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Course: ECE 3210

Subject: Lab 7, Fast Fourier Transform

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1 Introduction

This lab focused on the fast Fourier transform as well as the discrete Fourier transform. Comparing these two transforms shows that the FFT is many times faster than the DFT. It also looked at how we can use the FFT to compute further parameters such as the convolution and inverse FFT. We were tasked with performing these calculations in C.

2 Theory

To calculate the DFT we implemented the following equation in code.

$$F_r = \sum_{k=0}^{N_0-1} x_k \cdot e^{\frac{-j2\pi}{N_0}rk} \quad (1)$$

To perform the discrete convolution we used this equation.

$$y_n = \sum_{k=-\infty}^{\infty} f_k \cdot g_{n-k} \quad (2)$$

All other tasks in this lab did not require a specific equation.

3 Results

Ultimately I was unable to get a working FFT which prevented me from completing the subsequent programs in C.

I was able to complete the DFT and linear convolution portions of this lab.

4 Discussion and Conclusions

Due to the fact that I was unable to produce a working FFT I don't have figures to analyze. I can infer that the FFT would run much faster than the DFT and also that the FFT convolution would be able to run faster than the linear convolution.