Engr228 Lab #5 Supplement

Capturing Data from the Tektronix TDS 210 Oscilloscope

This brief tutorial explains how to import a waveform displayed on your oscilloscope to Microsoft Excel, allowing you to make measurements, place trend lines, or do other analysis on your lab data.

Connecting the Oscilloscope and Capturing Data

1) Make sure the oscilloscope is connected securely to the back of your computer.
2) Double-click the **OpenChoice Desktop** icon on the PC Desktop.
3) Click on the **Select Instrument** button**,** select the **ASRL1::INSTR** option, and click **OK.** The *TDS 210 block* should appear.
4) Click on the **Waveform Data Capture** button on the top of the *OpenChoice Desktop*.
5) Click on the **Select Channels** button.
6) When the Select Channels menu appears, check the **MATH** button and then click on the **Get Data** button.
7) After a few seconds, a red waveform should appear identical to what you see on your scope display. This may take some time so go and buy the instructor a Diet Mountain Dew.

Saving and Analyzing the Data

1) Click the **Save As** button in the *OpenChoice Desktop*, give your file a name, and save it to the PC.
2) Double-click your data file to open it in **Excel**.
3) Select the two columns of data and create a scatter plot. Note that Excel has a limit on how many points can be displayed on a scatter plot, so you may have to shave off some of the 2500 points.
4) Using the Excel plot as a guide, start deleting data points until only the exponential decay section of the graph remains. This is the part of the data you want to compute an exponential trendline for. Note that Excel can't fit an exponential trendline to negative data so make sure you have sufficient DC offset in the function generator so that all captured data is positive.
5) Fit an exponential trendline to your data and record the results on the lab handout.

Something to Note

If your results are inaccurate, try the following technique:

1) You know that the exponential decay for the voltage across a capacitor in an RC circuit is given by:

$$V = V_0 e^{(t-t0)/RC}$$

Taking the natural log (ln) of both sides gives:

$$\ln(V/V_0) = t/RC - t_0/RC$$

Now you have a linear relationship with which to make a trendline. Create another column with the formula $\ln(V/V_0)$ next to your current data using the value that is known for V_0. Plot this new column of data against your *t* values and fit a linear trendline.

2) As the voltage across the capacitor approaches zero, the new data points tend to spread out and get noisier. These noisy data points will skew your trendline and increase inaccuracy. Shave off some of these data points to get a better trendline and report your observations at the end of your lab report.