i-score: an overview

Linux Audio Conference - Workshop

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Context

Foundation: libossia
- Goal
- Protocols
- Interoperability

The sequencer: i-score
- Control
- Temporal structure
- Interactivity
- Devices

Audio features

Conclusion

- Digital arts: music, video, transmedia, etc...
- Temporal structure & interactivity.
- Interoperability: software, hardware.

Nebula

Scénario Pachoud

Bosch

Quarrè

libossia: goals

- Automatic discovery
- Shared object model
- Bare metal ? IncludeOS.
- Scoring primitives

libossia: protocols

- OSC
- Minuit
- OSCQuery
- MIDI
- HTTP (Requires Qt)
- WebSocket (Requires Qt)
- Serial port (Requires Qt)

To come: ArtNet (DMX)

Standard protocols

Qt protocols

ossia : C++

C++14, Linux, macOS, Windows, GCC, Clang, MSVC, static, dynamic, etc.

```
auto& node = find_or_create_node(device, "/test/my_int");
auto address = node.create_address(val_type::INT);

node.set(access_mode_attribute{}, access_mode::GET);
node.set(bounding_mode_attribute{}, bounding_mode::FOLD);
node.set(domain_attribute{}, make_domain(2, 14));
node.set(description_attribute{}, "an integral value");

address->add_callback([] (const auto& val) {
    std::cout << val << " ";
  });

address->push_value(5678);
```

Integration with ofParameter, ofParameterGroup

```
ossia::Parameter<bool> _fill;
ossia::Parameter<ofColor> _color;
ossia::ParameterGroup _sizeParams;
...
_circleParams.setup(_parent_node, "circle");

_sizeParams.setup(_circleParams, "sizeParams");
_radius.setup(_sizeParams,"radius",10.,1.,100.);
_position.setup(_sizeParams,
                "position",
                ofVec2f(ofGetWidth() / 2, ofGetHeight() / 2),
                ofVec2f(0., 0.), // Min
                ofVec2f(ofGetWidth(), ofGetHeight())); // Max
```

ossia-pd (and ossia-max soon)

ossia-python

```
# create a node, create a tuple address and initialize it
tuple_node = local_device.add_node("/test/value/tuple")
tuple_address = tuple_node.create_address(
                        ossia.ValueType.Tuple)
tuple_value = ossia.Value([
    ossia.Value(44100),
    ossia.Value("test.wav"),
    ossia.Value(0.9)]
    )
tuple_address.push_value(tuple_value)

# attach a callback function to the boolean address
def bool_value_callback(v):
    print(v.get())
    bool_address.add_callback(bool_value_callback)
```

ossia-unity3D (C#)

```
public class Foo : public MonoBehaviour
{
  [Ossia.Attribute]
  int foo;
}
```

ossia-qml (Qt QML)

```
Item {
  Ossia.Node { name: 'test' }
  AngleSlider {
    // Reads and writes from /test/angle
    Ossia.Property on angle {
      min: -90
      max: 0
      bounding: Ossia.Context.Clip
    }
  }
}
```

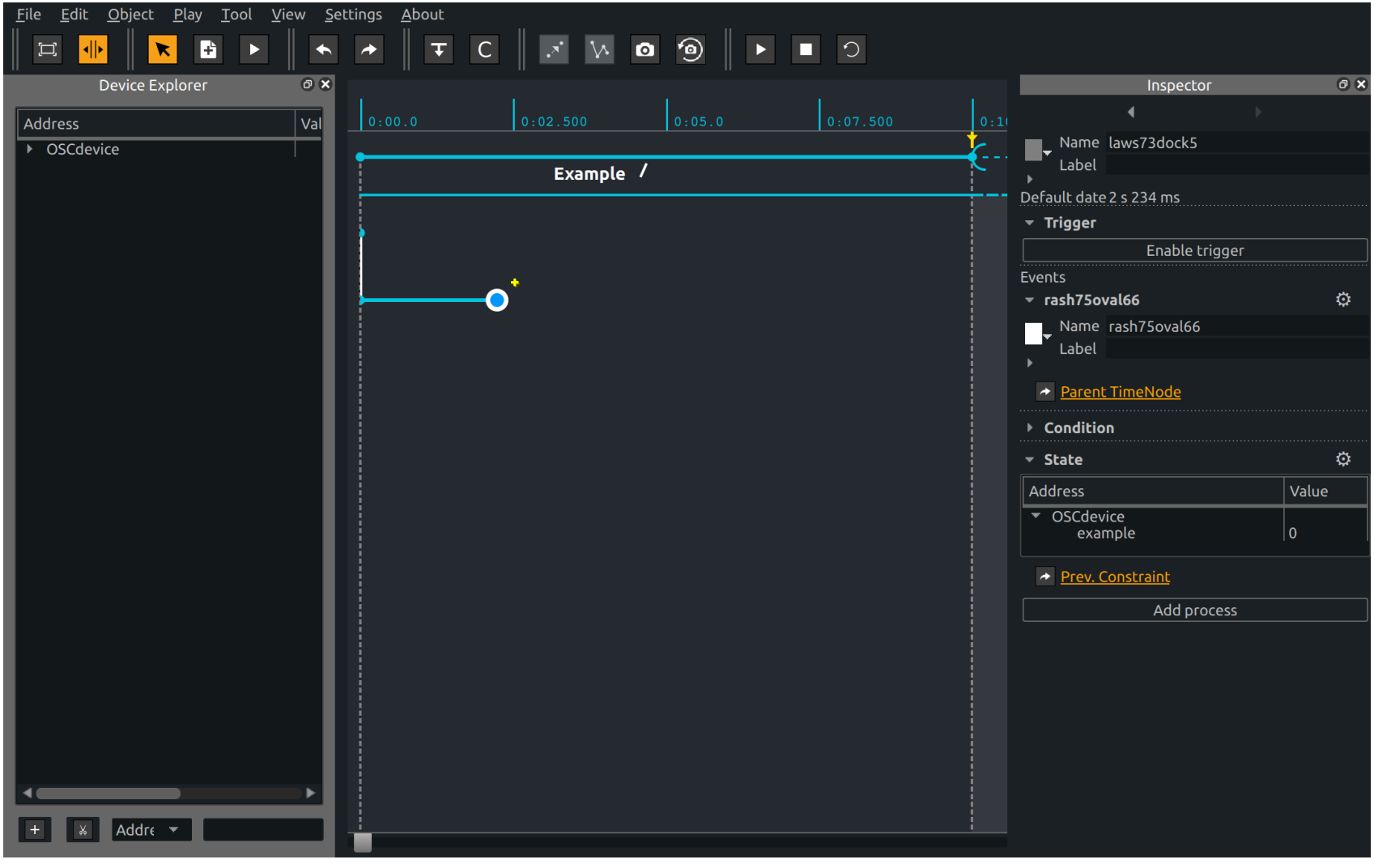
ossia-C (C99)

```
OSSIA_EXPORT
bool ossia_device_update_namespace(
        ossia_device_t device);

OSSIA_EXPORT
ossia_node_t ossia_device_get_root_node(
        ossia_device_t device);

OSSIA_EXPORT
const char* ossia_device_get_name(
        ossia_device_t node);

//// Node ////
OSSIA_EXPORT
ossia_node_t ossia_node_add_child(
        ossia_node_t node,
        const char * name);
```

