ECE241 Project Proposal: Digital Synthesizer

Matthew Gibson and Shawn Wang

Summary:
Our project proposal is a digital synthesizer, much like the ones that are commonly used to produce sounds in many genres of music (Figure 1). Utilizing a PS/2 keyboard as a makeshift piano/, the user will be able to shape a variety of waveforms (sine, square, sawtooth) using common audio DSP techniques such as applying a filter or envelope and playing the resulting waveform on the speakers. Time-permitting, the project will be extended to show the produced waveform in a oscilloscope on the VGA monitor, or additional DSP effects will be added (delay, reverb, etc..).

Figure 1 – A small digital synthesizer.

Block Diagram:

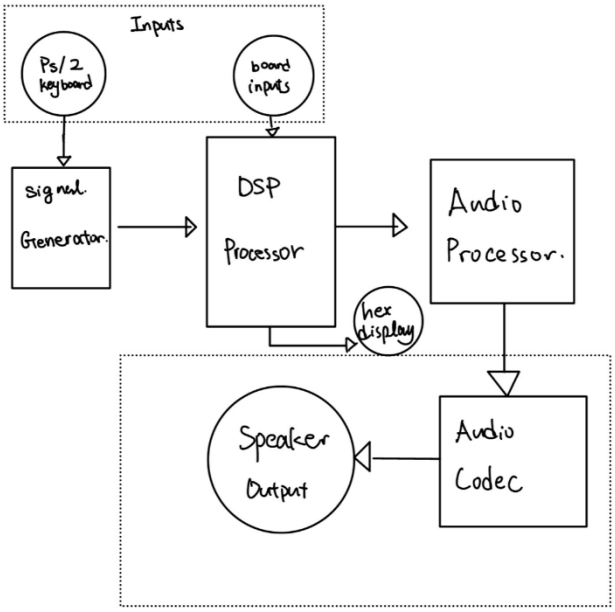

Figure 2 – The block diagram.

Weekly Schedule:

Week	Planned Action Items
Week 1	- Produce a simple sinusoidal waveform - Play the sinusoidal waveform over the speakers
Week 2	- Extend the signal generator to produce multiple waveforms (i.e. square, sawtooth) that can be selected using the switches - Add simple DSP effects such as a low-pass filter and envelope to shape the waveform; will be controlled via the switches and keys - Design a simple user interface that allows the user to select which parameter to change - Receive input from the PS/2 keyboard to produce specific musical notes
Week 3	- Add additional DSP effects as time permits (i.e. echo, reverb) - If time permits, produce a simple oscilloscope on the VGA monitor - Complete unfinished items & debug

Work Division:

Week	Matthew's Tasks	Shawn's Tasks
Week 1	- Design a simple signal generator (to produce sinusoidal waveform) - Prepare the waveform for playback on the speakers	- Map keys to specific frequencies - Setup audio codec output, research audio playback
Week 2	- Extend the signal generator (sawtooth, square waves) - Basic user interface design	- DSP Effects (Filters, envelopes) - Setup PS/2 keyboard input
Week 3	- Add additional DSP effects (time permitting) - Complete unfinished items, debug	- Basic oscilloscope on VGA monitor (time permitting) - Complete unfinished items, debug