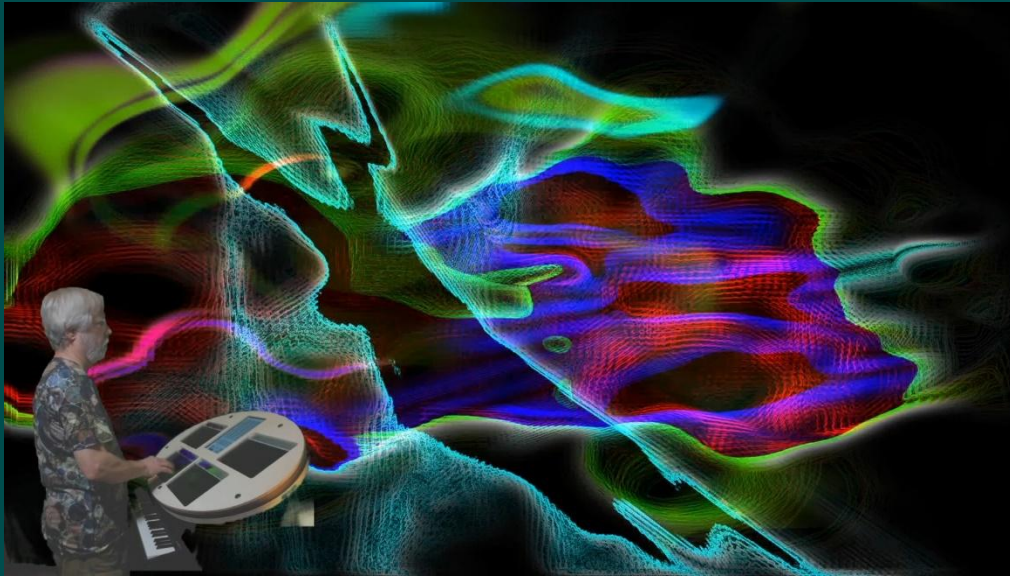


# Space Palette

A Visual Music Instrument



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# Outline

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- Casual versus Performance Instruments
- Interactive Art and 3D Sensors
- Space Palette Classic
- Space Palette Pro

# Casual versus Performance Instruments

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- Casual Instruments
  - Simple, discoverable with few or no instructions
  - Immediate gratification, fun, and pleasing results
  - Direct control is obvious to the player
  - Each person sounds different and can be uniquely creative
  - Ideally has potential for deep exploration
- Performance Instruments
  - More complex control mechanisms requiring instructions
  - Proficiency may require practice

# Physical Interface Goals

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- A single physical interface can serve for both casual and performing
- Differences between the two types:
  - interface semantics, how they react to input
  - GUI display
- Instrument type can be changed on the fly

# Physical Interfaces in Interactive Art

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Burning Man 2003

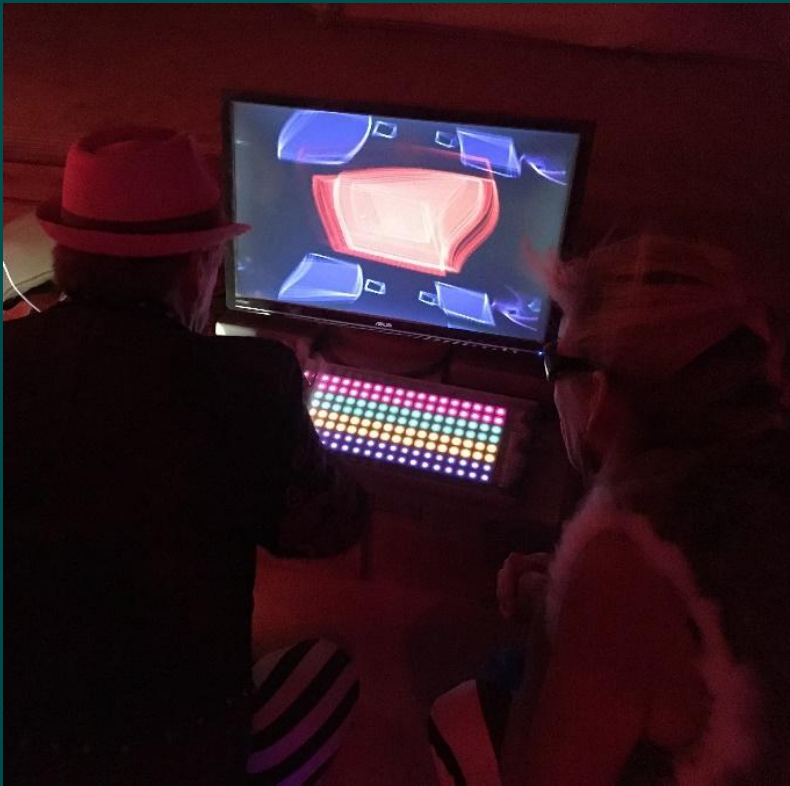
# Physical Interfaces in Interactive Art