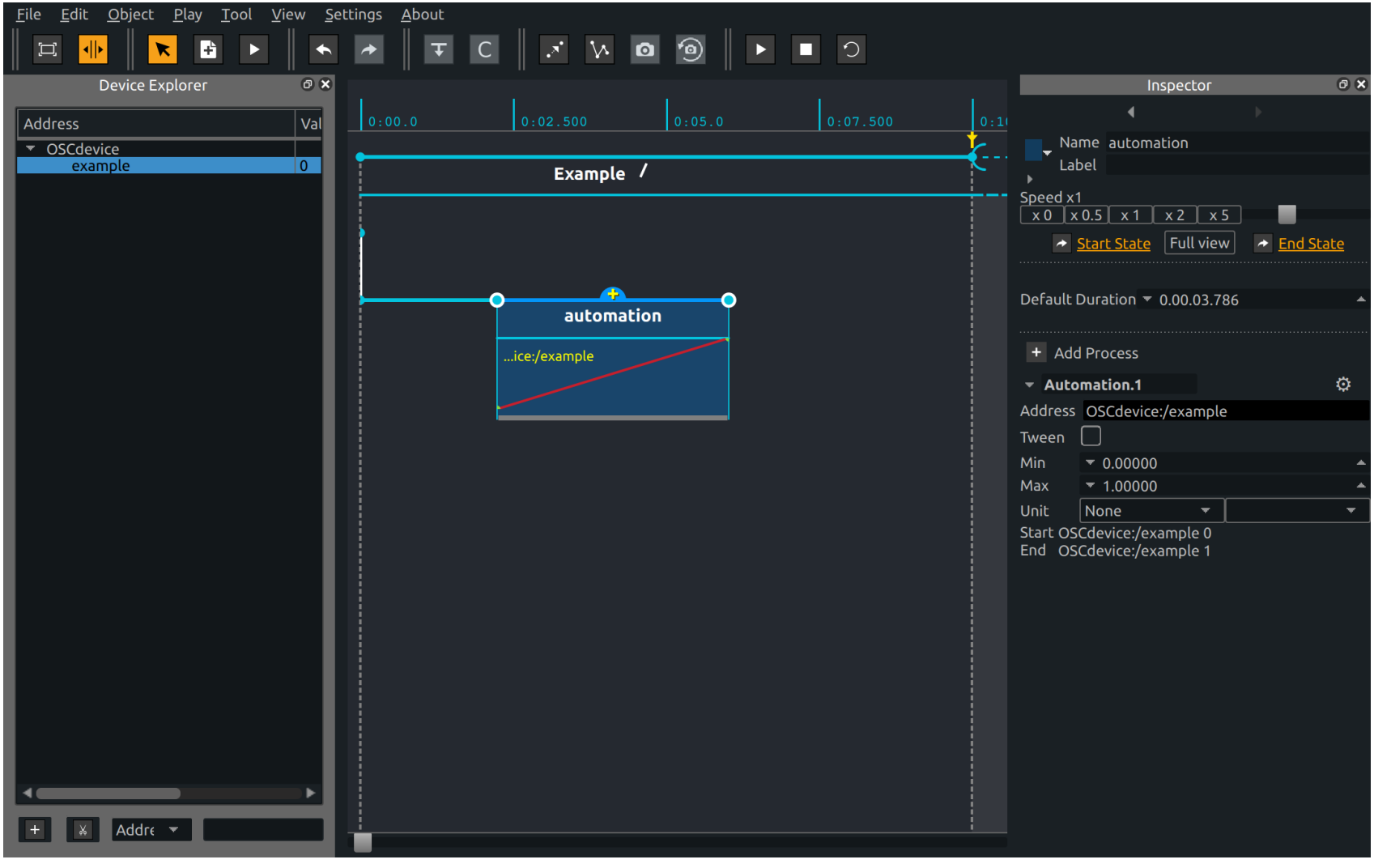
Demonstration

i-score + PureData + Processing

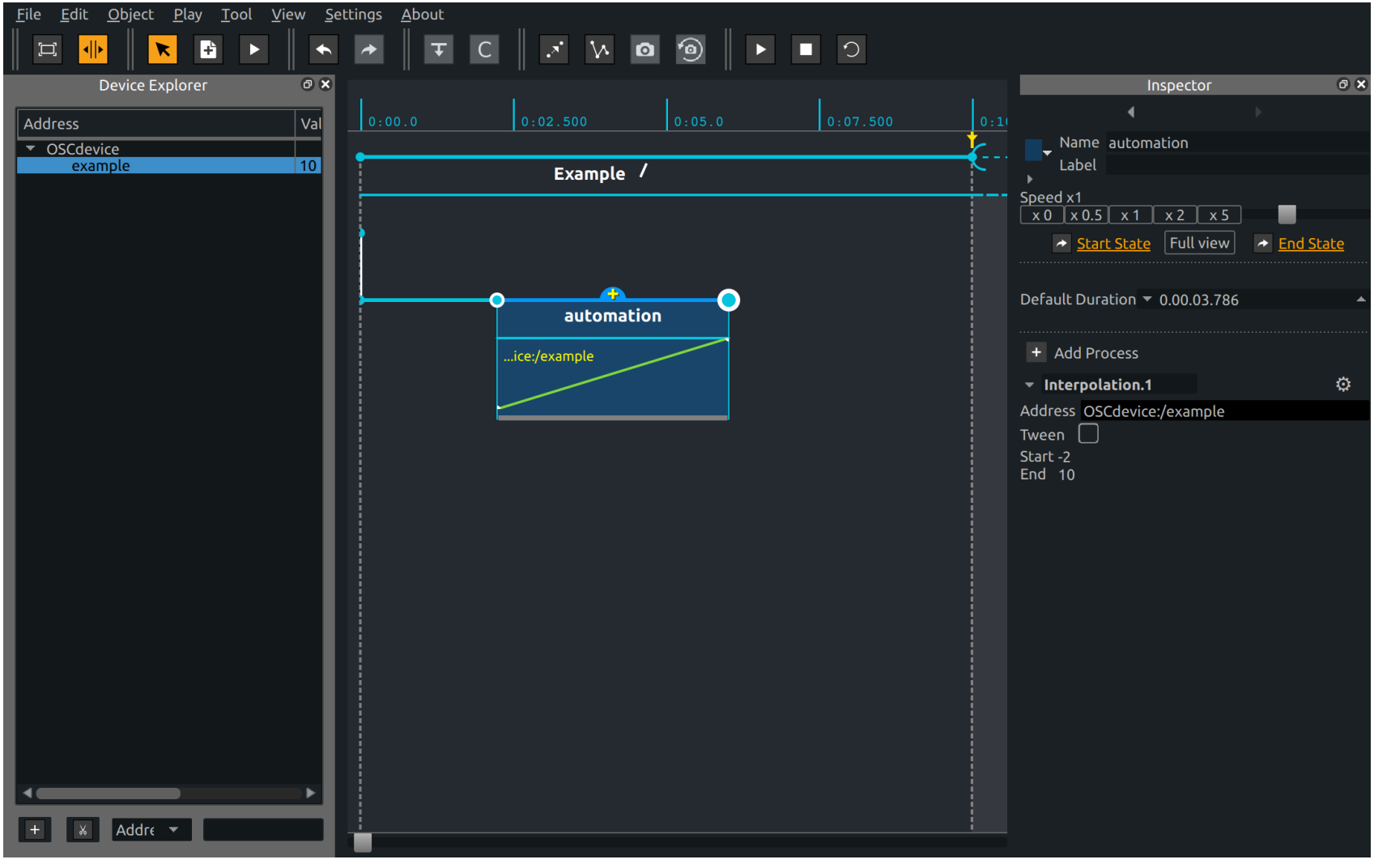
Sending messages



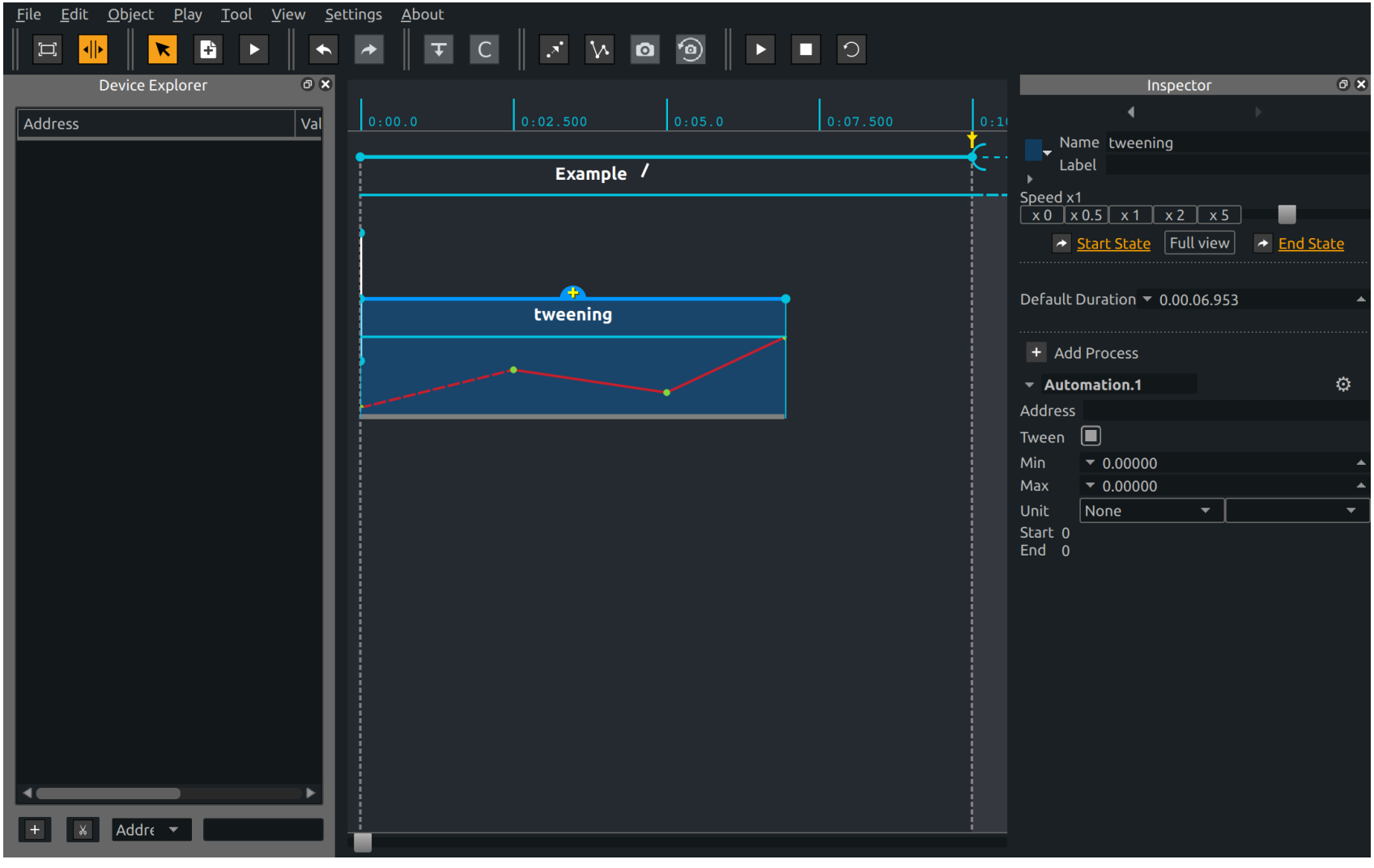
Automating


File Edit Object Play Tool View Settings About
Device Explorer
Address
Val
OSCdevice
example
0
0:00.0
0:02.500
0:05.0
0:07.500
Example
automation
...ice:/example
Inspector
Name automation
Label
Speed x1
x 0
x 0.5
x 1
x 2
x 5
Start State
Full view
End State
Default Duration 0.00.03.786
Add Process
Automation.1
Address OSCdevice:/example
Tween
Min 0.00000
Max 1.00000
Unit None
Start OSCdevice:/example 0
End OSCdevice:/example 1

