

# **Modality**

## **modal control in SuperCollider**

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Marije Baalman, Till Bovermann, Miguel Negrão

## The beginning

- » What is Modality?
- » Process and work approach

The concept

Workshop

The end

# The beginning

# What is Modality?

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The beginning  
» What is Modality?  
» Process and work approach

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- a loose collaboration between a couple of SuperCollider developers and users
- goal is to create a toolkit to make it easy to hook up controllers to sound in SuperCollider
- do complicated mapping
- change mappings on the fly, while playing the instrument (modal control)

# What is Modality?

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- goal is to create a toolkit to make it easy to hook up controllers to sound in SuperCollider
- do complicated mapping
- change mappings on the fly, while playing the instrument (modal control)

*First meeting between Jeff Carey, Bjørnar Habbestad, Alberto de Campo, Wouter Snoei and Marije Baalman in September/October 2010 in Bergen (BEK).*

*Second meeting at STEIM in May 2011 with Jeff Carey, Alberto de Campo, Marije Baalman, Till Bovermann, Miguel Negrão, Hannes Hölzl and Robert van Heumen.*

*Semi-regular email contact and chance meetings since then...*

# Process and work approach

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## *STEIM residency:*

- Presentation and discussion at SC-user meeting
- first three days presentations of each others work
- and a lot of discussion
- and brainstorming
- Then coding, coding, coding
- and brainstorming
- and playing a concert
- some more coding and discussion
- and creating some instruments for presentations.

*Bergen residency followed a similar scheme (but also involving walks on mountains)*

The beginning

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The concept

- » Concept
- » Realisation
- » What is the problem?
- » Issues in accessing devices
- » Device description index
- » Device description
- » Basic elements of device descriptions
- » Chain of events
- » A simple instrument

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# The concept

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- Support different devices that work with different protocols (MIDI, HID, OSC, Serial, etc)
- Provide a common interface to use these devices
- Provide a system to process the data from these devices
- Make real and virtual interfaces interchangeable (GUI for device, processed data for device, etc)

# Realisation

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- Support different devices that work with different protocols (MIDIMKtl, HIDMKtl)
- Provide a common interface to use these devices (MKtl)
- Provide a system to process the data from these devices (Dispatch or FRP approach)
- Templates for various devices
- Templates for various common ways of processing
- Same interface for MKtl and Dispatch

*We are actually slowly moving Dispatch out again in favour of FRP...*



# What is the problem?

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- Different protocols have different ways of transporting the data
- Different operating systems (well, Linux and OSX) provide data in different ways
- Semantics of different controllers

*A general solution is not so trivial.*

# Issues in accessing devices

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- HID: different subsystems in OSX and Linux:
  - ◆ causing elements to be numbered differently,
  - ◆ as well as scaling,
  - ◆ as well as names reported with slight variations.
- MIDI: device names are reported differently between OSX and Linux,
- real MIDI devices (not USB-MIDI) will not report their names, but simply be MIDI-ports.
- Similar issues are to be expected for OSC or SerialPort devices.

# Device description index

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```
IdentityDictionary[
\nanoKONTROL ->
(osx: ( device: "nanoKONTROL" ),
linux: ( device: "nanoKONTROL-nanoKONTROL MIDI 1" ),
protocol: \midi, file: "nanoKONTROL.desc.scd" ),
\GamePad -> ( type: \template, protocol: \hid,
file: "GamePad.desc.scd" ), // gamepad template
\Run_N_Drive ->
(osx: ( device: "Run'N' Drive" ),
linux: (device: "Thrustmaster Run\'N\' Drive" ),
protocol: \hid, file: "Run_N_Drive.desc.scd" ),
\manta ->
(inport: 1234, outport: 5678, protocol: \osc,
file: "Manta.desc.scd" )
]
```

# Device description

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```
// right hand side four labeled buttons
\bt_R_1, (type: \button, osx: (cookie: 2), linux: (slot: [1,304]),
        spec: \hidBut, mode: \push),
\bt_R_2, (type: \button, osx: (cookie: 3), linux: (slot: [1,305]),
        spec: \hidBut, mode: \push),

// joystick axes switches
\joy_L_X, (type: \joyAxis, osx: (cookie: 15, spec: \cent255inv),
linux: (slot: [3,0], spec: \cent1 ), mode: \center),
\joy_L_Y, (type: \joyAxis, osx: (cookie: 16, spec: \cent255 ),
linux: (slot: [3,1], spec: \cent1 ), mode: \center),
```

# Basic elements of device descriptions

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- Array of elements: name, event/dictionary with specifications.
- Whenever something is different between platforms, you put the platform specific stuff in a sub-dictionary containing the specifics. When the file is parsed, MKtl will check on which platform it is running, and handle things accordingly.
- Naming of elements are somewhat hierarchical, so they are easy to sort out using pattern-matching
- Since it's SC code you can also programmatically fill in the description...