Burning Man 2009

# Unilooper – A Visual Music instrument

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- LinnStrument for input
- 4-track MIDI looper
- Loops trigger visual shapes
- Implemented with KeyKit
- Looping Festival in 2015
- Burning Man in 2016

[Movie](#)

# My introduction to 3D input devices

- Fingerworks touchpads (early 2000's)
- Capacitive multitouch with finger area detection
- Extremely responsive, excellent driver support





# 3D Input in Physical Interfaces

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- Fingerworks pads showed the expressive potential
- Physical interface providing a third dimension can be:
  - Slider or scroll wheel
  - Pressure (Wacom, Continuum, Eigenharp, Linnstrument, etc)
  - Area (Fingerworks, Magic Trackpad, iPad)
  - Vibration, Orientation, Acceleration (smartphones, joysticks)
  - Spatial (Kinect, Leap Motion, Senz3D)
- 3D input provides natural and expressive input
  - Music: third dimension is useful for vibrato and filters
  - Graphics: very natural for position and size control

# 3D Input Sensors I've explored

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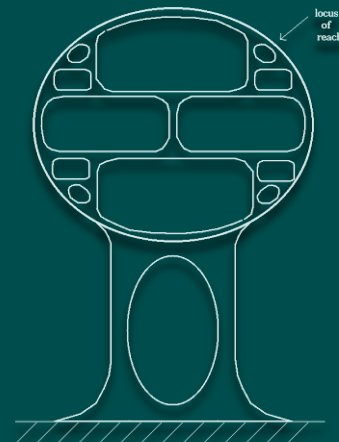
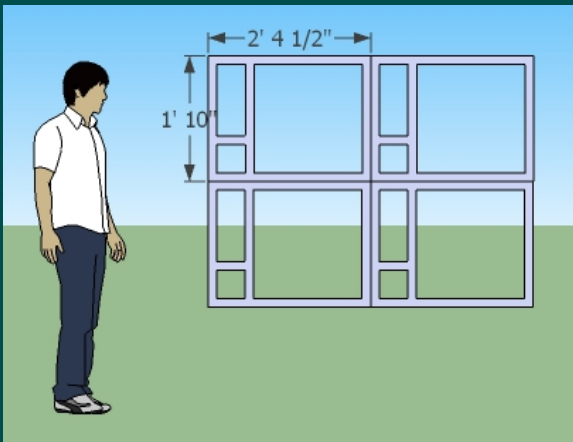
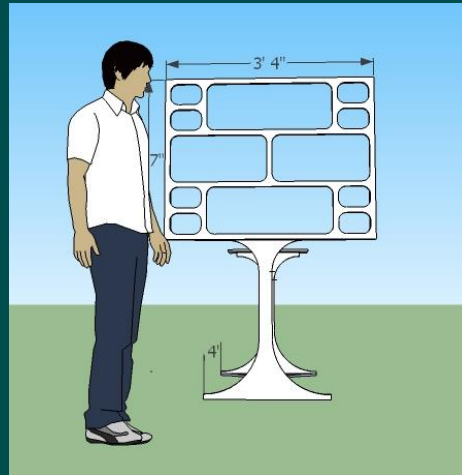
- Fingerworks iGesture pad
  - Finger area is the third dimension
- Microsoft Kinect
  - Breakthrough consumer product, structured light
- Leap Motion
  - Mind-blowing resolution [Movie](#)
- Creative / Intel / Senz3D / RealSense
  - Shorter range than Kinect, Time-Of-Flight
- Microsoft Kinect 2
  - Higher-resolution, Time-Of-Flight
- Sensel Morph
  - Multitouch and Pressure-sensitive

