Anders Pearson

Seattle, WA, USA

anderspearson206@gmail.com | anderspearson.com | anderspearson206 | anders-pearson | Google Scholar

Research Summary

As an **NSF Graduate Research Fellow**, I work at the intersection of **wireless communications** and **deep learning**: using signal processing, information theory, and electromagnetic physics to constrain learning, and data-driven architectures to overcome the limiting assumptions of classical wireless design, toward AI-native and physically grounded wireless systems. In the Sensor Systems Laboratory under Prof. Joshua R. Smith, I developed a physics-informed diffusion model for radio map prediction (**IEEE ICASSP 2026**) over lunar terrain. As a Machine Learning Engineering Intern at **DeepSig**, I developed deep-learning models for RF signal detection that generalize zero-shot to unseen sample rates. I am currently completing my M.S. in ECE at the University of Washington, where I am extending the radio map work to communication-aware path planning, leading the **IEEE ICASSP 2027 Grand Challenge** I proposed on radio map prediction, and starting new work on semantic communication for low-power wireless.

Research Interests

- **Generative and sequence models for RF** — diffusion and Transformer models for channel modeling and signal detection
- **Physics-informed learning** — radio map estimation, physics-informed neural networks
- **AI-native wireless systems** — neural receivers, semantic communications, communication-aware robotics
- **Robust learned RF systems** — zero-shot and out-of-distribution generalization, sim-to-real transfer

Education

University of Washington *Seattle, WA, USA*

M.S. in Electrical and Computer Engineering *Sep. 2026 - Expected Jun. 2027*

- Concurrent B.S./M.S.; advised by Prof. Joshua R. Smith; GPA: 4.0/4.0

University of Washington *Seattle, WA, USA*

B.S. in Electrical and Computer Engineering *Sep. 2022 - Jun. 2026*

- GPA: 3.9/4.0

Technische Universität Berlin (TU Berlin) *Berlin, Germany*

Summer Exchange Program (RASF Scholar) *Jul. 2024 - Aug. 2024*

- GPA: 4.0/4.0

Publications

Peer-Reviewed Conference Papers

1. Paolo Torrado, **Anders Pearson**, Jason Klein, Alexander Moscibroda, and Joshua R. Smith, "RadioLunaDiff: Estimation of Wireless Network Signal Strength in Lunar Terrain," in *Proc. IEEE Int. Conf. Acoust., Speech, Signal Process. (ICASSP)*, 2026, pp. 21231–21235. [doi] [arXiv] [project page] **(Poster presenter)**

Research Experience

Sensor Systems Laboratory, University of Washington *Seattle, WA, USA*

Research Assistant *Nov. 2024 - Present*

- Supported by the NASA STMD Early Stage Innovations grant *Deep Contact Graph Routing for Lunar Operations*.
- **Physics-informed radio map prediction (ICASSP 2026).** Designed a triplet-UNet diffusion model (DDPM) with a 3D Helmholtz residual loss to predict signal coverage over lunar terrain; outperformed state-of-the-art deep-learning baselines (**0.9068 SSIM**), with ablations showing a **10% NMSE improvement** from the proposed components.
- **Data pipeline.** Generated **65,000 radio maps** with NVIDIA Sionna ray tracing over procedurally generated lunar terrain conditioned on NASA elevation data; parallelized the open-source terrain generator for **10×** throughput.
- **Communication-aware path planning** *(ongoing).* Extending radio map predictions into planners that route rovers through predicted coverage; built lunar-mesh-env, a multi-agent RL environment for benchmarking MARL policies against classical planning and routing baselines.
- **Hardware testbed.** Developed ESP32-C5 delay-tolerant mesh firmware (esp32-bp7-mesh) with store-and-forward routing, interfaced with Jetson Orin Nano hosts on a physical rover fleet.
- **Semantic communication (SemComm) for low-power wireless** *(ongoing).* Deep-learning and SemComm with battery-free devices.

