



Using FPGAs for Spectrum Sensing and Modulation Recognition Project

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Project Overview

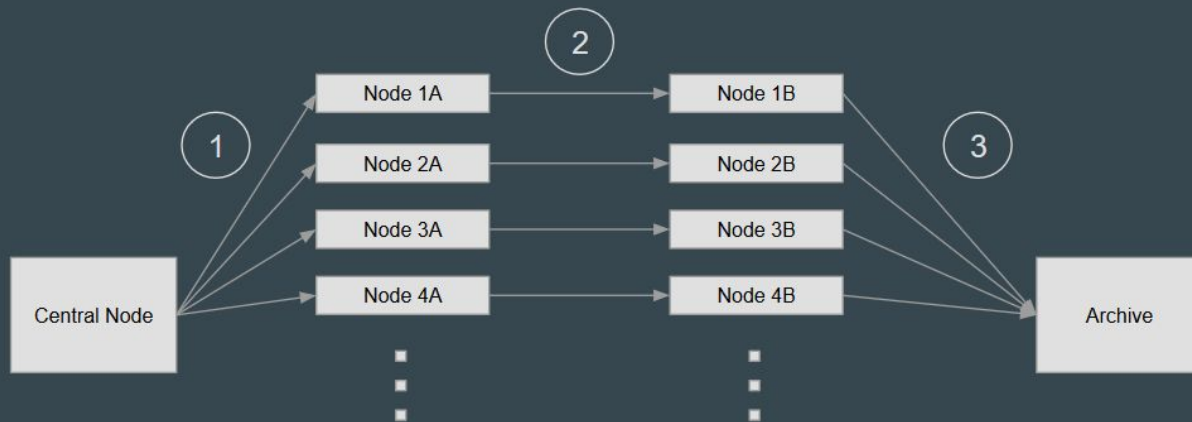
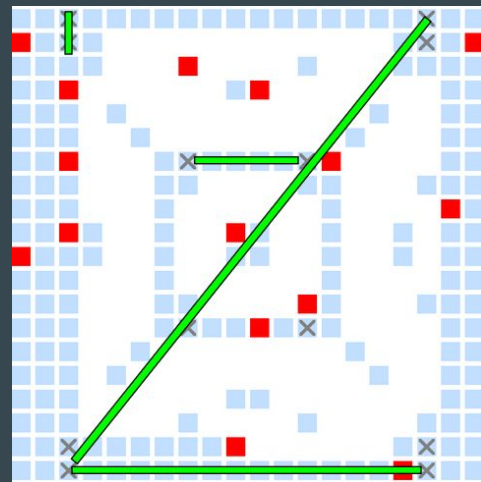
- Project seeks to use machine learning to recognize different wireless devices
- Use software defined radios (SDRs) to record various devices as training data for neural nets
- Classify type of device based on RF signature

Last Week

- Began working on RRC matched filter using MATLAB
- Collected data on Grid
- Added materials to the website

Data Collection

- Data has been collected
- Dataset documentation
- Create a large metadata file for the entire dataset



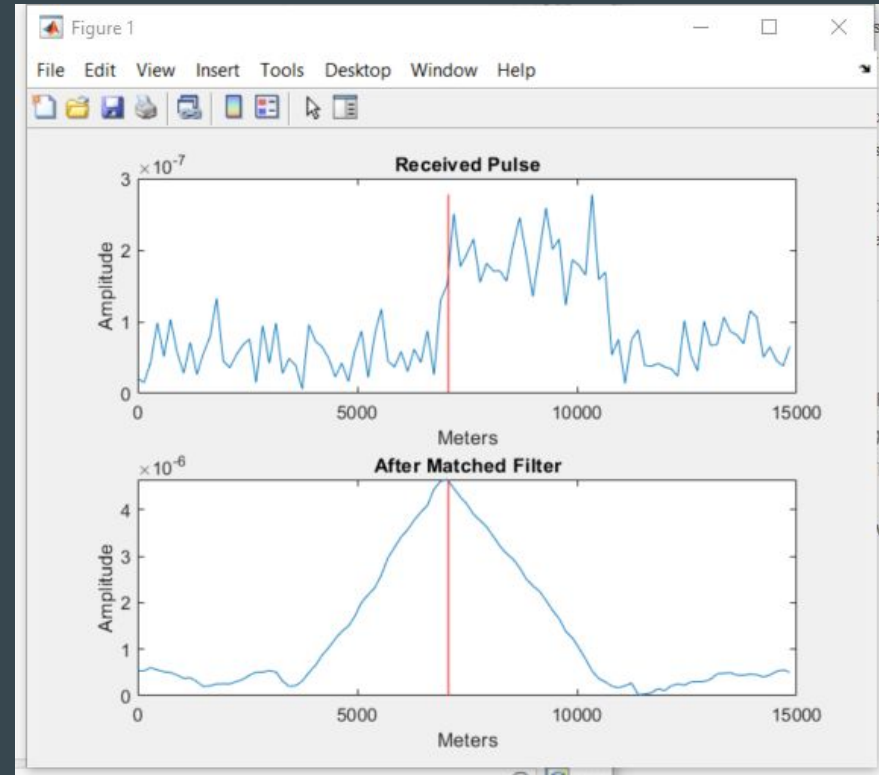
Matched Filter

- What it is:
 - Detect if a “template” signal is present in a noisy, unknown signal
 - Used to determine if the unknown signal follows a particular modulation scheme
 - Popular choice for maximizing SNR in digital communications
- What it is to us:
 - NN Based Modulation Recognition
 - Requires very little a priori information
 - Used for signals we know very little about
 - Matched Filter
 - Requires a priori information (cannot work without it)
 - Used for signals we have decent knowledge of
 - Performance Comparison

Use Simple Matched Filter to Improve the SNR in Matlab

Goals:

- Help us detect the pulse better even with noise
- Minimize the effect of noise by increase SNR
- To maximize the SNR, the impulse response of matched filter should be a reversed and delayed version of the signal



Plans for next week

- Create a matched filter in Go instead of Matlab to be used in the argo2verilog compiler to generate Verilog code to used for FPGA implementation
- Document dataset
- Work more on the website

Questions?