AE251a: Experiments in Aerospace Engineering

LAB – 4 Date: April 02, 2019

Save your work in your own directory

1. Acquire data SubVI

This SubVI acquires specified number of samples from analog input channels 0, 1, and 2 at the sampling rate you specify. The output of the VI is a 2D array. Note that the first row of the 2D array is temperature data, the second row is sine wave data and the third row is square wave data. Use this SubVI to acquire or generate data that you use for the next few file I/O problems. Note that temperature signal when multiplied by 100 gives temperature in degree Celsius.

2. Write to file

Acquire 1000 samples/channel at a sampling rate of 10000 using Acquire data SubVI in problem 1 and write to the following files. Make sure you save data in your working space.

a) Write to a text file
b) Write to a datalog file

3. Read from file

Read the data from the files generated in problem 2 and display the temperature, sine wave, and square wave data in separate waveform graphs.

a) Read from the text file
b) Read from the datalog file

4. Data streaming to file

Write a VI using a while loop for the following cases that will save a block of 1000 samples/channel to a file every 200ms acquired at a sampling rate of 10000samples/sec. The VI is stopped after saving 20 blocks of data in the file. Make sure you save data in your working space.

a) Write to a text file
b) Write to a datalog file

5. Read from file

Read the data from the files generated in problem 4 and display temperature, sine wave, and square wave data in separate graphs.

a) Read from the text file
b) Read from the datalog file

6. Data streaming to file with header

Write a VI using a while loop, for the following cases, to save a block of 1000 samples/channel acquired at a rate of 10000 samples/sec to a file every 200 ms along with a header. In this VI, the data is written followed by a header named “Record #” where the # is the iteration number of the loop. The VI is stopped after saving 20 blocks of data in the file. Make sure you save data in your working space.

a) Write to a text file
b) Write to a datalog file

7. Read from file

Read the data from the files generated in problem 6 and display temperature, sine wave, and square wave data in separate graphs.

a) Read from the text file

b) Read from datalog file

8. The datalog data file "Q8_datalog.dat" has one record of data. The data record is a cluster containing a header string and a 2D array of numeric (SGL) data.

a) Write a VI to convert this datalog file to a text file. During this conversion, insert your name and roll number in the first line of the header string. Also, plot columns 2, 3, 4 against column 1 of the data in separate X-Y graphs. Show the data points in the graphs.

b) Write a VI to read the text file you created in part a) to display the header string and the data. Also, plot columns 2, 3, 4 against column 1 of the data in separate X-Y graphs. Show the data points in the graphs.

9. In an experiment data from multiple sensors was acquired at a sampling rate of 1000 samples/sec and saved in a datalog file. The datalog data file ("Q9_datalog.dat" available in your directory) contains multiple data records. The data record is a cluster containing a string and data (2D array of numeric in DBL).

a) Build a VI to display the total number of data records available in the file and read only the last record from the file and display all rows in the data array in separate waveform graphs whose x-axis is time in sec.

b) Build a VI to write only the 5^{th} and 11^{th} records of the datalog file to a text file. You can open the text file in Exel sheet to view the data you have written.