SNGH: it’s Not your grandma’s Guitar Hero…

Ruth Shewmon
Rhys Hiltner
Project Overview

AC97 Audio

noise

signal

Rhys

Ruth

game

current chord

response to input

FFT debug

score

next chord
harmonic_processor

peak_detector

fft_handler

ruth_conveniencer

debug_screen

AC97

ADV7125

game_ctrl

find_chords

find_notes

gamescreen

xvga

Switch[1:0]

r,g,b, hsync vsync, blank

r,g,b, hsync vsync, blank

ready fingers, name time, failure success

draw_circle
draw_tab
draw_timer
draw_debug
write_text

notes poss_chord

chord_id

chord_req

note

peaks

harmonic

processor

FFT

ruth

conveniencer

debug

screen

AC97

ADV7125

Switch[1:0]
FFT Handler

fft_handler:

1. Loop back audio
2. Buffer incoming audio
3. Window data
4. Feed and water FFT
5. Provide freq-space data
Find Peaks

**peak_detector:**

1. Find local maxima
2. Throw away small peaks
3. Provide first 64 peaks

Variables:
- `peak_index`
- `bin_index`
- `bin_power`
- `new_fft`
- `peaks_ready`
- `peak_addr`
- `peaks_ready`
- `new_fft`
- `rc_addr`
- `rc_peak`
Find Harmonics

harmonic_processor:
1. Find peaks’ multiples
2. Group peaks into fundamentals and harmonics
3. Provide first 8 fundamentals

peak_index: 14
peak_power: 8
peak_addr: 6
new_peaks: 1

fund_index: 14
fund_power: 8
fund_addr: 3
new_funds: 1

rc_addr: 10
rc_fund: 1
rc_harm: 1
Graphical Debug Display

ruth_conveniencer:
1. Convenience Ruth
2. Give FFT data to debug screen
3. Flag peaks, fundamentals, and harmonics for coloring

rc_peakinfo
rc_ready
rc_addr 10
rc_power 8
new_fft 1
new_funds 1
rc_peak 1
rc_fund 1
rc_harm 1
rc_addr 10
rc_power 8
fft debug
find_notes:
1. sort into bins
2. > 6 notes?
3. timespace filter
4. cycle notes

find_chords:
1. consult LUT
2. find wrong string
Game Controller

- Internal timer controls game flow
- Stores chord sequences
- Verifies chords
- Generates fingerings and names for game display
- Keeps score
Game Screen

gamescreen
- draw_circle
- draw_tab
- draw_timer
- draw_debug
- write_text

ready
fingers, name
time, failure
success

current
chord

response
To input

FFT debug

score

next chord
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- **Timeline**
- **11-12-13-14-15-16-17**: Working FFT and debug screen
- **18-19-20-21**: Game logic and peak detection
- **22-23-24**: Eat turkey
- **25-26-27-28**: Game screen
- **29-30-1**: Time domain and chords
- **2-3-4-5-6-7-8**: Panic
- **9-10-11-12**: Piña coladas
- **17-16-15-14-13-12-11**: Harmonic and fundamental detection
- **5-6-7-8**: Sleep