LAB Assignment #2 for ECE 495/595

Assigned: Thur., Feb 12, 2009
Due: Thur., Feb 19, 2009

Description: Use LABVIEW to read in a floating point waveform, convert the y values to 8-bit integers and write the y values to a file.

The waveform is defined by an array of (x,y) pairs, where each x value corresponds to a specific time value and the corresponding y value is a digitized sample of the signal's voltage at that time instance. The (x,y) pairs representing the waveforms that I give you as examples will be pairs of floating point numbers. The file format includes two numbers per line separated by a space or tab, each represented in scientific notation.

Once you have the data value pairs read in using LABVIEW (as floating point numbers), you need to scale the y data to convert the floating point numbers to **8-bit** integers. One approach is to multiply each of the y values by a constant. This simple approach does not make full use of the entire range that 8-bit integers provide, from -127 to 127. The proper way to scale the floating point values is to *parse* the array identifying the largest and smallest values. This gives the range of the original data. The ratio of the integer range to floating point range gives a scaling factor that you can use to multiply each of the floating point values. To make this work, you'll also need to compute an offset that needs to be added to the scaled y value in order to center the waveform in the range of integers. When completed, the smallest and largest floating point y values will map to the smallest and largest integer values given above. See formula below.

> Parse the floating point y values in LABVIEW, save largest and smallest values and compute two constants:
>
> $$zero = (largest + smallest)/2;$$
> $$mult = (largest - smallest)/(2^8 - 2);$$
>
> To convert the array of floating point values to integers:
>
> $$y\_int[i] = (y\_float[i] - zero)/mult;$$

Laboratory Report Requirements:

1) No written report required for this laboratory. Be prepared to demonstrate your project in class on Thurs, Feb 19. You need to read in the file of (x,y) floating point values and write a file with the 8-bit integers.

Grading:
LABVIEW coding style: 20%
Proper operation: 80%