Nathan Tung
Mark Iskandar

EE M116L
Design Lab Proposal: Portable Keyboard

Description: Our idea is to create a very simple keyboard-like device using the FPGA board and the 8Ω speakers* on the ProtoBoard. Given 8 switches, we are able to produce notes like C, D, E, F, G, A, B, C, with the Cs in adjacent octaves. Pushbuttons on the side can allow us to switch between perhaps 2 or 3 different octaves, and therefore 2 or 3 different sets of those 8 notes.

A key between different octaves can be obtained by halving or doubling said frequency. If our device starts at "middle C," or C4, the speaker needs to receive a frequency of approximately 262 Hz, and the next octave's C is C5 at a frequency of about 523 Hz. Similarly, A4 is 440 Hz and A5 is 880 Hz.

Functionality:

- 8 FPGA board switches, of which only one can be high at a time, will send a frequency to the ProtoBoard speakers to produce a valid musical node
- Pushbuttons on the FPGA board allow us to toggle between several different octaves such that the speaker can produce both high notes and low notes
- If time allows, perhaps our device can contain manually-programmed samples of pre-recorded songs for the user to listen to for practice

**This project proposal is based on the premise that the ProtoBoard speakers can produce sound at varying specified frequencies.*