# 3D Input Device – Microsoft Kinect

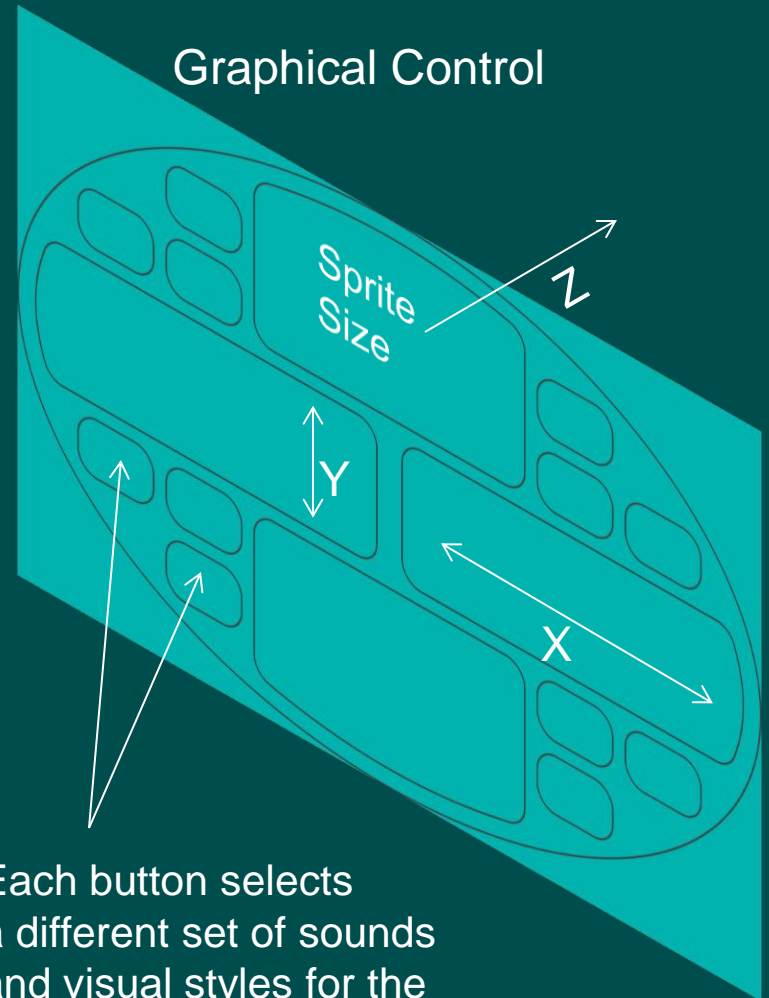
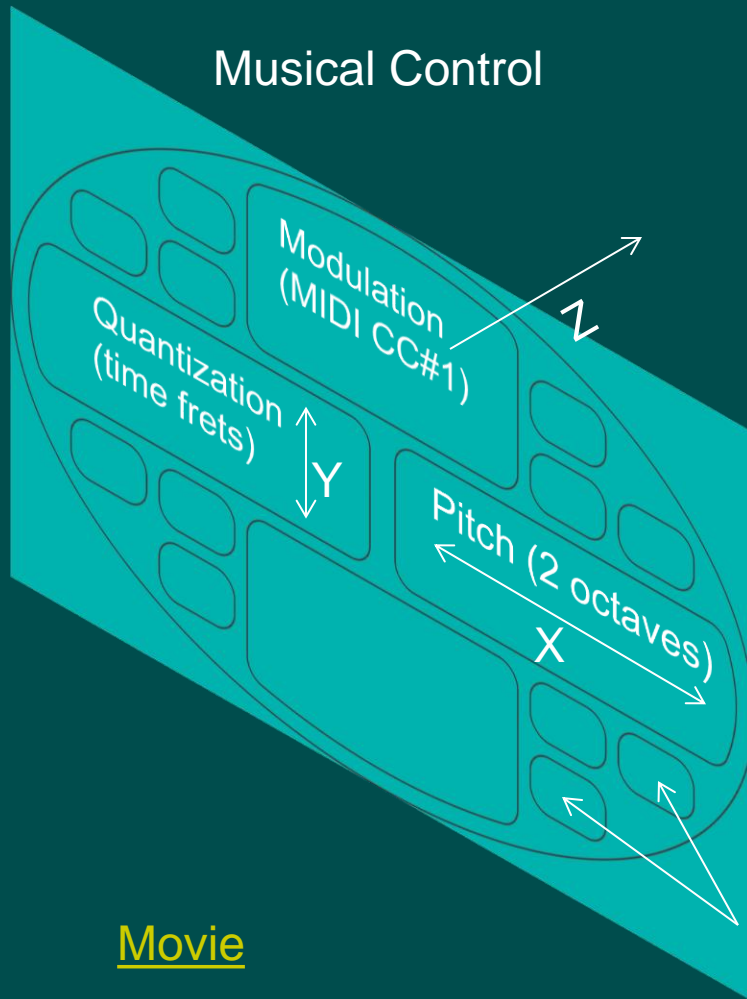
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- Fastest-selling consumer electronics device ever
- Inexpensive and ubiquitous
- Good resolution and robustness
- Easy to access from custom software
- Can be used as a 3D scanner
- Tolerant of dust, intolerant of sunlight

