

Audience engagement in musical performances through on-site and online networks

Anna Xambó

Music, Technology and Innovation - Institute for Sonic Creativity (MTI2), De Montfort University

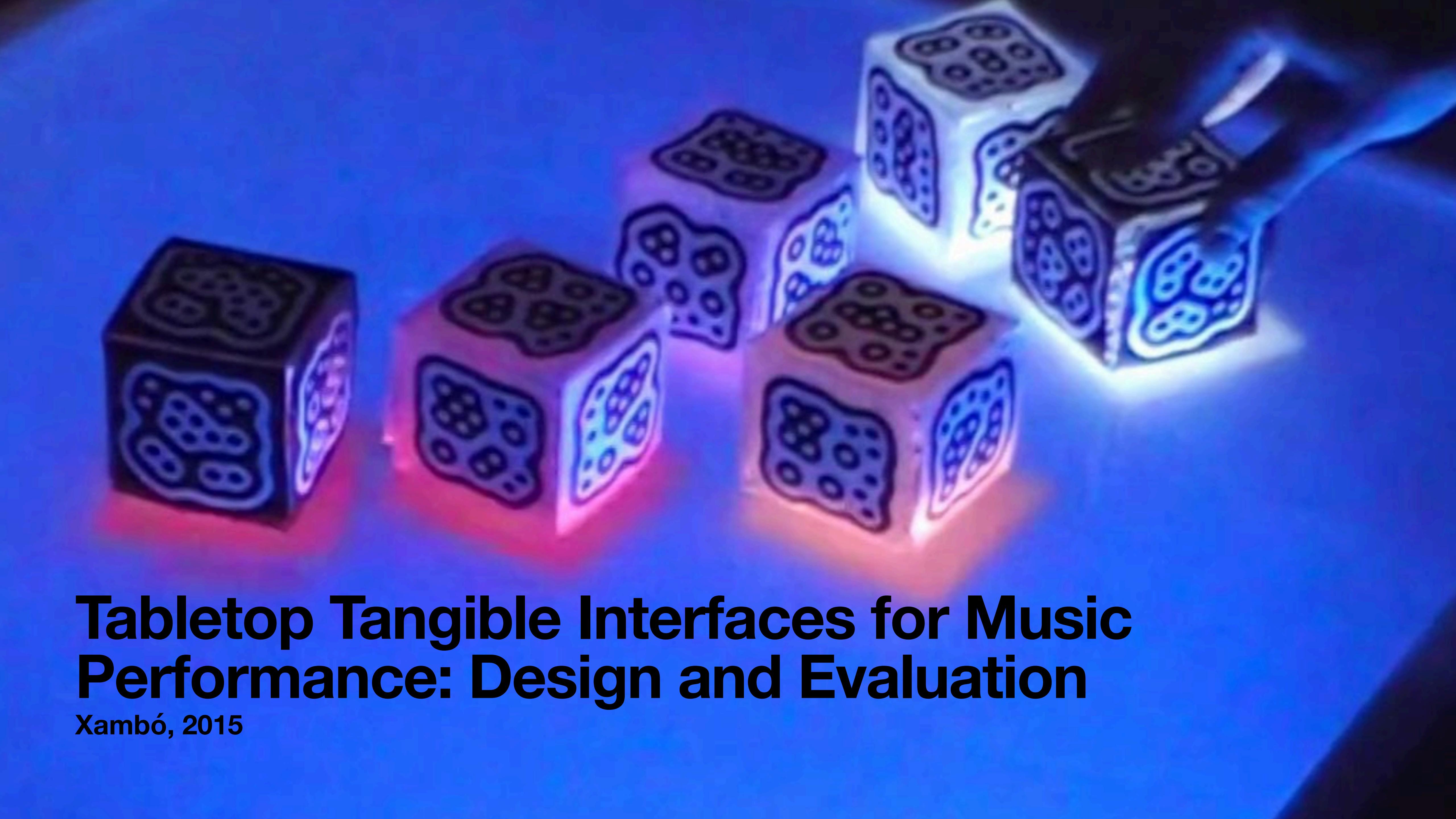
COSY Colloquium, Faculty of Computer Science, University of Vienna, 21.5.2021

What Is Network Music?

