

Project

MCFX-CONVOLVER
multichannel non-equal partitioned convolution matrix

Preset: SH2BIN_Domenico_Stefani_o3_trimmed

Save preset within project

OSC receive port: 7200 Master gain: 0.0 dB First Partition Size: 128

Input channels: 16 Output channels: 2 Impulse responses: 32

Maximum Partition Size: 8192

14:53:48 | Plugin Latency: 0 [smpls]
14:53:48 | Configuration loaded, maximum filter length: 0.01[s], 512 [smpls]
14:53:48 | loaded 32 filters with: length 512, input channels: 16, output channels: 2, fil
14:53:48 | Samplerate: 48000 Host Buffer Size: 128 Internal Buffer Size: 128
14:53:48 | trying to load D:\develop-farina-proj\MATRICES(hrtf-and-SOFA)\HRTF\Vir
14:53:48 | Loading preset...
14:52:51 | Search dir: C:\Users\cimil\AppData\Roaming\mcfx\convolver_presets

Clear log skipped cycles: 0 50x50ch. v0.6.3



SPARTA| 6DoFconv Ver 1.0.0beta, Build Date Mar 17 2022

Load IR dataset: /Users/mccorm1/Downloads/m5_direct_short_2_1_noEq.sofa

Host Block Size: 2048 IR Length (s): 0.00533...
N# IR channels: 25 Filter Samplerate: 48000
N# IR positions: 525 Host Samplerate: 48000

Source Position: x: 1.0, y: 1.1, z: 1.4

Target Listener Position: x: 1.034, y: -1.441, z: 1.600
Target Index: 242 OSC Port: 9000

Ambisonic Sound-Field Rotation

Enable Rotation

(Note that this rotation is only suitable if you have loaded Ambisonic IRs)