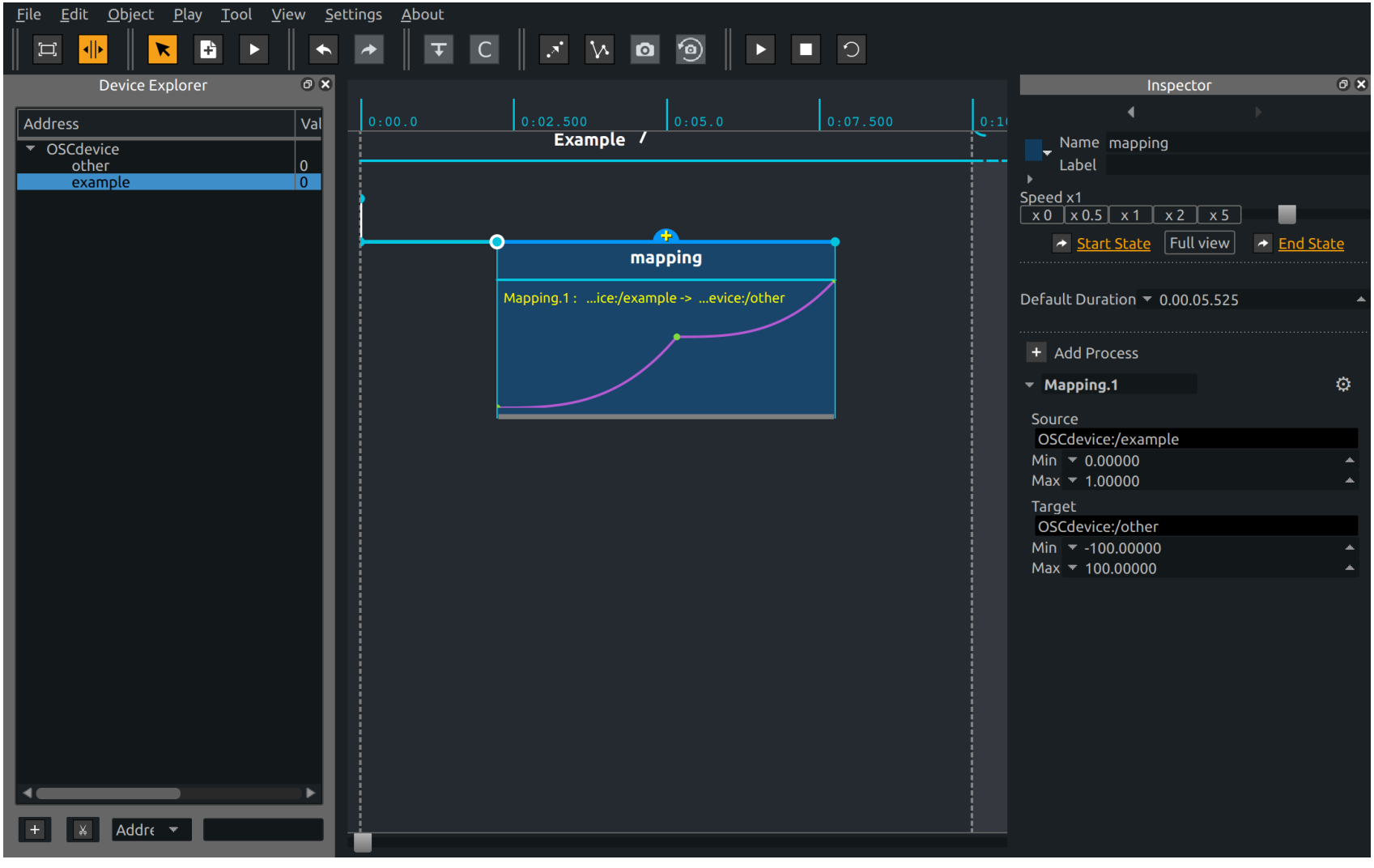
Interpolating



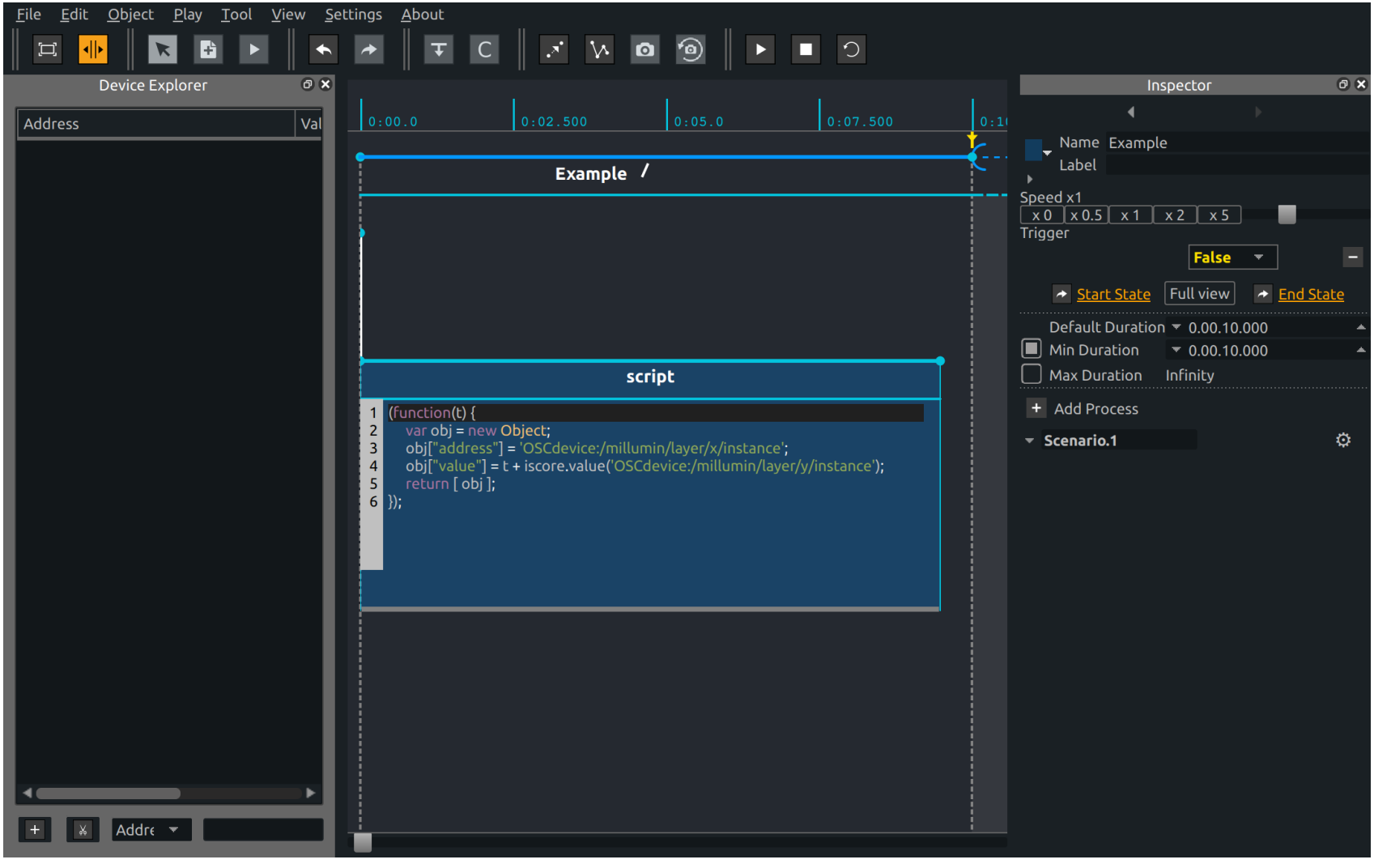
Tweening


File Edit Object Play Tool View Settings About
Device Explorer
Address
Val
Addre
0:00.0
0:02.500
0:05.0
0:07.500
Example
tweening
Inspector
Name tweening
Label
Speed x1
x 0
x 0.5
x 1
x 2
x 5
Start State
Full view
End State
Default Duration 0.00.06.953
Add Process
Automation.1
Address
Tween
Min 0.00000
Max 0.00000
Unit None
Start 0
End 0

