DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
COLLEGE OF ENGINEERING AND APPLIED SCIENCE

APPLICATION DEADLINE: September 22, 2025

PROJECT TITLE: Machine Learning for RF Signal Classification

Physical Requirement :
No physical requirement

Project's Technical Skills Requirement :
wireless communications, RF signals, hardware design (Verilog or VHDL), software defined radio, OR machine learning

Project's Available Positions : 1 or 2

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Project Description

Deep neural networks can be utilized to classify Radio Frequency signals for many critical tasks in wireless communications. For instance, a deep neural network can be used to perform modulation classification or device fingerprinting based on RF signals obtained on a receiver. However, these neural networks face challenges in terms of robustness, security, and optimization.

The goal of this project is to improve the design of neural networks for classifying Radio Frequency signals. Specifically, the project will focus on (a) algorithm/hardware optimization of neural networks; (b) the security and robustness of neural networks for tasks such as modulation classification and device fingerprinting.

The students will (1) study machine learning, software-defined radio, and signal processing techniques; (2) leverage and extend existing neural networks that our group has developed to enhance the robustness and resilience of neural networks; (3) write code and conduct experiments over large-scale RF signals to demonstrate the performance of neural networks on embedded devices, such as Jetson and FPGAs.

Students with background or experience in signal processing, software defined radio, wireless communications, FPGAs, OR hardware optimization for neural

networks are strongly encouraged to apply. Undergraduate researchers who previously worked with Dr. Wang have received UC undergrad research fellowship awards and have published multiple research papers.