013 **University of Minnesota–Twin Cities**, Minneapolis, MN,
Bachelor's of Science in Electrical Engineering.

Professional Experience

2019 **ViaSat** Tempe, AZ

RF Engineering Intern March - June

Design, simulation, testing, and analysis of RF sub-systems in a re-designed transmit-receive integrated assembly (TRIA) for use with the next-gen ViaSat-3 satellite constellation.

2017 **NASA Langley Research Center** Hampton, VA

Avionics Lead on the GPX-2 Small Satellite Mission June - August

Avionics Lead on the GPX-2 small satellite mission that intends to test low-cost, off-the-shelf differential-GPS receivers in space.

2013-2016 **NASA Langley Research Center** Hampton, VA

RaD-X Avionics Lead Sept. 2013 - January 2016

Avionics Lead for the Radiation Dosimetry Experiment (RaD-X) high-altitude balloon experiment to measure hours of galactic cosmic ray and solar energetic particles from the stratosphere.

OAAN Avionics Lead June 2015 - June 2016

Avionics Lead for the On-orbit Autonomous Assembly of Nanosatellites (OAAN) project to develop a nanosatellite bus and ground validation system using air-bearings to demonstrate novel, low-cost guidance, navigation, and control system for nanosatellite rendez-vous and docking..

Autonomy Incubator Hardware Engineer December 2015 - June 2016

Hardware design support for research on the integration of autonomous drones into the national airspace and the use of autonomous aerial drones for planetary exploration.

2013 **Synapse Product Development** Seattle, WA

Electrical Engineering Intern January - May

Design, fabrication, and testing of consumer electronics.

2012 **Airbus** Toulouse, France

Electrical Engineering Intern May - December

Research and development of a CDMA wireless modem implemented on FPGAs.

2011-2012 **University of Minnesota UAV Research Group** Minneapolis, MN

Research Assistant May 2011 - May 2012

Design, fabrication, and testing of sensors for drones. Flew specific flight patterns as the drone test pilot for research on controls and system identification.

2010 **University of Arizona Neurorobotics Laboratory** Tucson, AZ

Research Assistant May - August

Firmware and instrumentation engineer working on humanoid robots.

2009-2010 **University of Minnesota UAV Research Group** Minneapolis, MN

Research Assistant July 2009 - May 2010

Instrumentation engineer and flight test pilot of fixed-wing and rotary-wing research drones.

Grants & Scholarships

2019 **Bergstrom Award for Art & Science**, Co-Investigator

2018 **National Science Foundation Graduate Research Fellow** (NSF GRFP)

2018 **NASA Space Technology Research Fellowship** (declined for NSF GRFP)

2011 **Roger M. Nordby Engineering Scholarship**

2009 **New Look Laser Technologies Essay Scholarship Winner**

2008 **Academy of Model Aeronautics Student Achievement Scholarship**

2008-2012 **University of Minnesota *Gopher Gold* Scholarship**

Honors

2019 **IEEE Wireless Sensor Networks Conference** Student Paper Award Finalist (C4 & C5)

2017 **NASA Group Achievement Award – Autonomy Incubator**

2016 **NASA Group Achievement Award – Radiation Dosimetry Experiment** (C2)

Peer-Reviewed Publications (J–journal, C–conference)

J3 **J. Rosenthal** and M.S. Reynolds, "A 1.0 Mbps 198 pJ/bit Bluetooth Low Energy (BLE) Compatible Single Sideband Backscatter Uplink for the NeuroDisc Brain-Computer Interface," *IEEE Trans. on Microwave Theory and Techniques*, vol. 67, no. 10, pp. 4015–4022, Oct. 2019.

J2 **J. Rosenthal**, A. Sharma, E. Kampianakis, M.S. Reynolds, "A 25 Mbps, 12.4 pJ/bit Backscatter Data Uplink for the NeuroDisc Brain Computer Interface," *IEEE Trans. on Biomedical Circuits and Systems*, vol. 13, no. 5, pp. 858–867, Oct. 2019

J1 A. Sharma, E. Kampianakis, **J. Rosenthal**, A. Pike, A. Dadkhah, and M.S. Reynolds, "Wideband UHF DQPSK Backscatter Communications in Reverberant Cavity Animal Cage Environments," *IEEE Trans. on Antennas and Propagation*, vol. 67, no. 8, pp. 5002–5011, 2019.

