Computer Music Projects

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www.softsynth.com
www.portaudio.com
www.transjam.com
www.mobileer.com
Overview

- Z80/C64 – electronic hacks
- HMSL in Forth on Mac, Amiga
- 3DO – video game console
- JSyn for web synthesis
- TransJam for web collaboration
- PortAudio for cross platform 'C' apps
- ME2000 ringtone synthesizer
- HD/XMP – next generation MIDI
Z80/C64

- home-made synth in shoe box
- Z80 with custom digital oscillator
- written in Hex machine language
  - 82 C3 17 92
  - 1 KB RAM
  - cassette tape for program storage
Shoebox Synth
HMSL

- Hierarchical Music Specification Language
- with Larry Polansky, David Rosenboom
- Mills College Center for Contemporary Music 1983-1992
- compiler and music toolbox in Forth
- for Mac and Amiga with 68000
- MIDI, Amiga sound & 56000 DSP
- “computer musicians” were programmers
HMSL Concepts

- “music” tools with no bias towards any musical style
- only required parameter is time
- notes, scales, measures etc optional
- Parallel and Sequential Collection objects
- stochastic tools, Markov chains, GUI
- 1-3 MB RAM, 0-80 MB hard drive
HMSL Shape Editor

Shape Editor

Set Mode
- Insert
- Delete
- Replace
- Select
- Rubber
- Draw
- Set Y
- Random

Select Shape
- SHAPE-1

Cut
- Copy
- Paste
- *A/B+C
- -C*B/A
- Up 1
- Down 1
- Reverse
- Invert
- Scramble
- Zoom
- UnZoom
- <= Pan
- Pan =>
- Custom

A  B  C
2  1  0

All/1  Track
3DO Game Console

- First video game console with a software synthesizer, not HW - 1993.
- Modules, unit generators, ran on DSP.
- Wind sound using noise and filter.
- Sample playback using DMA channels.
- 25 Mz 32-bit ARM, semi-custom DSP
- 3 MB RAM, CD-ROM
- Cagent - RISC style DSP
JSyn

- modular synthesizer for Java
- first implementation used native plugins
- current implementation is pure Java
- for web-based music experiments
- Wire for patch creation
- oscillators, filters, envelopes, waveshapers
- many online apps using JSyn
- download from www.softsynth.com/jsyn
Wire
Transjam Collaboration Server

- similar to a game server
- pass state between performers
- www.transjam.com
WebDrum (multi-user)
PortAudio

• with Ross Bencina and others
• cross-platform 'C' API for audio I/O
• hides OS audio SDK madness
• `Pa_OpenStream( ..., numChannels, sampleRate, callback, ... )`
• `Pa_StartStream()`
• fill audio buffers in your callback function
• used by, PD, CSound, Audacity, etc
ME2000

- MIDI synthesizer in 'C' for ringtones, toys
- polyphonic General MIDI synth
- had to run on <100MHz ARMs with no FPU
- fixed-point math instead of floats
- no memory alloc, no system calls, all math
- samples for violin, piano, clarinet
- synth for organ, pads, some percussion
- used in Palm Treo, etc. (pHMSL)
HD XMP

- HD (is not) MIDI, in testing phase
- 64 or 128 bit packets
- 32-bit controls, more opcodes
- direct pitch control, articulation
- per-note controllers, ramps
- lots more channels, groups
- sessions, timestamps, query/response
- first transport is UDP with auto-discovery