Musical Feet: Checklist

Rajeev Nayak and Harley Zhang

• Tempo generator and pedometer input modules
  o These modules process the input signal from the input and convert it to a tempo_period value
  o Can be tested by using Labkit switches/buttons as inputs and viewing output on hex display
  o Estimated date of completion: Tuesday, 11/18

• Tonality generator module
  o This module uses the output of the tempo generator to produce a single-bit tonality signal
  o Can be tested by using Labkit switches as inputs and viewing output and state on hex display
  o Estimated date of completion: Tuesday, 11/18

• Beat generator module
  o This module converts the tempo_period into an appropriate single-cycle enable signal
  o Can be tested by using Labkit switches as inputs and viewing output through LED
  o If time permits, the beat generator can be modified to produce an enable signal that asserts every half tempo_period
  o Estimated date of completion: Tuesday, 11/18

• Chord generator and note generator modules
  o These modules produce a set of four notes for a string quartet based on the tonality
  o Chord generator can be tested by using Labkit switch as tonality input and viewing the FSM state on the hex display
  o Note generator can be tested by using switches for the chord input and viewing the note values on the hex display
  o Estimated date of completion: Saturday, 11/22

• Random number generator module
  o This module produces pseudo-random numbers
  o Can be tested by displaying output on hex display
  o Estimated date of completion: Wednesday, 11/19

• Audio synthesis modules
  o These modules produce the electrical signals corresponding to the instruments’ sound waveforms
The BRAMs store the sound samples and the oscillators use the BRAMs to generate the given input pitches.

The envelope generators change the amplitude of the samples and pass them into the mixer, which outputs them into the AC97 to be converted into an analog output signal.

The oscillators and BRAMs can be tested by using the Labkit’s switches as inputs to the oscillator and displaying the BRAM output through the logic analyzer.

The envelope generator can be tested by feeding in a flat-level voltage or sine wave and sending the output to the AC97 to be viewed on an oscilloscope.

If time permits, the tempo_period can be sent to the envelope generator to control the output volume.

Estimated date of completion: Tuesday, 11/25

**Video output modules**
- These modules produce video output that shows either the music information (tempo, tonality, chord) or a visualization of the input footsteps.
- Can be tested by feeding it inputs through switches on the Labkit.
- If time permits, the visualization effects can be made more complex (gradually varying colors, random ripples, etc.).
- Estimated date of completion: Saturday, 11/22

**Complete system**
- The final product will improvise music played by a string quartet based on the speed of the footsteps.
- As the speed of the footsteps increases or decreases rapidly, the music will be minor; otherwise, it will be major.
- Visualizations will show either the status of the music or display a pattern whenever a footstep is taken.
- Estimated date of completion: Saturday, 12/6