# Space Palette Prototypes using the Kinect



# Space Palette Interface



Each button selects a different set of sounds and visual styles for the four big holes

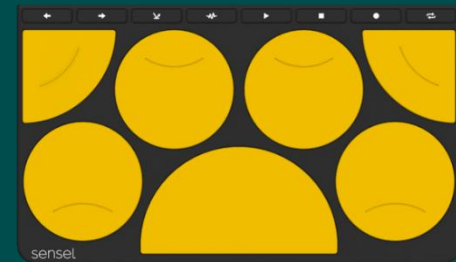
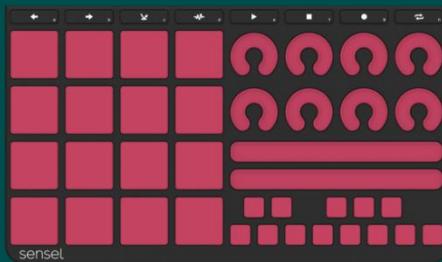
[Movie](#)

# Space Palette - Festival Appearances



# Sensel Morph - a dream come true for 3D input

- 20,000 force-sensing resistors, detects 5g to 5kg
- Raw data is easily obtained
- Overlays for different control layouts



- Magnets in overlays allow detection and swapping
- No overlay == blank canvas

# Space Palette Pro

- Differences from Space Palette:
  - Sensel Morphs and a touchscreen
  - Pressure rather than depth
  - Five 3D cursors per hand
  - Separate visual layers, greater variety



