Data Acquisition Basics
Data Acquisition Parameters

- Block Diagram
- Signal Input Range
- Terminal Configuration (Differential, RSE)
- Acquisition Mode (Continuous Samples)
- Samples to Read
- Sample Rate (Hz)
Graph Function Generator Output

• Create a Blank VI
• Make sure NI ELVIS II is turned on
• Instantiate Functions -> Measurement I/O -> DAQMx -> DAQ Assistant
  – Click on Acquire Signals -> Analog Input -> Voltage and select Dev1 (NI ELVIS II) -> ai0.
  – Signal Input Range = +/- 10 V
  – Terminal Configuration = RSE
  – Acquisition Mode = Continuous Samples
Graph Function Generator (cont.)

– Acquisition Mode = Continuous Samples
– Samples to Read = 50k
– Sample Rate = 50k Samples per second

• How long does it take to collect 50k samples.
Configure the Data Acquisition as shown above. Click **OK**

You will be prompted to insert the DAQ Assistant in a loop – click **YES**
Connections on NI-ELVIS board

- FGEN to Banana A & B
  - Use BNC cable
  - Use female BNC to banana jack adaptor
- Banana A to AI0+
  - Use wire
- Banana B to AIGND
  - Use wire
Graph Function Generator (cont.)

• Turn on the Function Generator. See steps 1-4 of this tutorial for details.

• Add a Waveform Graph to your front panel and connect it to the DAQ Assistant on the block diagram to see the sine wave. Right click on the graph and click on Visible Items -> Scale Legend and -> Graph Palette to enable the zoom and autoscale options.
Graph Function Generator (cont.)

- Change the waveform to triangle and square. Click on the lock to turn off auto scaling and use the zoom tools to look at the waveforms in detail.
Fourier Transform

• All signal can be represented as a sum of sinusoid by using the Fourier Transform.
• If you plot the Magnitude of the Fourier Transform, the X-Axis represents frequency and the Y-Axis represents the amplitude of the frequency components of your signal.
• The term FFT (Fast Fourier Transform) is commonly used to refer to the Discrete Fourier Transform.
Fourier Transform (cont.)

- Verify the frequency of the signal shown above in both the time and frequency domain.
- Notice the harmonic distortion not visible in the time domain.
- You can compute the Signal to Noise ratio easily in the frequency domain. Everything not at 100 Hz is noise.
Fourier Transform (cont.)

• Add a plot of the Frequency Components of the Function Generator output to your vi. Use Functions -> Express -> Signal Analysis -> Spectral to compute the Fourier Transform. The default values will work for us. Wire a second graph to the FFT-(RMS) output.