- **Musical networks (local or remote)**: Musicians and computers connected by a network, independent of the musicians' locations.
- **Interdependence**: Musicians can influence, share, and shape each other's music in real time.
- **Local musical networks**: “Groups of performers who interact in real-time, in the same physical location, on a set of musical instruments, with the possibility of sonic interdependence provided by a fast local computer network” (Barbosa 2003).

Timeline

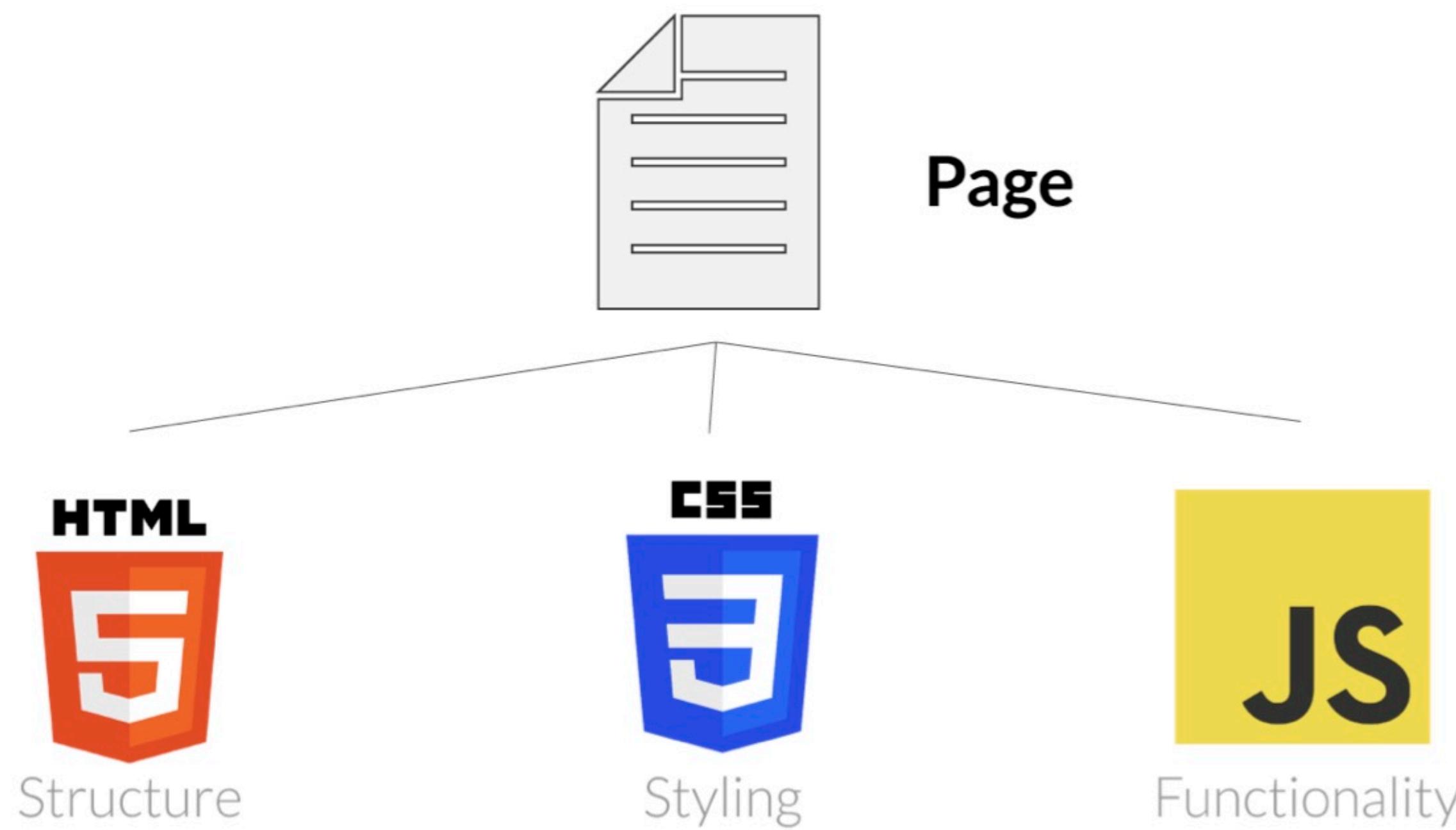
- **1951** Imaginary landscape no. 4 (John Cage)
- **1964** Mikrophonie I (Stockhausen)
- **1978** Concert at the Blind Lemon by The League of Automatic Music Composers
- **1998** Hub 2: The MIDI Hub by The Hub
- **2003** ensemble powerbooks_unplugged / Republic 111
- **2008** SLOrk ensemble
- **2014** Female Laptop Orchestra
- **2016** Orchestra for Females and Laptops (OFFAL)