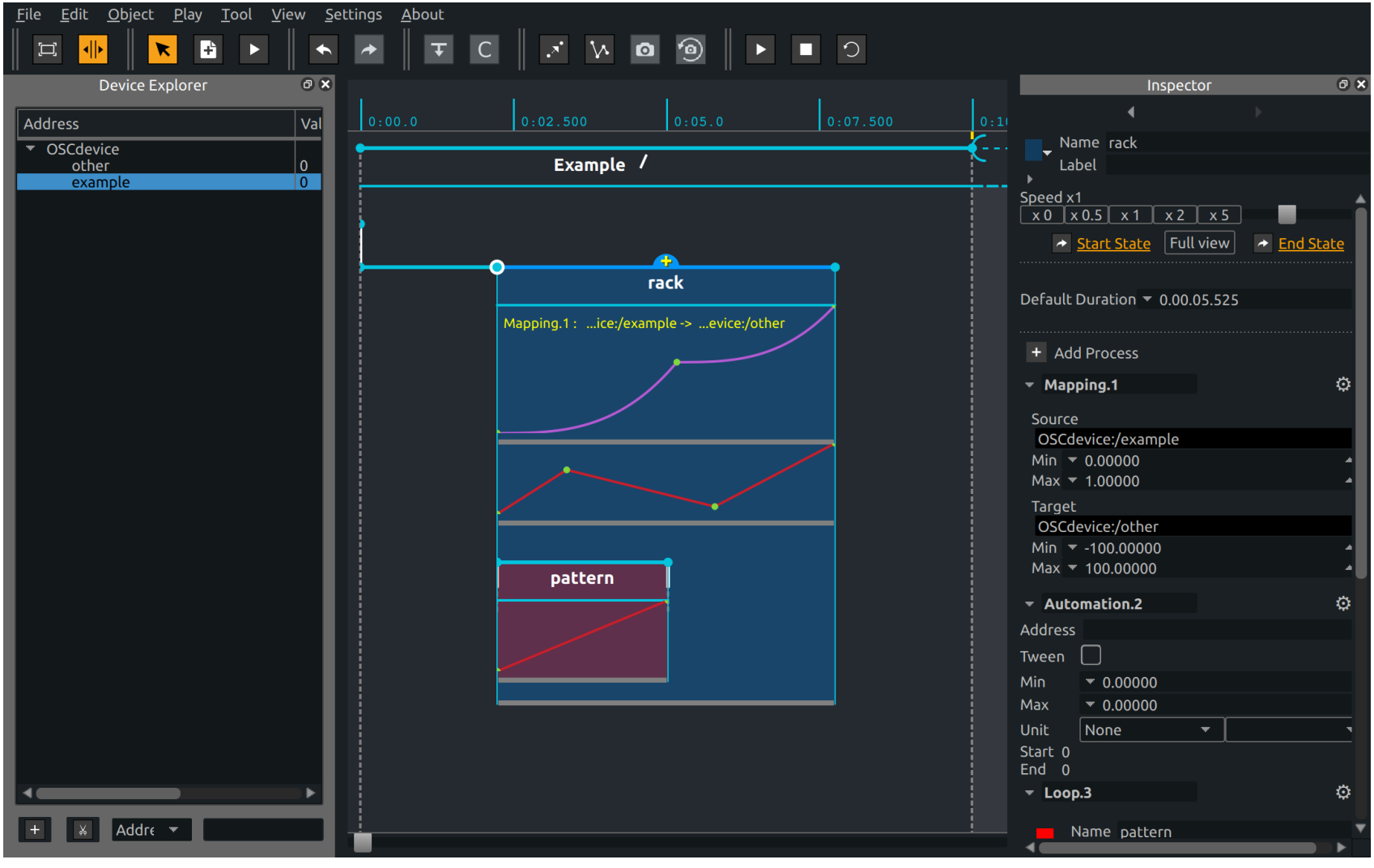
Mapping


File Edit Object Play Tool View Settings About
Device Explorer
Address
Val
OSCdevice
other 0
example 0
Addre
0:00.0
0:02.500
0:05.0
0:07.500
Example
mapping
Mapping.1 : ...ice:/example -> ...evice:/other
Inspector
Name mapping
Label
Speed x1
x 0
x 0.5
x 1
x 2
x 5
Start State
Full view
End State
Default Duration 0.00.05.525
Add Process
Mapping.1
Source
OSCdevice:/example
Min 0.00000
Max 1.00000
Target
OSCdevice:/other
Min -100.00000
Max 100.00000

