Title: A/D and D/A characteristics
Area: Linear Systems
Prerequisites: EE 310
The ARM7 processor used in EE 354 has an onboard 10-bit A/D converter and an 8-bit D/A converter has been added. Write a program in C to input from the A/D and output to the D/A as fast as possible. Design an experiment to determine characteristics of the system when the program is running. You should produce a plot of frequency versus gain magnitude and frequency versus phase over a frequency range of 0Hz to 1MHz.

Title: Black Box mystery
Area: Linear Systems
Prerequisites: EE 310
There is a "black box" in the lab which contains a linear system. Design an experiment that will allow you to determine the transfer function of the system in the box.

Title: Odd harmonics
Area: Linear Systems
Prerequisites: EE 310
Begin this project by showing that a square wave can be represented by an infinite sum of sinusoids of odd harmonic frequencies given by.

\[ f(t) = \sum_{k=1}^{\infty} \frac{4}{k\pi} \sin(kt) \]

Design three digital notch filters to filter the fundamental, the third harmonic, and the fifth harmonic frequency from a square wave produced by a signal generator. Your filters should use appropriate amplification so that all three outputs have the same amplitude. Each filter should be at least second order.

Title: Oven Transfer Function
Area: Linear Systems
Prerequisites: EE 310
Given a low temperature oven made of Styrofoam and heated by a 25 watt light bulb. If the input is the voltage to turn on the bulb and the output is the temperature, determine the transfer function of the oven.