Service & Leadership

The First Lunar Pathloss Radio Map Prediction Challenge *Toronto, Canada*

Lead Organizer, IEEE ICASSP 2027 Grand Challenge *2026 - May 2027*

- Proposed the challenge to the IEEE Signal Processing Society; accepted as one of 18 official ICASSP 2027 Grand Challenges.
- Designed a two-task benchmark replacing ray tracing with learned pathloss prediction at **415 MHz** and **5.8 GHz** under a 500 ms inference budget; released a new 1 m/pixel ray-traced lunar dataset with the evaluation protocol.

Selected Projects

Synthetic Training Data Generation for Side-Scan Sonar *University of Washington*

Senior Capstone, ENGINE Program · Sponsored by Booz Allen Hamilton *Jan. 2026 - Jun. 2026*

- Built a Unity-based physics simulator that ray-casts side-scan sonar over procedurally generated seabeds, modeling seabed backscatter, water-column attenuation, and transducer beam pattern; generates thousands of labeled images in hours versus $900 per survey day for real collection.
- **2nd Place (tie)** among 72 teams at the ENGINE 2026 Showcase. [poster]

Honors, Awards & Fellowships

2026	**Graduate Research Fellowship (GRFP),** National Science Foundation (NSF)	*United States*
2026	**Conference Travel Award (IEEE ICASSP 2026),** UW Undergraduate Research Program	*Seattle, WA*
2026	**2nd Place (tie), among 72 teams,** ENGINE 2026 Capstone Showcase, UW	*Seattle, WA*
2024	**Reinhardt Abraham Student Funding (RASF) Scholarship,** TU Berlin	*Berlin, Germany*
2022	**Mary Gates Scholar,** Mary Gates Endowment, University of Washington	*Seattle, WA*

Industry Experience

DeepSig Inc. *Arlington, VA, USA*

Machine Learning Engineering Intern *Jun. 2026 - Sep. 2026*

- **Zero-shot sample-rate generalization.** Enabled deep-learning-based RF signal detectors to generalize to sample rates unseen in training, avoiding per-rate retraining. Improved F1 on unseen rates by **0.25** on average (**+0.45** at 120 MHz, **+0.4** at 200 MHz).
- **Frequency-shift robustness.** Identified architecture and training modifications that improve detector robustness to frequency shifts by removing periodic artifacts caused by upsampling layers.
- **Automated research framework.** Automated dataset generation, training, and evaluation.

WiBotic Inc. *Seattle, WA, USA*

Software Engineering Intern *Jun. 2023 - Sep. 2023*

- Developed ESP32 firmware (socketcand_translate) streaming CAN bus data over Wi-Fi for remote diagnostics, and contributed Socketcand support upstream to pycyphal.

Engineering Intern *Mar. 2022 - Sep. 2022*

- Tested hardware and software reliability with the production team.

Teaching Experience

EE 419 / EE 565 — Computer-Communication Networks *University of Washington*

Teaching Assistant *Mar. 2026 - Jun. 2026*

- Supported undergraduate and graduate students on programming-based networking assignments.

Technical Skills

- **Programming** — Python, C++, C, C#, Java, Bash, MATLAB/Simulink, Verilog/SystemVerilog
- **Machine Learning** — PyTorch, TensorFlow / TensorFlow Lite, scikit-learn, NumPy, Pandas; diffusion models (DDPM), Transformers, CNNs/U-Nets, physics-informed neural networks, multi-agent reinforcement learning (PettingZoo), computer vision
- **RF & Signal Processing** — NVIDIA Sionna (differentiable ray tracing), radio map estimation, wave propagation modeling, digital signal processing, wireless/6G systems
- **Hardware & Embedded** — ESP32 / ESP32-C5 (ESP-IDF), Arduino, Jetson Orin Nano, FPGA, CAN bus / Socketcand, ESP-NOW, delay-tolerant networking (DTN), digital circuit design, soldering
- **Tools & Infrastructure** — Git, Linux, Docker, Apptainer, CUDA, HPC/cluster computing, Vim, LaTeX