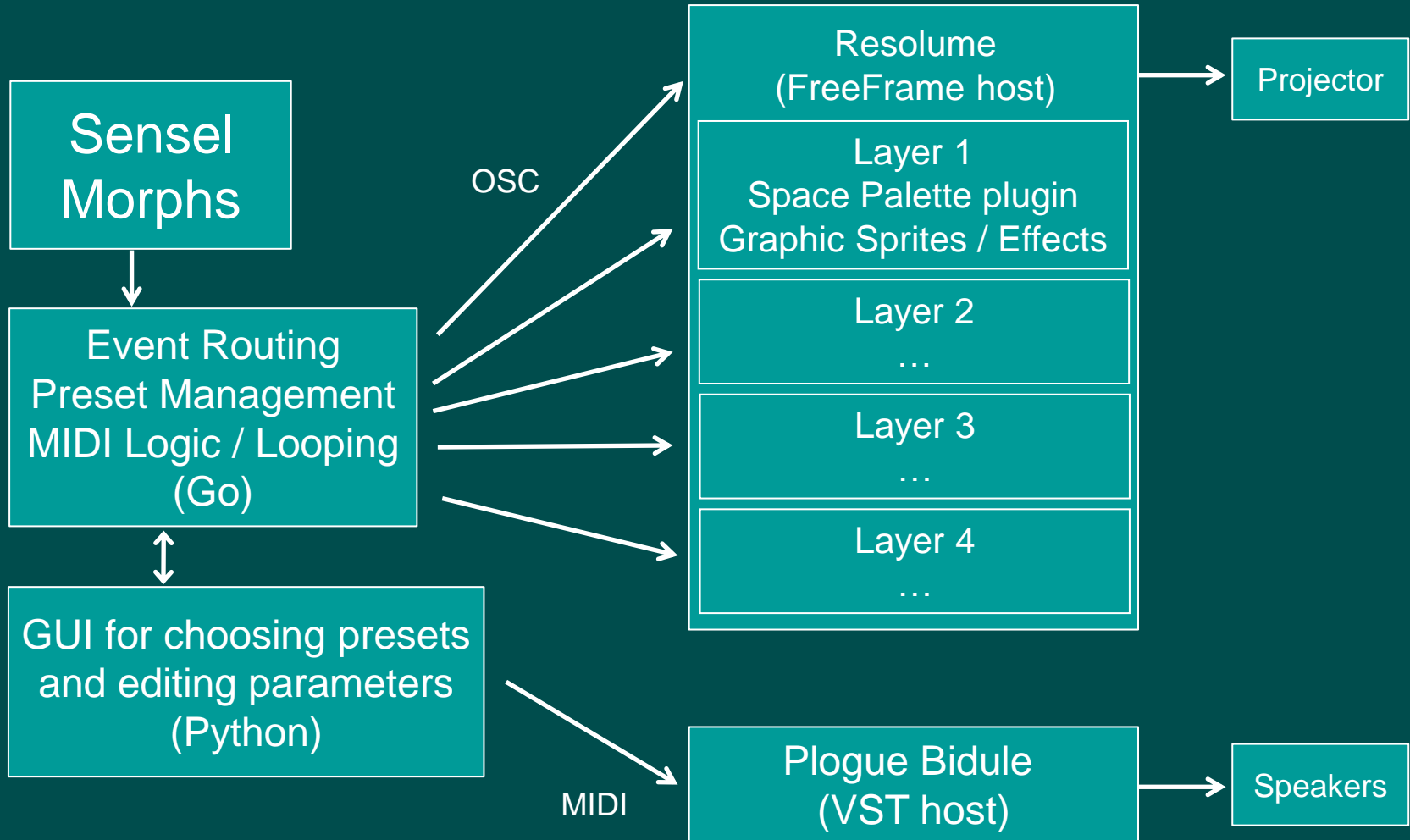


# Space Palette Pro - Overview

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- Each of the 4 Morphs has independent control of:
  - Gesture looping; gestures generate both MIDI and graphics
  - Visual effects applied to graphics within Resolume
  - Sounds (Omnisphere 2)
- Python-based GUI for preset selection and editing
- Go-based router
  - Handles all input - TUIO, MIDI, APIs
  - Generates MIDI output
  - Realtime looping of gestures
  - APIs for parameter and preset control (used by GUI)