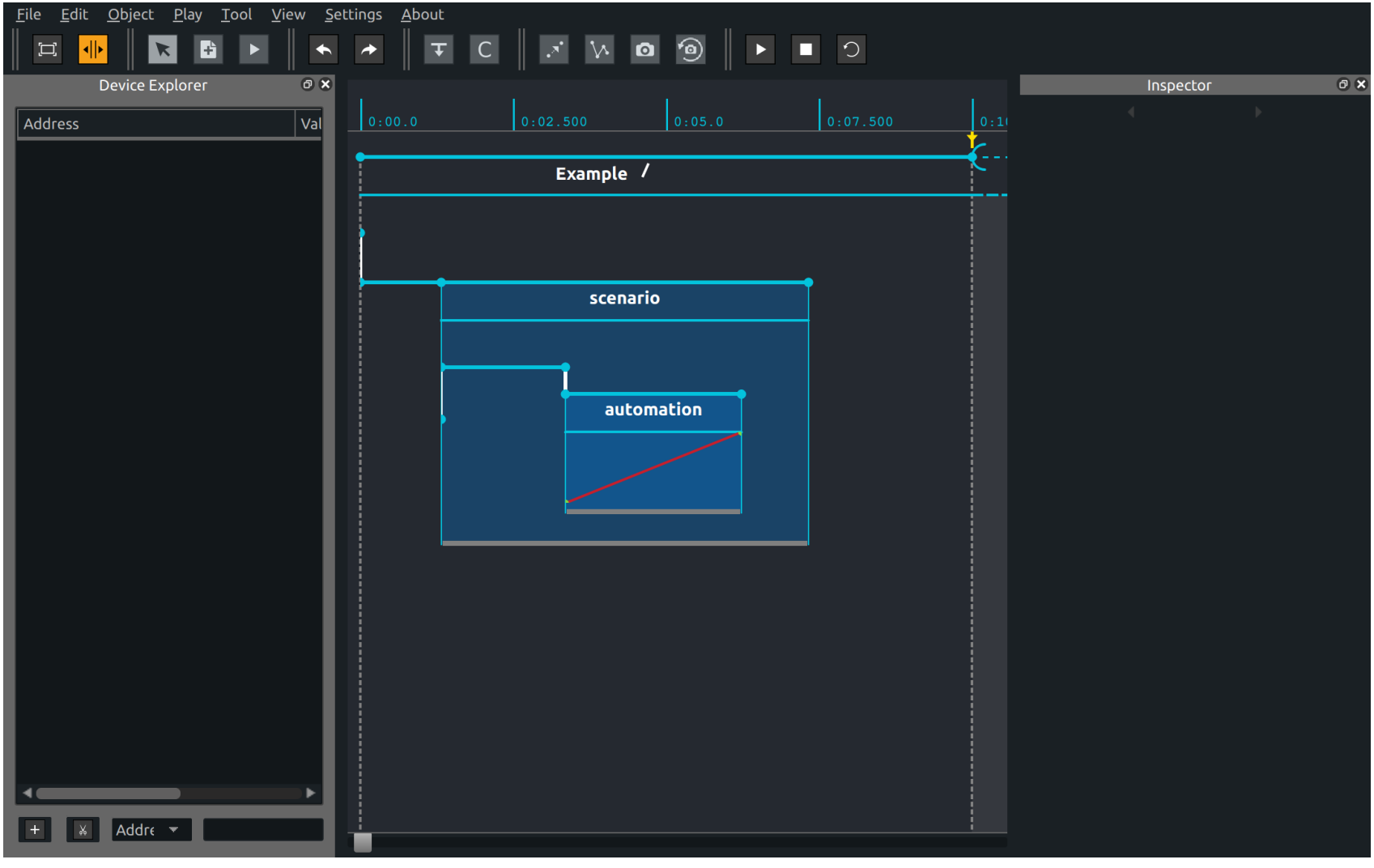
Scripting


File Edit Object Play Tool View Settings About
Device Explorer
Address
Val
Addre
0:00.0
0:02.500
0:05.0
0:07.500
Example
script
1 (function(t) {
2 var obj = new Object;
3 obj["address"] = 'OSCdevice:/millumin/layer/x/instance';
4 obj["value"] = t + iscore.value('OSCdevice:/millumin/layer/y/instance');
5 return [obj];
6 });
Inspector
Name Example
Label
Speed x1
x 0 x 0.5 x 1 x 2 x 5
Trigger
False
Start State
Full view
End State
Default Duration 0.00.10.000
Min Duration 0.00.10.000
Max Duration Infinity
Add Process
Scenario.1

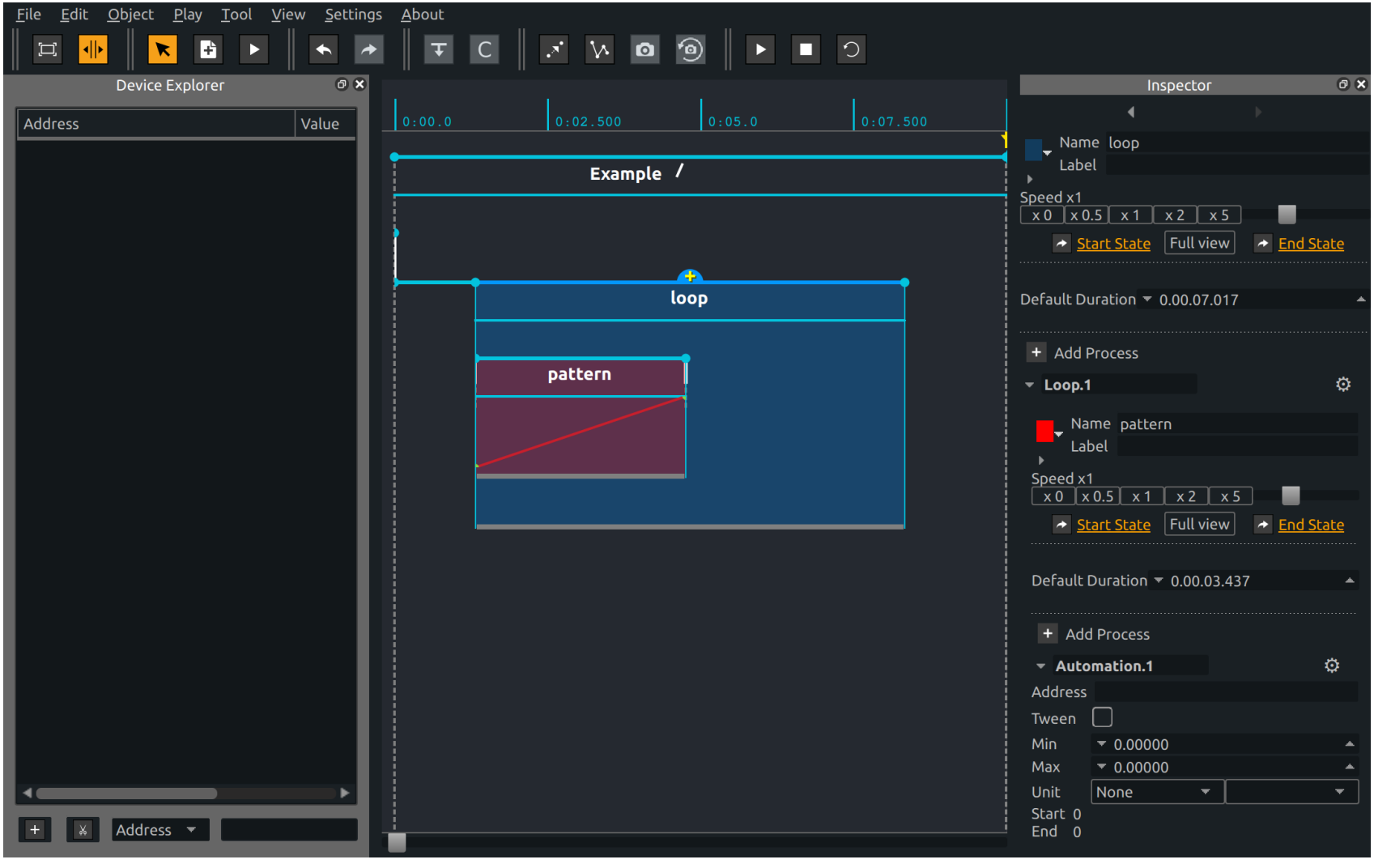
Racks


File Edit Object Play Tool View Settings About
Device Explorer
Address
Val
OSCdevice
other 0
example 0
0:00.0
0:02.500
0:05.0
0:07.500
Example /
rack
Mapping.1 : ...ice:/example -> ...evice:/other
pattern
Inspector
Name rack
Label
Speed x1
x 0 x 0.5 x 1 x 2 x 5
Start State
Full view
End State
Default Duration 0.00.05.525
Add Process
Mapping.1
Source
OSCdevice:/example
Min 0.00000
Max 1.00000
Target
OSCdevice:/other
Min -100.00000
Max 100.00000
Automation.2
Address
Tween
Min 0.00000
Max 0.00000
Unit None
Start 0
End 0
Loop.3
Name pattern

