**EE 445S Real-Time Digital Signal Processing Laboratory – Prof. Brian L. Evans**

**Lab 2 Instructions – Part 1**

**1.  Sinusoidal generation using winDSK:**

* Connect your DSP board with the PC through the serial cable.
* Switch on S2-1 (the first one in the left group of switches), keep all the others off. Reset the board.
* Run winDSK8 on the PC, and then follow page 92 in the real-time DSP book. Observe Fig 5.7.Connect the line-out port on the board with oscilloscope. You can play around with the gain and the frequency in order to see how the shape of the sinusoid changes.

**2.  DSK implementation in C:**

* Please connect the DSP board to the PC using the USB cable, and connect the oscilloscope to the line out port.
* Please follow the instructions in “C:\CD\docs\App\_CCS\_5\_1\_omapl138.pdf” for the detailed steps to create a project. However, in Step 3 of A.5 Adding Files to a Project, the following change has been made:

Navigate to the **C:\CD\code\chapter\_05\ccs\sigGen** directory and select StartUp.c and “sinGenerator\_ISRs.c”. Click “Open”.

* Open the “sinGenerator\_ISRs.c” program, and examine the “interrupt void Codec\_ISR()” function. See how the library function calls have been used in generating the sinusoid. Run the code in order to see the waveforms displayed on the oscilloscope.
* Open the program “DSP\_Config.h”. Comment out the line “#define SampleRateSetting AIC3106Fs48kHz // 48kHz sample rate”, and uncomment the line “#define SampleRateSetting AIC3106Fs8kHz // 8kHz sample rate” to set the appropriate sampling rate. Also change the sampling frequency in the program sinGenerator\_ISRs.c in the line “Int32 fs = 48000; /\* sample frequency \*/” to 8000Hz.
* Change the code to implement sinusoidal generation using the difference equation method. Generate sinusoids at frequencies of 1 kHz and 2 kHz, with a sampling frequency of 8 kHz. Note that some of the variables should be defined as static variables so that they won’t be allocated as new variables every time ISR function is called.
* Now generate two sinusoids at frequencies 1 kHz and 7 kHz, and send them to the left and the right channel respectively. Observe the oscilloscope waveforms. Explain what happened mathematically. Repeat with two sinusoids at frequencies 2 kHz and 6 kHz

***\*  All the necessary codes are provided to you in “C:\CD\code”.***

***\*  A mistake in the pdf instruction: at step A.7 (2), add both “OmapL138ZoomTargetConfiguration.ccxml” and “OMAPL138\_DSP.gel” into the project.***

***\* Note that the workspace of CCS can only be in the C: drive.***

***\* Please make sure all DIP switches(two packages of eight switches, each) on the board are in the “OFF” position.***

**3.  Other notices**

***\* The above pdf instructions only show how to create a new project. If you want to open an existing project, go to menu “project”  “importing existing CCS/CCE eclipse project”.***

***\*  Since the computer will erase any changing to the C drive after logging off. Please backup your project either in your personal directory or in flash disks. Losing files is not an acceptable excuse for not submitting assignments on time.***