6.111 Project: Digital Tuner

Roshni Cooper, Linda Fang
Introduction

• Three modules
  – Record
    • Records a tone from the microphone
  – Playback
    • Plays back the last recorded tone
    • Determines the frequency, note number, and music staff position
  – Playtone
    • Plays back a pre-recorded sample of a tone defined by the user, in one of three ways:
      – Switches
      – Mouse
      – Keyboard

• Cool because
  – Music is cool
  – Being in tune is cool.
Block Diagram: Linda
Important Designs

- Fourier Transform
  - Using the Xilinx Fast Fourier Transform
  - Calls for the last recorded tone
  - Finds the frequency of the tone
    - Used to determine the pitch of the note

- Additions
  - Simultaneous notes (chords)
  - Strings of notes
  - Tempo
  - User input: note they want, so we can filter out other noise

- Video
  - Displays:
    - Music staff
    - Mouse cursor for mouse inputs
  - Outputs:
    - Music note on the staff
    - Note number
    - Frequency of the tone
  - Used for playback and playtone
Testing and Debugging

• Tones
  – Simulations
    • Testing if the Fourier Transfers are working properly
  – Matlab
    • Using Matlab generated pure tones, see if the output actually corresponds to the input
  – Logic Analyzer
    • Using the logic analyzer to look at the output and see if we’re getting the right output

• Video
  – Simulation
    • Playing around with it
  – Mouse input testing
    • Using Matlab to verify
  – Logic Analyzer
    • Using the logic analyzer to test that the video output corresponds to the note that is being played
Conclusion

• We should have a user-friendly tuner that helps users test their instruments for notes ranging from 27.5Hz to 4.186kHz.
  – It will determine frequencies of inputted tones (and play them back so you can hear yourself).
  – It will playback user selected tones so you can hear what you’re supposed to sound like.
• Any Questions?