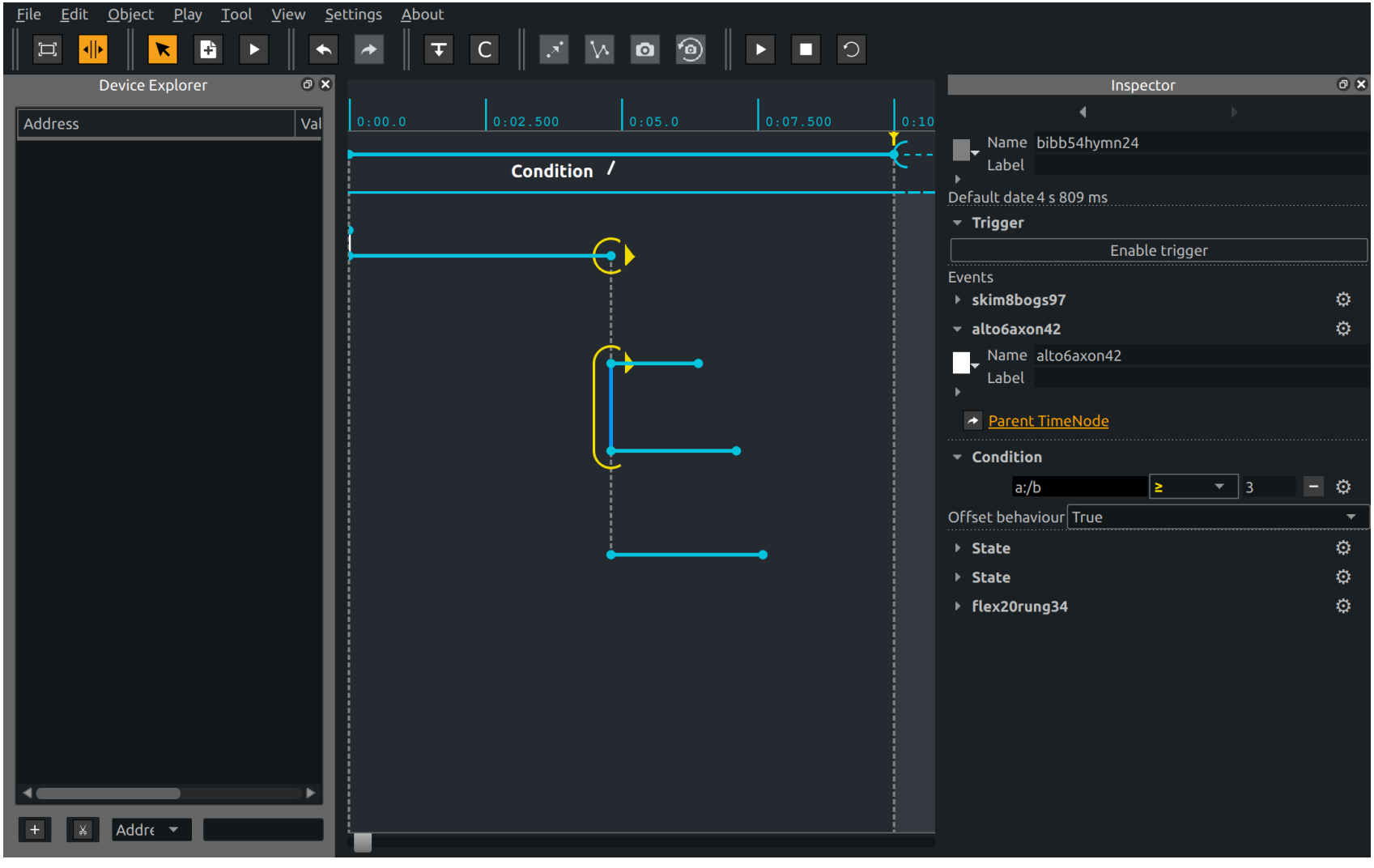
Hierarchy


File
Edit
Object
Play
Tool
View
Settings
About
Device Explorer
Address
Val
Addre
0:00.0
0:02.500
0:05.0
0:07.500
Example /
scenario
automation
Inspector