# Space Palette Pro - Design



# Space Palette Pro - GUI

## Casual

**Presets**

All Drums	Basic Chaos	Bellsy Bells	Bold Strokes
Complex Kaleid	Deep Triangles	Dream Puddles	Drifting Borders
Dusty Pools	Edgy Kaleid	Endless Colors	Explosive Shapes
Full Bodied	Ghost Puddles	Line Dance	Organic Growth
Perky Trails	Plucky Stuff	Shape Shards	Simple Organism:
Smooth Breathing	Smooth Dust	Spiro Graphical	Too Square

**Actions**

Looping OFF	Length 8 Beats	Fast Fade	Clear Loops
Default Scale			Reset All

## Performing

Space Palette Pro

Monitor  MidiScale  Midipassthru  Midisplit

Preset: < 000\_Guitars > Save Send

Effects: < Smooth\_Dust >

Chan: 1 Port: >

ANO Slower Faster Reset

Transpose: Next Prev Reset

Clear All Fade All Loop All Loop Non


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**AreaA**

S: Smooth\_Dust\_1 Edit  
V: Smooth\_Dust\_1 Edit

L: Record Play Fade Clr

Leng: 4b Fade: Fast Rpts: Inf

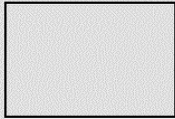


**AreaD**

S: Smooth\_Dust\_4 Edit  
V: Smooth\_Dust\_4 Edit

L: Record Play Fade Clr

Leng: 4b Fade: Fast Rpts: Inf




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**AreaB**

S: Smooth\_Dust\_2 Edit  
V: Smooth\_Dust\_2 Edit

L: Record Play Fade Clr

Leng: 4b Fade: Fast Rpts: Inf




**AreaC**

S: Smooth\_Dust\_3 Edit  
V: Smooth\_Dust\_3 Edit

L: Record Play Fade Clr

Leng: 4b Fade: Fast Rpts: Inf



# Space Palette Pro – Performing GUI (take 3)

**Preset**

African Borders	African Modern	Amoebic Drips	Amoebic Growth
Another Kaleidoscope	AquaBell Elevations	Basic Shapes	Bending SpaceTime
Blobby Borders	Blobby Pop	Blurry Kaleidoscope	BubblesOf Bliss
Burn Barrels	Candied Blobs	Circular SpiderWebs	Cloud Flowers
Cloudy Circles	Dirty Virus	Drum Fragments	Fireful Foursome
Floating GuitarSquares	FourSided Flowers	Fractured Squares	Glowing Lava
Guitar Flowers	Horizontal Percussion	Kaleidic Space	Lava Blobs
Mirrored Mania	Pastel Lozenges	Percussive Purple	Ruptured Terrain
Scatalogical Chaos	SeaOf SodaStraws	Simply Circles	Smooth Fractures
Softest Circles	Synth Blobs	Synth Symphony	Traffic Jam
Trembling	Universe	Voracious	WhiteBorders

**Perform**

Looping is OFF  
  Loop Length  
  Loop Fade  
  Loop  
  Transpose  

Fret Quantize  
  Pressure  
  Newage Scale  
  Tempo  

\*

**Preset** Snapshot Sound **Visual** Effect Sliders

**Save**

alphafinal	0.000	<< < . . > >>
alphainitial	1.000	<< < . . > >>
alphatime	2.289	<< < . . > >>
aspect	1.000	<< < . . > >>
bounce	false	<< < . . > >>
cursorsprites	true	<< < . . > >>
filled	true	<< < . . > >>
huefillfinal	0.000	<< < . . > >>
huefillinitial	288.000	<< < . . > >>
huefilltime	5.000	<< < . . > >>
huefinal	252.000	<< < . . > >>
hueinitial	252.000	<< < . . > >>
huetime	2.003	<< < . . > >>
lifetime	6.000	<< < . . > >>
luminance	0.500	<< < . . > >>

