



Using FPGAs for Spectrum Sensing and Modulation Recognition Project

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Project Overview

- Project seeks to use machine learning to recognize different wireless devices
- Use software defined radios (SDRs) to record various devices as training data for neural nets
- Classify type of device based on RF signature

Last Week

- Rework UDP client / server to work with Go to Verilog compiler
- Running Go programs through the argo2verilog compiler
- Get familiar with machine learning concepts
- Begin collecting data using the grid

The Experiment

Goal: Mimic WiFi transmissions in a (mostly) controlled environment and be able to classify each transmission based on its modulation scheme.

Hardware: USRP X310, USRP B210

Software: MATLAB, UHD, OEDL

Target Modulations: BPSK, QPSK, 16QAM, 64QAM

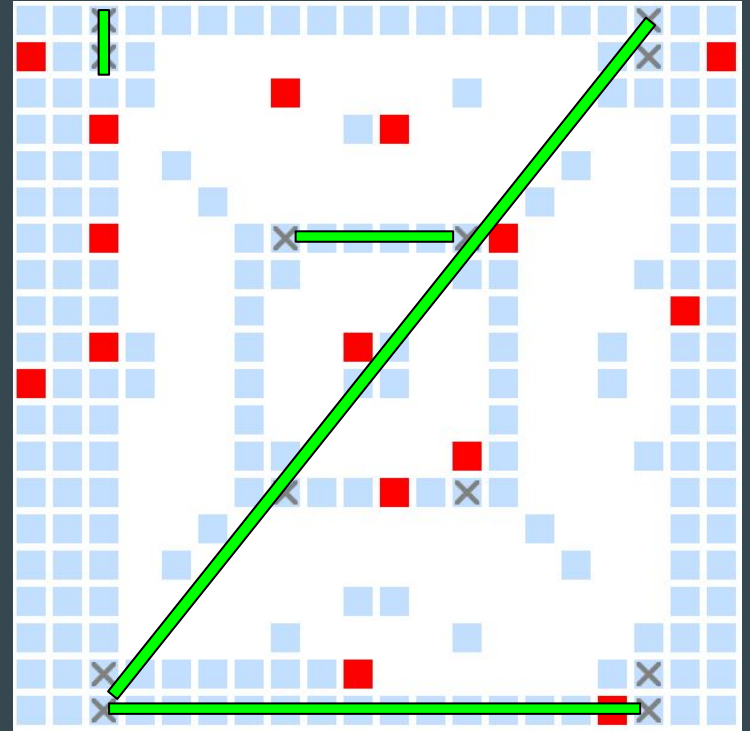
The Experiment

Constants

Transmitter Bandwidth	20 Mhz
Receiver Sampling Rate	40 MSps
Input/Output Binary File Format	Float32
Packet Payload Size	1500 Bytes

Variables

Gain	TBD
Distance (ft)	3, 15, 45, 72
Frequency (Mhz)	2412, 2437, 2462, 5180, 5240, 5745, 5825
Modulation and Coding Scheme (MCS)	0, 1, 2, 3, 4, 5, 6, 7



Tasks for this week

- Automate data collection using OEDL
- Using USRP hardware driver(UHD) to process several signals received inside a certain environment
- Learn the features for the GNU Radio software known as “flowgraphs” which supports USRP
- Analyze the plotting and data visualization delivered by GNU Radio

Plans for next week

- Classify the data collected on the grid by using research classification method and Use Matlab to analyze them
- Collect more training data to make better performance for our code
- Solving the overflow problem when running the GNU Radio Software
- Doing more radio experiment tests

Questions?