Yaw |vpr[0] Pitch |vpr[1] Roll |vpr[2]
0.00 0.00 0.00
+/- +/- +/-

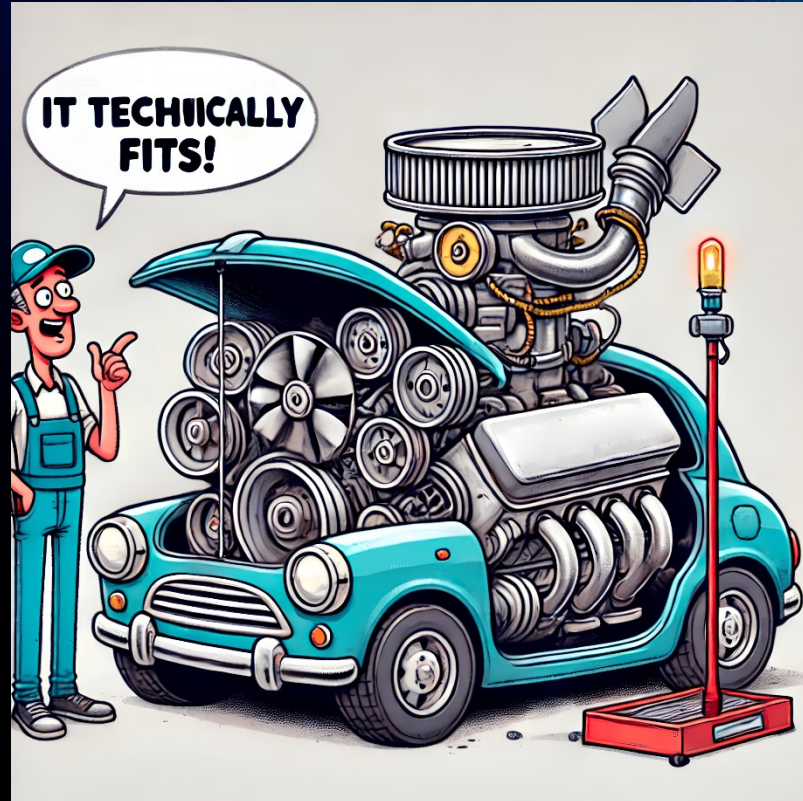
Coordinate View

50x50ch. v0.6.3

Efficient Convolutions

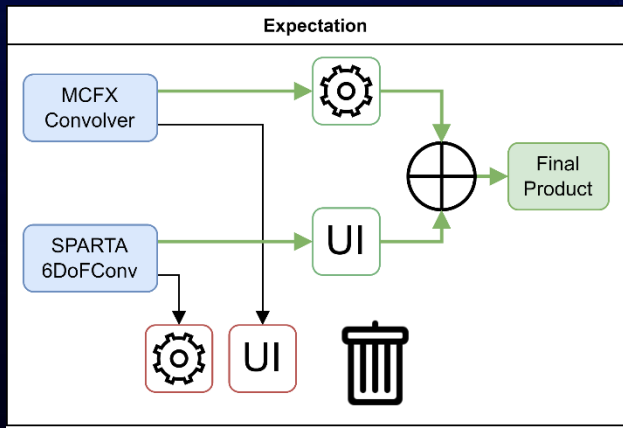
3DoF Navigation, IR Matrix Crossfade, OSC

Engine Swap



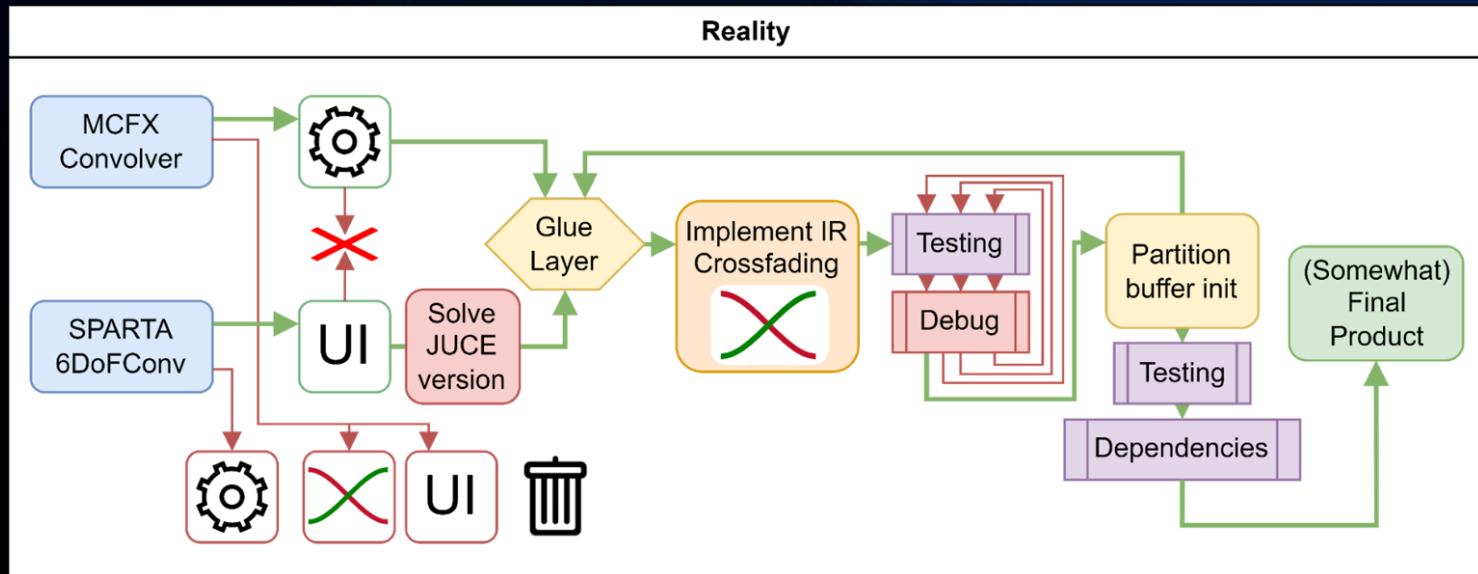
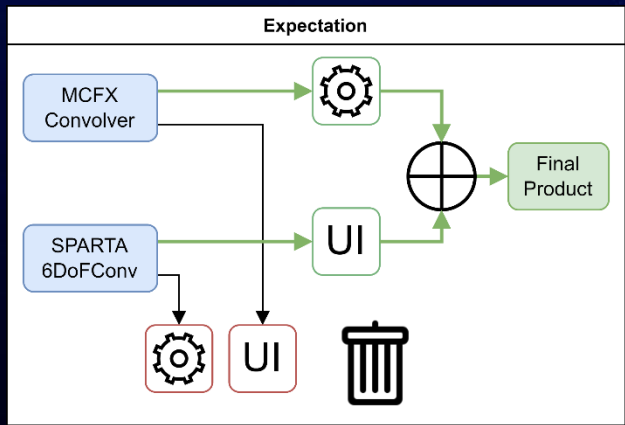
Engine Swap