# Basic elements of device descriptions

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- Array of elements: name, event/dictionary with specifications.
- Element specification contains:
  - ◆ the element in the controller (cookies, slots, midichannels and control numbers, notes, etc.)
  - ◆ a ControlSpec (by name). Some of these are defined in MKtl, but you can also define custom ones inside the device description file (it's just SC-code!).
  - ◆ types: we've tried to classify a number of typical controls (joyAxis, button, slider, encoder, etc).
  - ◆ modes: we've tried to classify a number of typical behaviours of controls (push vs. switch, center, ..)

# Chain of events

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The end

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- Each control can cause a chain of actions
- They can be handwritten
- Or created from one or more templates

# Chain of events

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The end

- Each control can cause a chain of actions
- They can be handwritten
- Or created from one or more templates
  - ◆ trigger
  - ◆ paged
  - ◆ threshold
  - ◆ thresholdUp, thresholdDown
  - ◆ up, down
  - ◆ thresholdZone
  - ◆ merge
  - ◆ multiclick



# A simple instrument

## The beginning

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## The end

```
MKtl.find;
```

```
a = MKtl.new( 'ngms0' );
```

```
Ndef( \sine, { Pan2.ar( Mix.new( SinOsc.ar(
  [\freq1.kr(400).lag(0.3,0.5), \freq2.kr(400).lag(0.3,0.5),
  \freq3.kr(400).lag(0.3,0.5)] * [3/4,1,4/3] ) ) / 10,
  \pos.kr(0) ) } );
```

```
Ndef( \sine ).fadeTime = 0.1;
```

```
d = Dispatch.new( \trigger, a,
  a.elements.select{ |it| it.type == \button }.collect( __.name ) );
```

```
d.addToOutput( \btgreen, \playSynth, { Ndef(\sine).play( fadeTime: 1 ); } );
d.addToOutput( \btred, \stopSynth, { Ndef(\sine).stop(1); } );
```

```
a.addToOutput( \accX, \changeFreq, { |c| Ndef( \sine ).set( \freq1,
  [400,2000,\exponential].asSpec.map( c.value ) ) } );
a.addToOutput( \accY, \changeFreq, { |c| Ndef( \sine ).set( \freq2,
  [400,2000,\exponential].asSpec.map( c.value ) ) } );
a.addToOutput( \accZ, \changeFreq, { |c| Ndef( \sine ).set( \freq3,
  [400,2000,\exponential].asSpec.map( c.value ) ) } );
```

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**Workshop**

» Workshop overview

» Installing Modality

The end

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# Workshop

# Workshop overview

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» Workshop overview

» Installing Modality

The end

- Intro (to which you just listened)
- Installing Modality and dependencies
- Hooking up your devices
- Creating templates for your devices
- What is FRP?
- Writing FRP's with your controllers

# Installing Modality

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» Workshop overview

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- Get the code from:  
`https://github.com/ModalityTeam/Modality-toolkit`
- Open the file “Installation.scd” in SuperCollider, and follow the instructions there
- Install the “FP” quark from the main quarks.
- Recompile slang!

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**The end**

» We're not there yet...

» Acknowledgements

# The end

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- GUI replacements and/or visualisation for controllers
- Backends for OSC and Serial based devices (and others?)

# We're not there yet...

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- GUI replacements and/or visualisation for controllers
- Backends for OSC and Serial based devices (and others?)

Where to have our next workshop week?

# We're not there yet...

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» We're not there yet...

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- GUI replacements and/or visualisation for controllers
- Backends for OSC and Serial based devices (and others?)

Where to have our next workshop week?

Who else could join in?



# Acknowledgements

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» We're not there yet...

» Acknowledgements

BEK - Bergen, Norway

`www.bek.no`

STEIM - Amsterdam, The Netherlands

`www.steim.org`

*Jeff Carey - getting us all together*