C9 **J. Rosenthal** and M.S. Reynolds, "All-Digital Single Sideband (SSB) Bluetooth Low Energy (BLE) Backscatter with an Inductor-free, Digitally-Tuned Capacitance Modulator," *IEEE International Microwave Symposium*, To be presented in June 2020.

C8 L. Arjona, **J. Rosenthal**, J.R. Smith, and C.T. Moritz, "High Performance Flexible Protocol for Backscattered-based Neural Implants," *2019 IEEE-APS Topical Conference on Antennas and Propagation in Wireless Communications (APWC)*, Granada, Spain, 2019, pp. 276-280.

C7 **J. Rosenthal**, A. Pike, and M.S. Reynolds, "A 1 Mbps 158 pJ/bit Bluetooth Low Energy (BLE) Compatible Backscatter Communication Uplink for Wireless Neural Recording in an Animal Cage Environment," *IEEE Conference on RFID*, 2019, pp. 1-6.

C6 **J. Rosenthal** and M.S. Reynolds, "A 158 pJ/bit 1.0 Mbps Bluetooth Low Energy (BLE) Compatible Backscatter Communication System for Wireless Sensing," *IEEE Topical Conference on Wireless Sensors and Sensor Networks (WiSNet)*, Orlando, FL, USA, 2019, pp. 1-3.

C5 A. Dadkhah, **J. Rosenthal**, and M.S. Reynolds, "ZeroScatter: Zero-Added-Component Backscatter Communication using Existing Digital I/O Pins," *2019 IEEE Topical Conference on Wireless Sensors and Sensor Networks (WiSNet)*, Orlando, FL, USA, 2019, pp. 1-3.

C4 **J. Rosenthal**, A. Sharma, E. Kampianakis, and M.S. Reynolds, "A 6.25 Mbps, 12.4 pJ/bit DQPSK Backscatter Wireless Uplink for the NeuroDisc Brain-Computer Interface," *2018 IEEE Biomedical Circuits and Systems Conference (BioCAS)*, Cleveland, OH, 2018, pp. 1-4.

C3 **J. Rosenthal**, B. Hayes, and C. Mertens. "A Silicon Micro Dosimeter for High-Altitude Measurements of Cosmic Radiation," *2018 IEEE Aerospace Conference*, Big Sky, MT, 2018, pp. 1-7.

C2 J. Pei, L. Murchison, A. Ben Shabat, V. Stewart, **J. Rosenthal**, et al. "Ground Demonstration on the Autonomous Docking of Two 3U Cubesats using a Novel Permanent-Magnet Docking Mechanism." *55th AIAA Aerospace Sciences Meeting*, 2017.

C1 J. Pei, L. Murchison, A. Ben Shabat, V. Stewart, **J. Rosenthal**, et al. "Autonomous Rendezvous and Docking of Two 3U Cubesats Using a Novel Permanent-Magnet Docking Mechanism." *54th AIAA Aerospace Sciences Meeting*, 2016.

Posters, Presentations, and Demos

Presentation	"A 1 Mbps 158 pJ/bit Bluetooth Low Energy (BLE) Compatible Backscatter Communication Uplink for Wireless Neural Recording in an Animal Cage Environment," *IEEE Conference on RFID*, 2019.
Presentation + Poster	"A 158 pJ/bit 1.0 Mbps Bluetooth Low Energy (BLE) Compatible Backscatter Communication System for Wireless Sensing," *IEEE WiSNet*, 2019.
Presentation + Poster	"A 6.25 Mbps, 12.4 pJ/bit DQPSK Backscatter Wireless Uplink for the NeuroDisc Brain-Computer Interface." *IEEE BioCAS*, 2018.
Presentation	"A Silicon Micro Dosimeter for High-Altitude Measurements of Cosmic Radiation." *IEEE Aerospace Conference*, 2018.
Poster	"Fully Wireless Instrumentation for a Bi-Direction BCI," *NeuroFutures Conference*, 2018.
Demo	"IBPoet: An Interactive & Biosensitive Poetry Composition Device," in *ACM UbiComp Conference*, 2017.
Poster	"Aerodynamic Characterization of the Mini Ultra Stick Airframe." *National Conference for Undergraduate Research*, 2012.
Demos	*Numerous demos and informal presentations for fundraising, lab visitors, and outreach guests.*