Expectation

Expectation vs Reality



Understanding engine differences

From talking with researchers, reading documentation, reading the code:

MCFX Convolver

- 1 NxM IR Matrix
- Reads WAVs
- ✓ Non Uniform Partitioned Conv.
- ✗ No Matrix Swap

SPARTA 6DoFConv

- K, 1xN IR matrices
- Reads SOFA files
- ✗ Uniform Partitioned Convolution
- ✓ Matrix Swap

First Issues

From reading the code:

MCFX Convolver

- Not meant to change IR-matrix without stopping audio callback.
- Allocates on matrix change.
- Handles many threaded convolvers processing different partition lengths

SPARTA 6DoFConv

- Matrix swap ?
 - 1-buffer delay for position change
- Crossfade ?
 - 1 block crossfade, deeply embedded within old engine
- Convolution and swap are integrated

Steps

1st Integration

1 position

1 IR Matrix



Steps

1st Integration

1 position

1 IR Matrix



Inefficient

Multiposition

1 convolver per

position

Steps

1st Integration
1 position
1 IR Matrix

Efficient
Multiposition
2 convolvers
For matrix change



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JUCE
incompatibility
CMAKE issues
Dependencies
Need for equivalent
WAV & SOFA
matrices

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Multiposition
1 convolver per
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Kills RAM
WORKS!

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Rethink life choices

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I wanted longer Xfade
Not-needed 😞

And now? Crossfade

- Integrate into one convolver?
- Use two convolvers?



And now? Crossfade

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2nd: Minimum
Modifications

New Crossfade

Simple Swap

And now? Crossfade

- Integrate into one convolver?
- Use two convolvers?



2nd: Minimum
Modifications

I should be done, Test

New Crossfade

Simple Swap

And now? Crossfade

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2nd: Minimum
Modifications

New Crossfade

Simple Swap

I should be done, Test

Clicks!

Did I get the Xfade wrong?

And now? Crossfade

- Integrate into one convolver?
- Use two convolvers?

Wait, clicks happen 512-1024 samples later



2nd: Minimum Modifications

New Crossfade

Simple Swap

I should be done, Test

Clicks!

Did I get the Xfade wrong?

And now? Crossfade

- Integrate into one convolver?
- Use two convolvers?

Wait, clicks happen 512-1024 samples later

Tail partition buffers!
Not coherent after pause/change



2nd: Minimum
Modifications

New Crossfade

Simple Swap

I should be done, Test

Clicks!

Did I get the Xfade wrong?

And now? Crossfade

- Integrate into one convolver?
- Use two convolvers?

Wait, clicks happen 512-1024 samples later

Tail partition buffers!
Not coherent after pause/change

Buffer Audio
Fill buffers on change



2nd: Minimum Modifications

New Crossfade

Simple Swap

I should be done, Test

Clicks!

Did I get the Xfade wrong?

Test

Test

Test

Testing & Performance Measurement

The screenshot displays a software interface for testing and performance measurement, likely a DAW or audio processing tool. The main window shows a track named "noise_1000sec" with a VST plugin named "sparta_multDoFconv (AALTO)".

