

James D. Rosenthal

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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-C10)
- 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 Design/Simulation Engineering Intern
- 2013-2017 **NASA Langley Research Center** Hampton, VA
GPX-2 Nanosatellite Avionics Lead
RaD-X High-Altitude Balloon Avionics Lead
OAAN Nanosatellite Avionics Lead
Autonomy Incubator Drone Hardware Engineer
- 2013 **Synapse Product Development** Seattle, WA
Consumer Product Electrical Engineering Intern
- 2012 **Airbus** Toulouse, France
Digital Wireless Modem Electrical Engineering Intern
- 2011-2012 **University of Minnesota UAV Research Group** Minneapolis, MN
Research Assistant/UAV Test Pilot
- 2010 **University of Arizona Neurorobotics Laboratory** Tucson, AZ
Embedded Electronics Research Assistant
- 2009-2010 **University of Minnesota UAV Research Group** Minneapolis, MN
Research Assistant/UAV Test Pilot

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**

- 2020 **UW ECE Research Showcase Winner**
A 25 Mbps, 12.4 pJ/bit Backscatter Data Uplink for the NeuroDisc BCI (J2)
- 2019 **IEEE Wireless Sensor Networks Conference**
Student Paper Award Finalist (C5 & C6)
- 2017 **NASA Group Achievement Award – Autonomy Incubator**
- 2016 **NASA Group Achievement Award – Radiation Dosimetry Experiment (C3)**

--- **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.
- C10.** **J. Rosenthal** and M.S. Reynolds, "A Dual-Band Shared-Hardware 900 MHz 6.25 Mbps DQPSK and 2.4 GHz 1.0 Mbps Bluetooth Low Energy (BLE) Backscatter Uplink for Wireless Brain-Computer Interfaces," *IEEE Conference on RFID*, To be presented in September 2020.
- 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 "A 158 pJ/bit 1.0 Mbps Bluetooth Low Energy (BLE) Compatible Backscatter Communication System for Wireless Sensing," *IEEE WiSNet*, 2019.
- + Poster
- Presentation "A 6.25 Mbps, 12.4 pJ/bit DQPSK Backscatter Wireless Uplink for the NeuroDisc Brain-Computer Interface." *IEEE BioCAS*, 2018.
- + Poster
- 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 Proficient with circuit prototyping and debugging, Network Analyzers, Spectrum
Equipment Analyzers, Oscilloscopes, Multimeters, Soldering (through-hole, surface-mount), Software-Defined Radios
Testing Thermal Vacuum Chamber, Burn-in, Radiation Beam Calibration, IACUC-approved
Experience Animal Testing

Languages & Outside Interests

English Native Speaker
French Proficient
Flying FAA Private Pilot Glider Certificate (Current)
HAM Radio FCC Technician Class License (KK4VMN)