**Perform** Main Sliders1 Sliders2 Sliders3

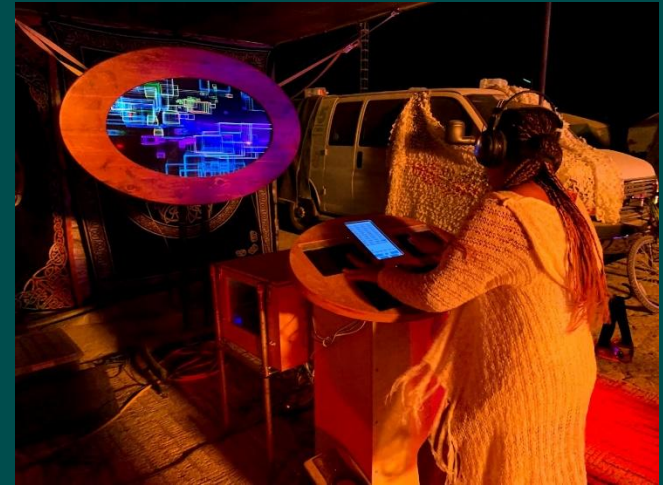
Looping is OFF  
  Loop Length  
  Loop Fade  
  Loop  
  Transpose  

Fret Quantize  
  Pressure  
  Newage Scale  
  Tempo  

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# Space Palette Pro - Burning Man 2019

- Photon Salon



- PlayAlchemist Grand Pyramid



[Movie](#)

# As a Performance Instrument

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Performance at Indexical in Santa Cruz

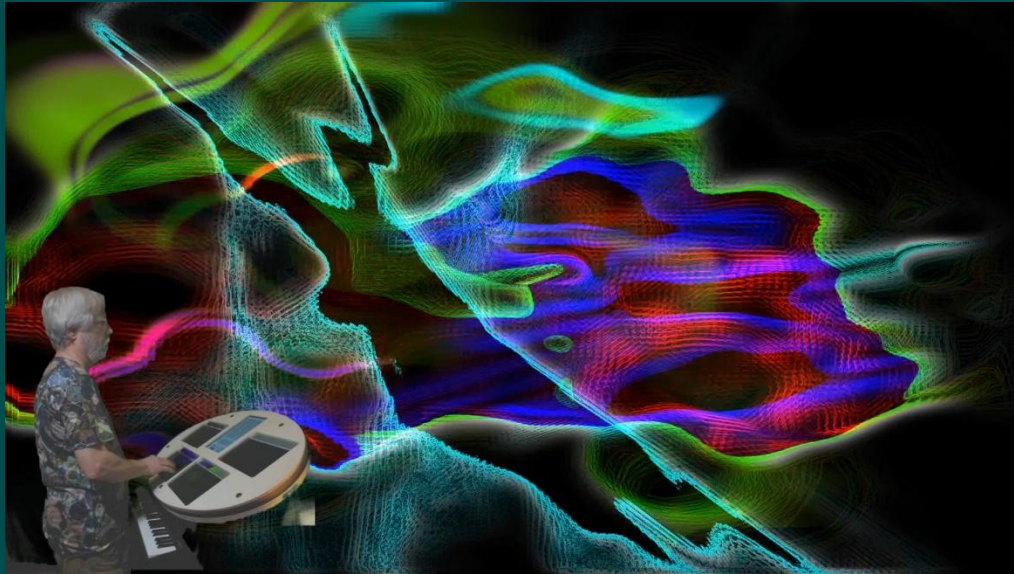
# Future Possibilities

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- More interesting finger painting behaviour
  - Two-handed control
  - Different pressure semantics
- More interesting musical behavior
  - Phrases rather than notes
  - Scanning sequences
- Interactive Shader Format
- Recording and uploading to YouTube

# Space Palette

A Visual Music Instrument



These slides can be found at [timthompson.com/talks](https://timthompson.com/talks)

Tim Thompson <https://timthompson.com> [me@timthompson.com](mailto:me@timthompson.com)