

CECS 347 Spring 2018 Project 1

Final Project Proposal

By

Nolan Luckett

03/03/2018

Initial plan for the final project

# Project Topic

I plan to implement a ethernet connected audio spectrum analyzer. When a button is pressed, the Zynq board will record audio data from a microphone. When the button is released the audio-data will be played from a connected speaker. A GUI on the PC will display the time series and frequency domain data.

# New Hardware Components/IPs

The new IP components are the FFT for computing the spectra (advanced), and an I2S controller for communicating with the audio codec (basic).

A microphone and a speaker are also needed.

# Source of the IPs

The FFT block is available from the IP integrator. The I2S controller is available for evaluation from Xylon (listed in the IP catalog).

# New IP Blocks

No new IP blocks will be written.

# Drivers for Hardware Components

The new IP blocks are AXI peripherals, so their drivers are available. The ethernet and I2C that are necessary are features of the microcontroller.

# Basic Software Applications

The Zybo board will record up to 5 seconds of audio data at the press of a button and play it back when the button is released.

# Advanced Software Applications

The Zybo board will record up to 5 seconds of audio data at the press of a button and play it back when the button is released. It will also transmit the data to the connected PC over ethernet. The host PC will display the data in the frequency and time domain, with the frequency domain having been generated on the Zybo board in PL.

# Project Timeline

* March 1: Turn in this report, begin top-level design
* March 7: Complete top-level design, order components (mic, speaker), begin implementing audio recording
* March 14: Finish audio recording, begin implementing audio playback
* April 1: Complete audio playback implementation, begin implementing ethernet output, begin implementing host PC interface
* April 14: Be able to display time domain data on the host PC, begin working on the frequency domain
* May 1: Be able to display the frequency domain in the GUI, begin wrapping it up
* May 14: Be done.

# Reference

<https://lauri.xn--vsandi-pxa.com/hdl/zynq/xilinx-dma.html>

<https://reference.digilentinc.com/learn/programmable-logic/tutorials/zybo-dma-audio-demo/start>

<http://www.instructables.com/id/Digital-Filters-on-Zybo-Board/>

<https://reference.digilentinc.com/reference/programmable-logic/zybo/reference-manual>