



Space Palette

A New Interface
For Instruments

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A history of UIs for performance and installations

- 12-foot Lyre controlled by dance pads
- Antique radio controlled by one knob
- 11-foot Monolith, 100 buttons, 32 pads, 4 multitouch pads
- Controller with 32 sliders, 96 buttons, 3 multitouch pads
- Wireless QWERTY keyboard and dance pads
- Steering wheel game controllers
- Wood-cased MIDI controller with multitouch and LCD
- Handheld camera/number-pad/LCD instrument

A history of UIs for performance and installations



Recent Focus

- 3D continuous input with hands
- Third dimension can be:
 - Pressure (Continuum, Eigenharp, Linnstrument, etc)
 - Area (Fingerworks, Magic Trackpad)
 - Depth (Kinect)
- Casual instruments
 - Walk up, play, sound good
 - Control over individual notes
 - Players recognize that they're the ones controlling it

Kinect !

- Inexpensive and ubiquitous
- Good resolution and robustness
- Easy to use from C
- Tolerant of dust
- Intolerant of sunlight

Space Palette



Features

- Holes in a frame become 3D multitouch surfaces
- Any number of hands or objects, simultaneously
- Flexible layout allows many control possibilities
- Provides frame of reference for player and audience
- Larger visual footprint is more interesting to audience
- Immediately playable, no initial dexterity required
- Larger and less-restricted motion by player is relaxing and expressive

Movies

[Lightning in a Bottle 2011](#)

[Burning Man 2011](#)

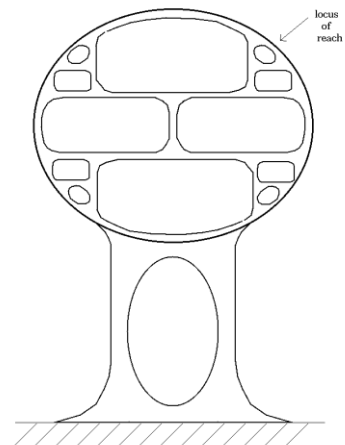
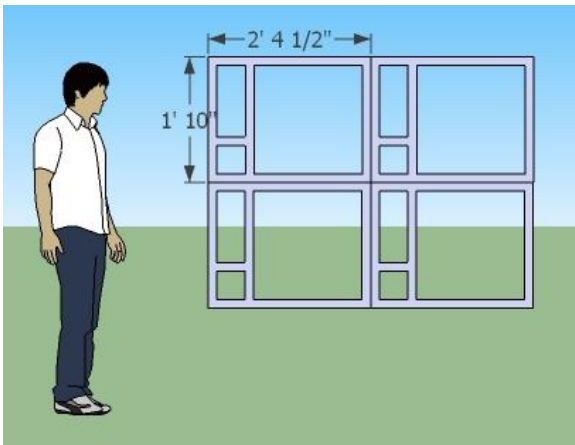
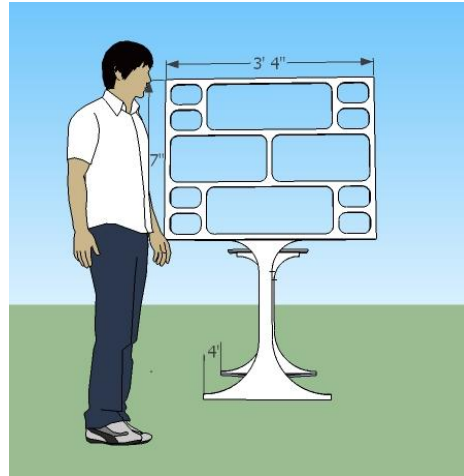
[SF Decompression 2011](#)

[LoopFest 2011](#)

Evolution

- Initial prototype: 4 panes
- Sweet spot: 7 panes, 4 buttons
- A little more control: 7 panes, 8 buttons
- Lightning in a Bottle
- West Coast Controller Battle
 - Tennis Ball !
- Simultaneous graphics using Processing (Java)
- Burning Man 2011
 - Multi Multi Touch Touch theme camp
- MusicTech Summit, Venice Art Crawl, Decompression, etc

Variations



MultiMultiTouchTouch (MMTT)

- C++ program uses libfreenect to talk to Kinect
- Uses depth image only
- Blob detection using OpenCV
- Trainable interactively on new frames, holes of any shape
- Trainable without a frame, using a specially-colored image
- Browser interface to control it, using JSON over HTTP
- Output is TUIO (a standard multitouch format) over OSC (a standard UDP protocol)
- Windows-only, freely available:
<http://multimultitouch.com/dist>

Controlling the Music

- Each large hole plays a different sound
- Horizontal position is pitch
 - All notes forced onto a particular scale and key
 - Typically two octaves across
- Vertical position controls timing quantization - “time frets”
 - Three bands: one beat, half-beat, quarter-beat
- Depth position:
 - Converted to MIDI aftertouch
 - Typically used for vibrato, filtering, and mixing
- Small holes are buttons to change key, scale, sounds, looping

Controlling the Graphics

- Each large hole is an independent 3D drawing surface
- Each hole's drawing has independent shape/color/motion
- Depth controls the size of graphics
- Small holes are buttons to change color, shape, motion

Software

- MMTT (MultiMultiTouchTouch)
- KeyKit (interpreted MIDI programming language)
 - Receives OSC, implements multitrack MIDI looper
- Plogue Bidule (VST host)
 - Receives MIDI, outputs audio
- Soft synthesizers:
 - Omnisphere, Battery 3, FM8, Massive
- Processing (Java)
 - Receives OSC, instantiates sprites, uses OpenGL
- Python-based and browser-based GUIs
 - Talks JSON to control parameters

Discussion

- Applications?
- Variations?
- Other Ideas?



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