DSP Application Programming using PortAudio

Preliminary

This semester we will write DSP applications in C. In order to make the applications more interesting, we will utilize the audio subsystems (microphone, speakers, and soundcard) found in desktop and laptop computers; the soundcard will provide us with A/D and D/A converters. With current microprocessor speeds, our applications will easily be able to execute in real-time, that is, our application can digitally process the input stream without skipping any samples.

Although students' computers have different soundcard hardware and operating systems, there (fortunately) exists an open-source, cross-platform, audio application programming interface (API) called *PortAudio* that will facilitate writing real-time, DSP applications in C. For more information, please see

http://www.portaudio.com

Building and Installing PortAudio

In order to utilize PortAudio, you will need to download the source and build (compile) on your system

http://www.portaudio.com/download.html

Instructions for building on **Windows** using Microsoft Visual Studio can be found at

http://portaudio.com/docs/v19-doxydocs/compile_windows.html

Instructions for other integrated development environments (IDEs) such as Bloodshed and Eclipse are available on the web. Alternatively, you can bypass the build step and use pre-compiled DLLs

http://code.google.com/p/portaudiosharp/

Instructions for building on **Macintosh** using Xcode can be found at

http://portaudio.com/docs/v19-doxydocs/compile_mac_coreaudio.html

Alternatively, you can follow

http://www.ece.nmsu.edu/~pdeleon/EE592/PortAudioInstall.html

and use the pre-compiled lib from MacPorts

http://www.macports.org/ports.php?by=library&substr=portaudio

Instructions for building on **Linux** can be found at

http://portaudio.com/docs/v19-doxydocs/compile_linux.html

Students are highly encouraged to work together on building and installing PortAudio on their systems. For this assignment, copying is highly-encouraged!

Building the Passcode

Prof. De Leon has written a floating-point passcode which utilizes PortAudio and can be downloaded from

http://www.ece.nmsu.edu/~pdeleon/EE592/C_DSP_Code.html

The passcode implements a simple callback function to *pass* audio samples from input to output. PortAudio takes care of all required interfacing with soundcard hardware.