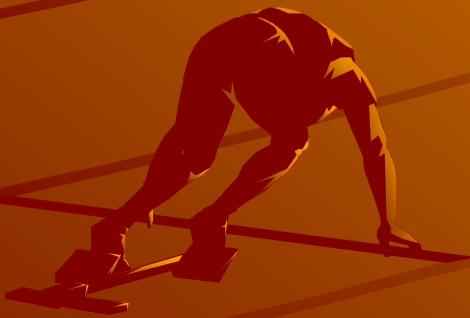


Musical Feet:

A Step-by-Step Approach to
Music Generation



Rajeev Nayak
Harley Zhang

Overview

- ✦ Input to the system is the user's footstep, measured by a pedometer
- ✦ Generates music based on footstep speed and previous history
- ✦ Video output has two modes:
Visualization and Music Info



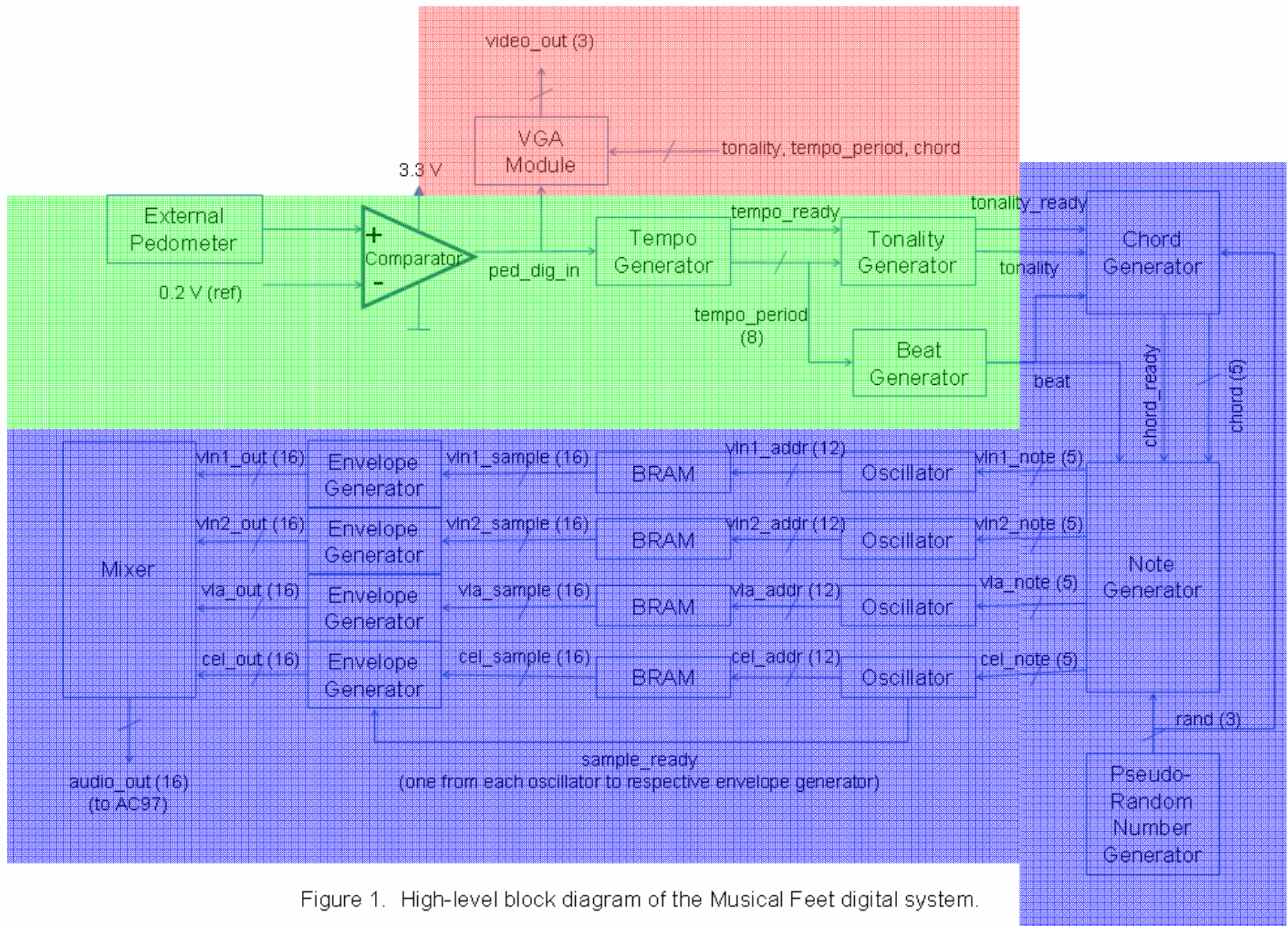


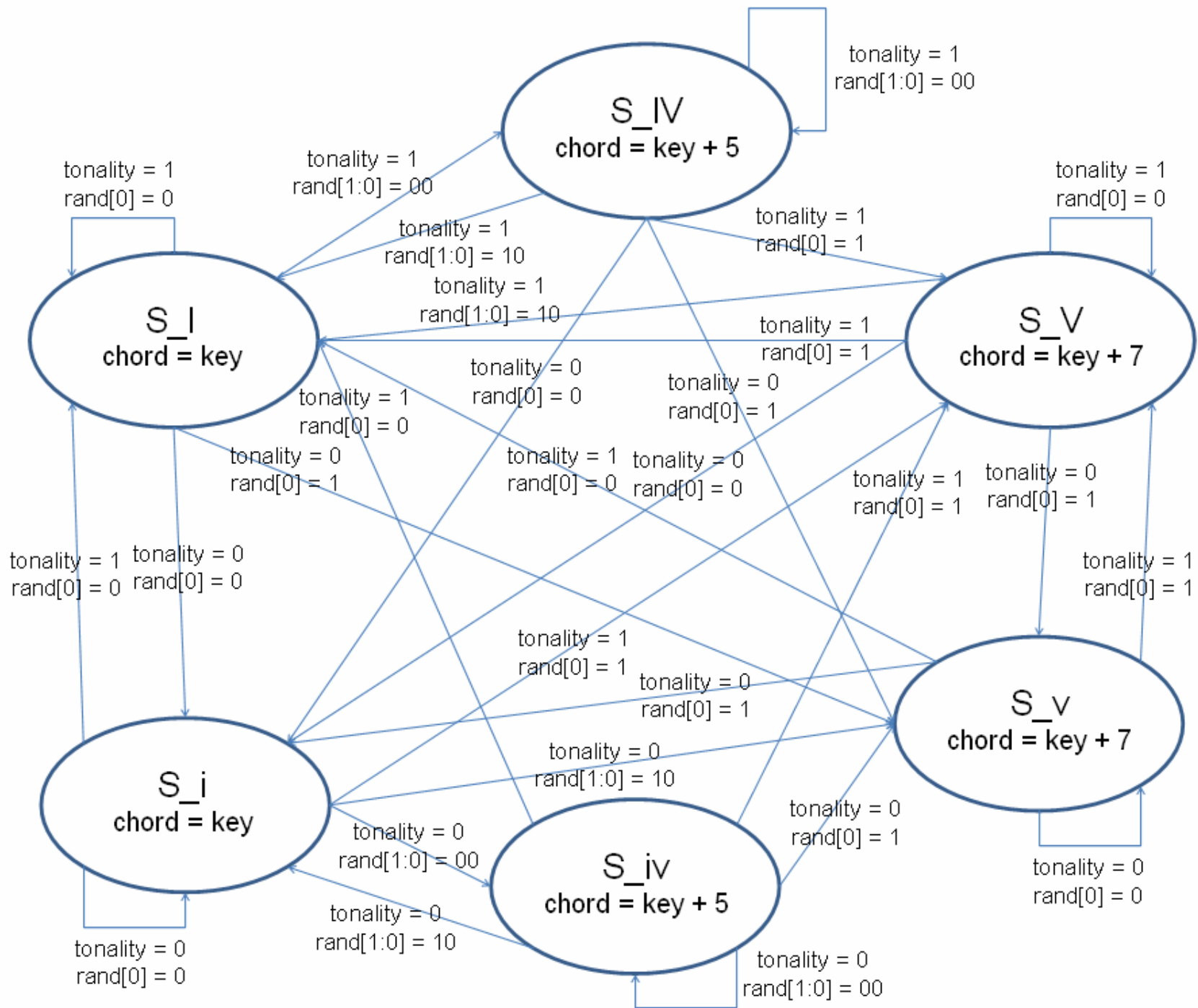
Figure 1. High-level block diagram of the Musical Feet digital system.

Input Modules

- ◆ Pedometer's analog output is converted to a one-bit digital signal
- ◆ Tempo generator module stores intervals between successive steps and produces a weighted average tempo
- ◆ Tonality generator module stores tempos and uses their history to produce a one-bit tonality signal
- ◆ Beat generator module produces a single-cycle enable signal

Audio Output Modules

- ◆ Chord generator FSM decides on next chord based on current chord, key, and tonality
- ◆ Note generator decides on next note for each instrument based on previous notes and current chord
- ◆ Random number generator introduces some randomness in these decisions
- ◆ Generators update at every beat assertion



Audio Output Modules (cont'd)

- ◆ String instrument samples will be stored in 4 different BRAMs
- ◆ Given a note, oscillators will access the samples at a certain rate, producing a pitch
- ◆ Envelope generators will modify the sample amplitude
- ◆ Mixer combines the 4 instrument signals and sends them to the AC97

Video Output Modules

- ✦ Switch will control modes
- ✦ Music Info mode displays the system's current tempo, chord, and tonality
- ✦ Visualization mode shows a pattern of ripples, with a new ripple for each footstep

Timeline - November

SUN	MON	TUE	WED	THU	FRI	SAT
9	10	11	12	13	14	15
			Design Presentation			
16	17	18	19	20	21	22
Chord Generator and Random Number Generator			Note Generator			
Input Modules			Video Output Modules			
23	24	25	26	27	28	29
Mixer and Envelope Generators		Leftovers				
Oscillators and BRAMs						
30						

Timeline - December

SUN	MON	TUE	WED	THU	FRI	SAT
	1	2	3	4	5	6
Put everything together, fix bugs, add final touches, expand on video output if possible						
7	8	9	10	11	12	13
Final Project Checkoff						

