James D. Rosenthal

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Education

2018–Present **University of Washington** *Seattle, WA*
Ph.D. in Electrical & Computer Engineering, Certificate in Neural Engineering

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

2016-2020 **University of Washington** *Seattle, WA*
Research assistant developing embedded systems for biomedical applications

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 with Afroditi Psarra

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.

C12. **J. Rosenthal** and M.S. Reynolds, "On-the-fly Adaptation of Backscatter Modulator Impedances Using Digitally-Tuned Capacitors," *IEEE Topical Conference on Wireless Sensors and Sensor Networks (WiSNet)*, To be presented virtually in January 2021.

C11. T. Petrie, **J. Rosenthal**, and M.S. Reynolds, "A Low-Cost 1 Mbps Frequency Shift Keying Backscatter Receiver and Carrier Wave Generator System for Wireless Neural Recording," *IEEE Conference on RFID*, Virtual, 2020.

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*, Virtual, 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*, Virtual, 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

Poster	"Electronic Mode Stirring for Improved Backscatter Communication Link Margin in a Reverberant Cavity Animal Cage Environment," *IEEE RFID*, 2020. (Presented by Sara Reyes)
Presentation + Poster	"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 RFID*, 2020.
Presentation	"A 25 Mbps, 12.4 pJ/bit Backscatter Data Uplink for the NeuroDisc BCI", UW ECE Research Showcase, 2020.
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 & Professional 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, C7)
2018-2019	**UW** Anissa Dadkhah, UW Undergrad, *Analysis of the Wireless Channel Inside a Metal Animal Cage* and *ZeroScatter* (J1, C5)
2019-2020	**UW** Tyler Petrie, UW Undergrad, *Low-cost Receivers for Wireless Brain-Computer Interfaces* (C11)
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*. **UW Dept. of Computer Science & Engineering's Honorable Mention for Best Senior Thesis Award**

Volunteering & Outreach

2020	**UW** *UW STEM Upward Bound*, Summer Research Section Instructor
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** *Promoting Safe Interactions with Youth*

2020 **UW** *Reporting Abuse and Neglect*

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*

Reviewer

IEEE Transactions on Industrial Electronics

IEEE Journal of Radio Frequency Identification (RFID)

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
Modulations	OOK, ASK, M-ary PSK, FSK, OFDM
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 (B2/C1)
Flying	FAA Private Pilot Glider Certificate (Current)
HAM Radio	FCC Technician Class License (KK4VMN)