The SPARTA|MCFX-6DoFconv plugin interface is visible, showing various parameters and a 3D coordinate system. The parameters include:

- Host Block Size: 512
- IR Length [s]: 2
- N# IR positions: 335
- Filter Samplerate: 48000
- N# IRs x pos: 16
- Host Samplerate: 48000
- N# Inputs: 1
- 1st Partition Size: 512
- N# Outputs: 16
- Max Partition Size: 1024

The 3D coordinate system shows a grid of points representing the sound field. The axes are labeled X, Y, and Z. The X-axis ranges from -9.928 to 1.500, the Y-axis from -10.542 to 1.500, and the Z-axis from 1.5 to 9000. The origin is at (0,0,0). The grid points are colored in shades of blue and green, indicating different levels of sound field intensity or phase.

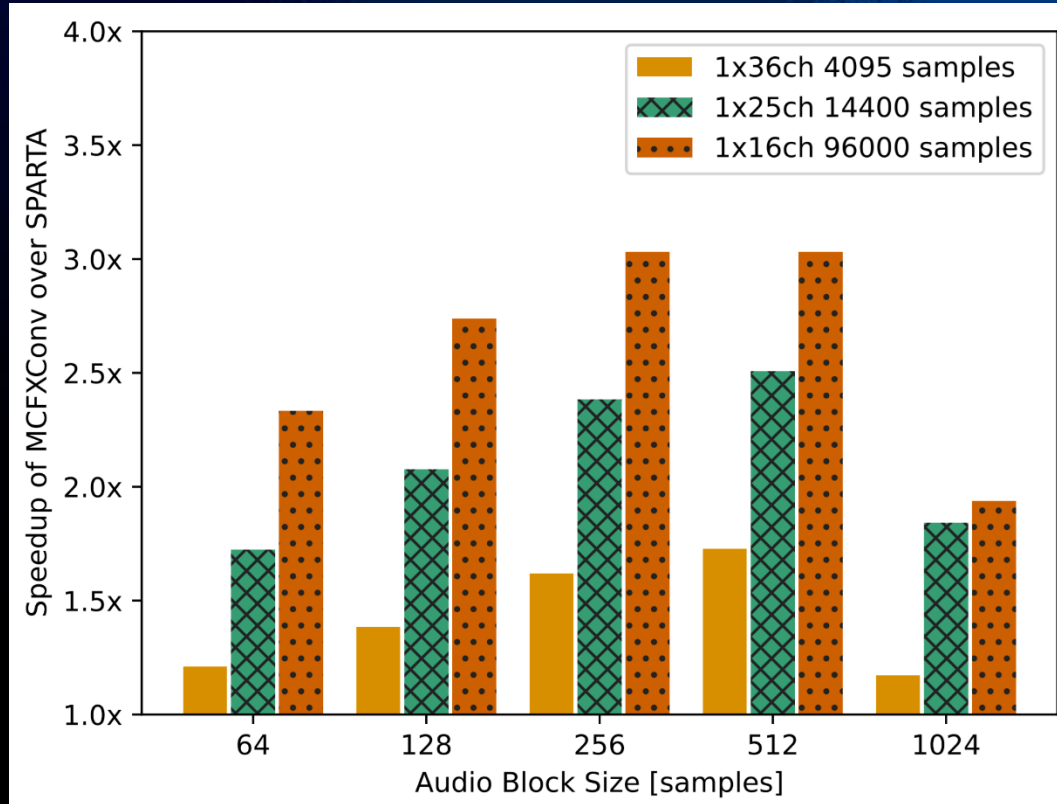
Other visible parameters include:

- Source Position: x: 1.5, y: -1.0, z: 1.6
- Target Listener Position [m]: x: -9.928, y: -10.542, z: 1.500, Index: 142, OSC Port: 9000
- Crossfade Time [ms]: 10.7
- Ambisonic Sound-Field Rotation [degrees]: Yaw [deg] (0.00), Pitch [deg] (0.00), Roll [deg] (0.00)

The interface also shows a "Parameter Modulation/Link for receiver_coordinate_y / sparta_" window with various controls like "Enable parameter modulation", "Output", "Shape", "Speed", "Strength", "Phase", and "Direction".

Efficient!

2 to 3x faster with 2-second IRs



Thank you!

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