

Wenxuan Guo

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RESEARCH INTERESTS Physically based simulation and machine learning for sensing. My research improves the physical fidelity of RF simulation and develops physics-guided data synthesis, toward data-driven sensing models that generalize to the real world.

EDUCATION **University of California San Diego (UCSD)** Fall 2025 – Present
M.S. in Computer Science
University of Michigan, Ann Arbor Fall 2022 – Spring 2025
B.S. in Computer Science and Economics

POSTERS AND DEMOS [D1] Xingyu Chen, **Wenxuan Guo**, Xinyu Zhang. “Demo: Differentiable Radio Frequency Digital Twin.”
In: *ACM MobiCom Demo 2026*
[P3] **Wenxuan Guo**, Xingyu Chen, Xinyu Zhang. “Generative Radar Data Synthesis for Human–Animal Disambiguation: Physics-Based Scene Simulation for Radar Sensing.”
In: *Amazon Hardware Organization Academic Innovation Partnership Poster Event*, Oct. 2026
[P2] **Wenxuan Guo**, Xingyu Chen, Xinyu Zhang. “RF Simulation for Animal Sensing.”
In: *2026 CWC Annual Research Review*, UC San Diego, Oct. 2026
[P1] **Wenxuan Guo**, Cyrus Omar. “Improving Proof Learning with Proof Blocks: Providing Customized Feedback to Help Students Identify Mistakes.”
In: *CSE Undergraduate Research Symposium*, University of Michigan, Apr. 2025

RESEARCH EXPERIENCE **ML Research Assistant, University of California San Diego** January 2026 – Present
Electrical and Computer Engineering
Advisor: [Prof. Xinyu Zhang](#)

Physics-Based Radar Data Synthesis for General Activity Recognition (with Amazon Lab126)

- Built a generative pipeline that produces subject motion and behavior from text prompts, providing controllable inputs for radar simulation.
- Placed generated motion into sensor-agnostic RF scene representations and simulated the resulting radar signals with RF Digital Twin (RFDT) [D1], a physically based differentiable RF ray tracer, yielding labeled training data.
- Scaled synthesis to a million-scale labeled corpus spanning diverse subjects, behaviors, and environments, and used RFDT gradients to concentrate generation on configurations where the recognition model performs poorly.
- Collected real radar measurements of human and pet activities, and trained a general activity recognition model on combined real and synthetic data, covering everyday activities (e.g., walking, sitting, lying down, falling, jumping) beyond fall detection.

Physically Grounded Graphics-to-RF Material Translation

- Established a physically grounded connection between an object’s visual appearance and its RF response, so that graphics assets can be converted into reusable RF assets without RF measurements of each object.
- Developed a shared physical material model that predicts both optical and RF properties, and generated paired optical renderings and RF simulations with consistent geometry and material states.
- Analyzed which aspects of PBR appearance constrain RF behavior and where ambiguity remains, guiding the design of the learned mapping.
- Trained a graphics-to-RF model that predicts frequency-dependent permittivity, effective conductivity, and uncertainty from graphics assets.

Research Assistant, University of Michigan

May 2025 – August 2025

Nuclear Engineering and Radiological Sciences

Advisor: Prof. Sara A. Pozzi

Augmented Reality Visualization of Radiation Imaging Data

- Reconstructed radiation fields from detector signals and displayed them on HoloLens 2 in real time, allowing operators to locate radiation hotspots from a safe distance.
- Rebuilt the detector-to-headset data pipeline in Cython and C++ to make real-time radiation imaging usable in the field, reducing average latency from 10 ms to 0.8 ms.
- Traced timing and serialization errors along the data path to keep displayed radiation images consistent with incoming detector events, sustaining a throughput above 10K events per second.

Research Assistant, University of Michigan

June 2024 – Apr 2025

Electrical Engineering and Computer Science

Advisor: Prof. Cyrus Omar

PrairieLearn for Proof-Based Courses

- Built an ordering-feedback engine for Proof Blocks and merged it into PrairieLearn, providing customized feedback that helps students identify mistakes in their proofs [P1].
- Independently led the project, working with faculty, PrairieLearn developers, and the Proof Blocks founder to identify needed features and resolve integration issues.
- Built a prototype Discrete Math course and authored a department-specific user guide, providing a template for department-wide adoption and streamlining TA onboarding.