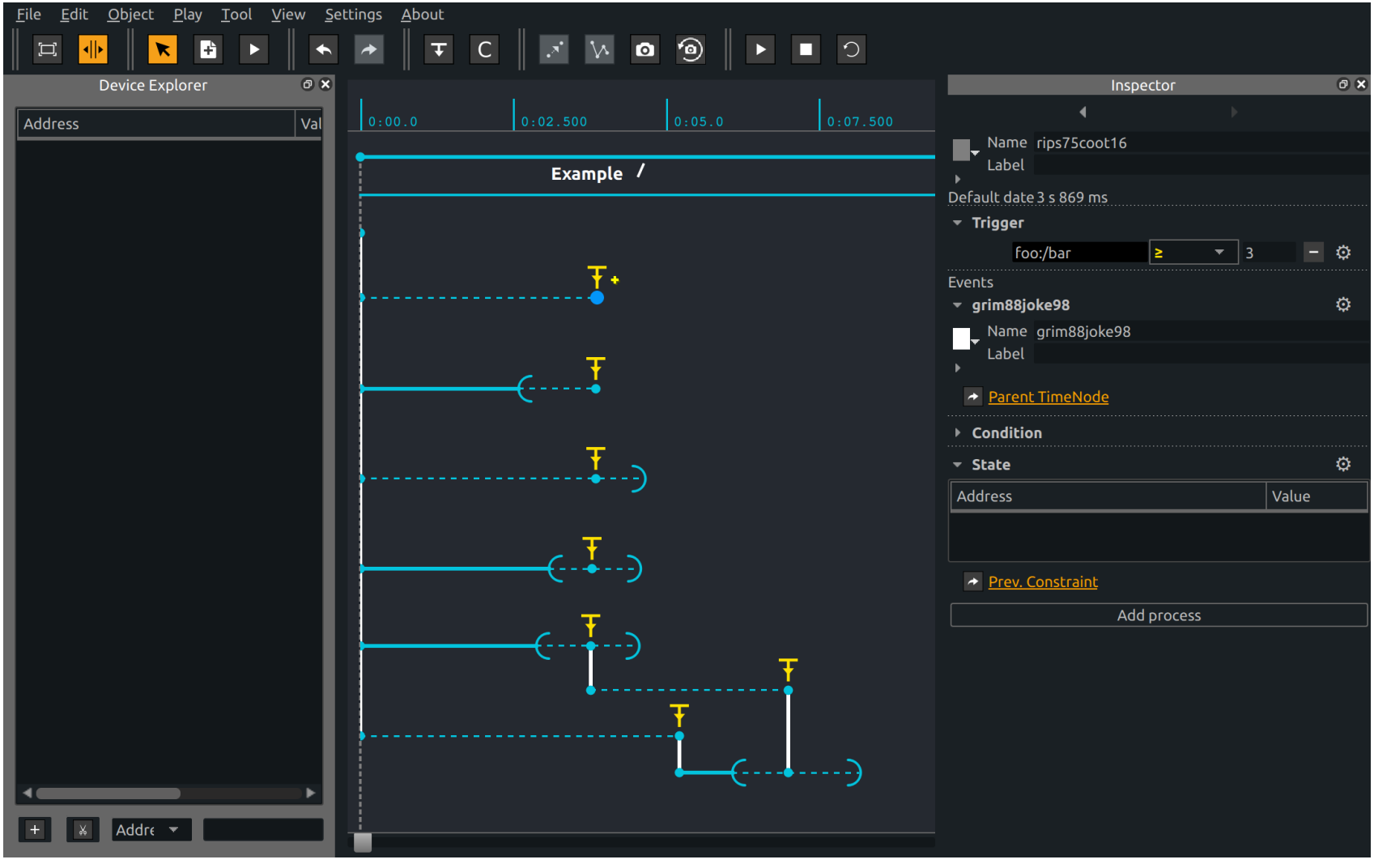
Loops


File Edit Object Play Tool View Settings About
Device Explorer
Address
Value
Address
0:00.0
0:02.500
0:05.0
0:07.500
Example /
loop
pattern
Inspector
Name loop
Label
Speed x1
x 0 x 0.5 x 1 x 2 x 5
Start State
Full view
End State
Default Duration 0.00.07.017
Add Process
Loop.1
Name pattern
Label
Speed x1
x 0 x 0.5 x 1 x 2 x 5
Start State
Full view
End State
Default Duration 0.00.03.437
Add Process
Automation.1
Address
Tween
Min 0.00000
Max 0.00000
Unit None
Start 0
End 0

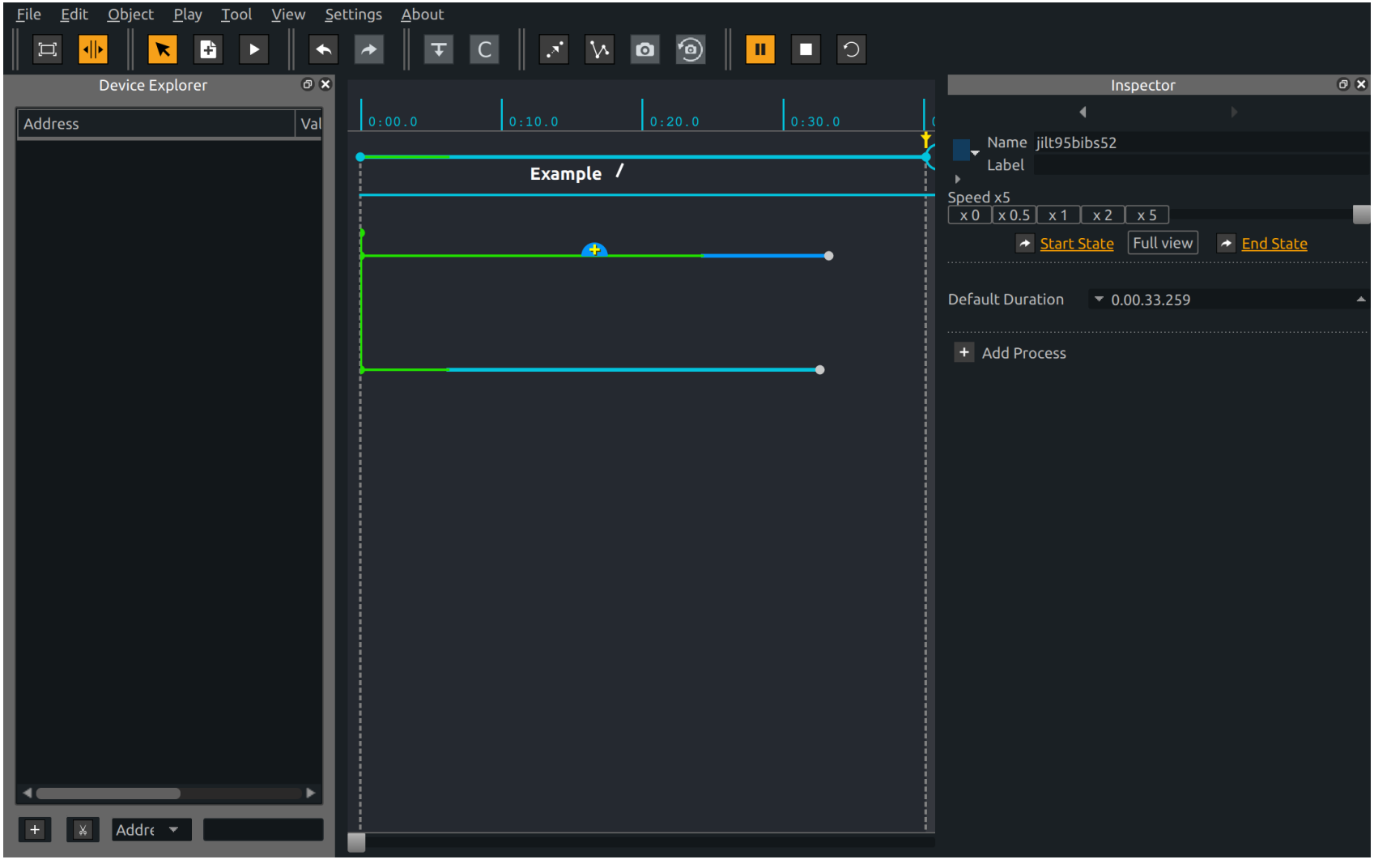
Interactivity: conditions



Interactivity: trigger points



Interactivity: execution speed



Working with external devices

- Automatic discovery
- Loading
- Manual entry
- Introspection

Demonstration

MIDI control surface and WebSockets

Audio: sounds, live input

Hierarchical mixing.

Audio: applying effects

Audio: send, returns

What's missing

- Multichannel operation.
- Displaying LV2 UIs...
- Musical time structures (bars, metronome, etc).
-  Packaging for distros 

Work-in-progress

- Embedded score player.
- Network operation.
- Plug-in API.
- Full-fledged audiograph.
- Ongoing work on UI.

Workshop

- Building scores
- Experimenting with your favorite environments