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## Education

- 2018–Present **University of Washington** *Seattle, WA*  
Ph.D. in Electrical & Computer Engineering, Certificate in Neural Engineering  
Focus Area: Ultra-Low Power Wireless Communications
- 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

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## Teaching Experience

- 2016–2021 **University of Washington** *Seattle, WA*  
W'2021 Instructor of Record: EE417 Modern Wireless Communications  
W'2020 Instructor of Record: EE417 Modern Wireless Communications  
S'2018 TA: EE595 Advanced Topics in Communications  
W'2018 TA: EE393 Technical Writing & Communication  
F'2017 TA: EE393 Technical Writing & Communication  
S'2017 TA: EE393 Technical Writing & Communication  
W'2017 TA: EE271 Intro to Digital Design  
F'2016 TA: EE271 Intro to Digital Design

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## 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

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## 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**

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## 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)**

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## Publications Under Review

- 1. **J. Rosenthal**, A. Pike, S. Reyes, and M.S. Reynolds, "Electronic Mode Stirring for Improved Backscatter Communication Link Margin in a Reverberant Cavity Animal Cage Environment," *IEEE Trans. on Antennas and Propagation*, submitted Jan. 2021.

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

**ORCID:** 0000-0001-7873-3421

- J4.** **J. Rosenthal** and M.S. Reynolds, "Hardware-Efficient All-Digital Architectures for OFDM Backscatter Modulators," *IEEE Trans. on Microwave Theory and Techniques*, vol. 69, no. 1, pp. 803–811, Jan. 2021.
- 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)*, 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

- Presentation "On-the-fly Adaptation of Backscatter Modulator Impedances Using Digitally-Tuned Capacitors," *IEEE WiSNet*, 2021.
- 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 + "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.
- Poster
- 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 + "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 & 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

- 2018-2020 **Paperboys Podcast** Scicomm Podcast Co-host
- 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 Proficient with circuit prototyping and debugging, Network Analyzers, Spectrum Analyzers, Oscilloscopes, Multimeters, Soldering (through-hole, surface-mount), Software-Defined Radios  
Equipment  
Testing Thermal Vacuum Chamber, Burn-in, Radiation Beam Calibration, IACUC-approved Animal Testing  
Experience

## Languages & Outside Interests

English Native Speaker  
French Proficient (B2/C1)  
Flying FAA Private Pilot Glider Certificate (Current)  
HAM Radio FCC Technician Class License (KK4VMN)