Student Mentoring

Summer 2014	**NASA** Taylor Dayton, Grad Intern, *Additive Manufacturing for Nanosatellites*
2013-2015	**NASA** University of Virginia Small Satellite Team
Summer 2015	**NASA** Renee Hernandez, Undergrad Intern, *Low-cost Total Ionizing Dose Sensing System*
2018-2019	**UW** Alexandra Pike, NSF Research Experience for Teachers, *Analysis of the Wireless Channel Inside a Metal Animal Cage* (J1, C6)
2018-2019	**UW** Anissa Dadkhah, UW Undergrad, *Analysis of the Wireless Channel Inside a Metal Animal Cage* and *ZeroScatter* (J1, C4, C6)
2019-Present	**UW** Tyler Petrie, UW Undergrad, *Low-cost Receivers for Wireless Brain-Computer Interfaces*
2019-Present	**UW** Sara Reyes, UW Undergrad, *Analysis of the Wireless Channel Inside a Metal Animal Cage*
2020-Present	**UW** Tyan Trinh, UW Undergrad, *Bit and Packet Error Rate Measurements for the NeuroDisc Wireless Brain-Computer Interface*
2020-Present	**UW** Anand Sekar, UW Undergrad, *Bi-Directional Communication Protocols for Wireless Brain-Computer Interfaces*

Volunteering & Outreach

2018	**UW** *Summer Youth Electronics Design*, Instructor
2018	**UW** *GEARUP*, Outreach Presenter

2017-Present	**UW** *Engineering Days*, Outreach Presenter
2018-Present	**UW** *Graduate and Professional Student Senate*, Senator
2016-2018	**UW** *EE Graduate Student Association*, President
2017	**UW** *EE Soldering Workshop*, Instructor
2016-2018	**Washington State Opportunities Scholar Program**, Mentor
2016	**Big Brothers Big Sisters**, Mentor
2013-2016	**NASA** *HUNCH* Outreach Mentor, providing hands-on experience to students building space-flight hardware
2015	**NASA** *Virtual Career Fair*, Speaker
2018	**NASA** *RaD-X Outreach*, Presenter
2013-2016	**NASA** *Speaker's Bureau*, Volunteer speaker at local schools and libraries
2014-2016	**NASA** *College of William & Mary's Focus on the Future*, Volunteer speaker
2013	**International Rescue Committee**, *Refugee Resettlement*, Volunteer

Training & Professional Development

2020	**UW** *Empowering Prevention & Inclusive Communities*
2020	**UW** *Center for Neurotechnology: Creating an Inclusive Culture*
2018	**UW** *Green Dot Bystander Training*
2014	**NASA** *Requirements Development & Management*
2014	**NASA** *Proposal Development*
2014	**NASA** *Project Cost & Schedule Management*
2014	**NASA** *Crucial Conversations: Tools for Talking When Stakes Are High*
2013	**NASA** *Altium Designer: Schematic & PCB Layout*

Technical Experience

Programming	Matlab (proficient), Verilog, Embedded C (basic), Python (basic), BASH (basic)
Software	Altium Designer, Eagle CAD, LTSpice, HFSS, ADS, GNU Radio Companion, CST (basic)
Protocols	Bluetooth Low Energy, UART, SPI, I2C, CAN, USB
Lab Equipment	Proficient with circuit prototyping and debugging, Network Analyzers, Spectrum Analyzers, Oscilloscopes, Multimeters, Soldering (through-hole, surface-mount), Software-Defined Radios
Testing Experience	Thermal Vacuum Chamber, Burn-in, Radiation Beam Calibration, IACUC-approved Animal Testing

Languages & Outside Interests

English	Native Speaker
French	Proficient
Flying	FAA Private Pilot Glider Certificate (Current)

HAM Radio FCC Technician Class License (KK4VMN)