Tabletop Tangible Interfaces for Music Performance: Design and Evaluation

Xambó, 2015

Web Standards & Web Audio API

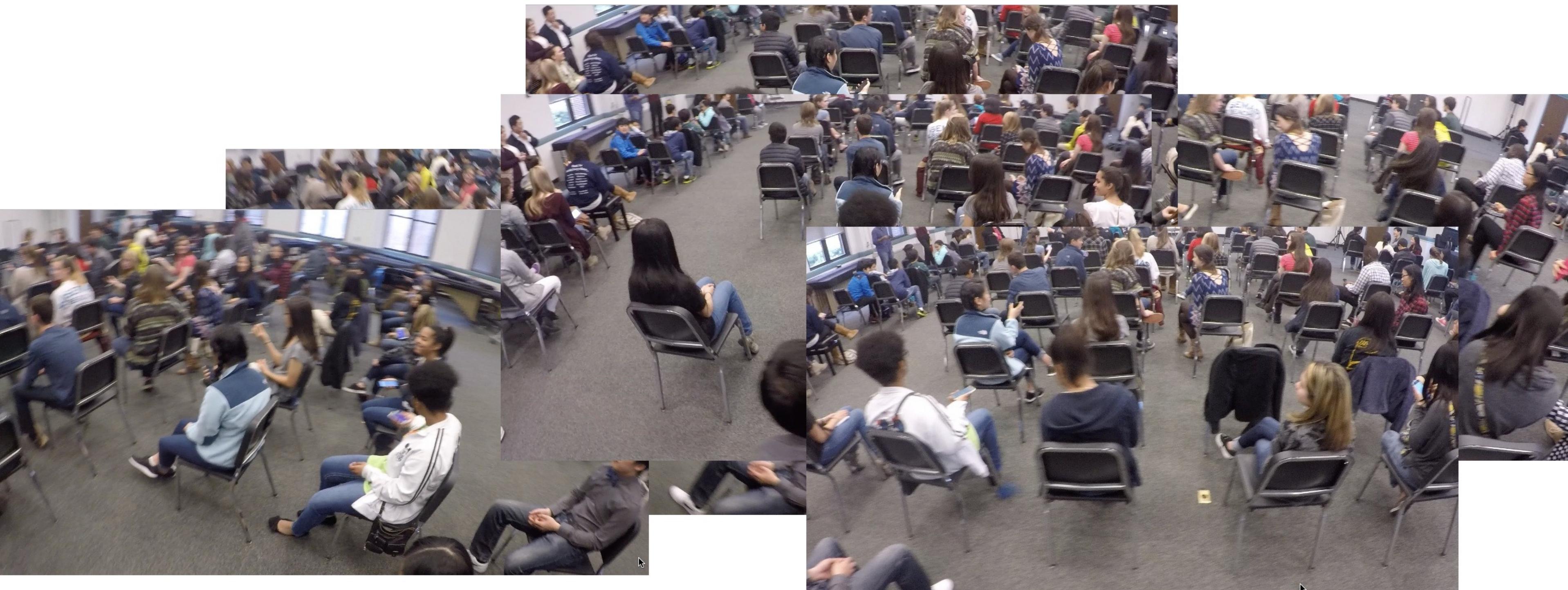


Outline

- Audience-centric performances
- Audience-led performances
- Hands-on demo

Audience-Centric Performances

The audience become performers/makers.



instructions:

- Please don't talk or laugh
- Tap on the link below and wait for the page to display the message "Touch to start"
- Practice the first example for a bit and try to discover new gestures
- When a gesture is recognized, a new sound will be produced, and your phone may vibrate
- If you find one, show it to your neighbors
- Do not allow the phone to lock the screen!

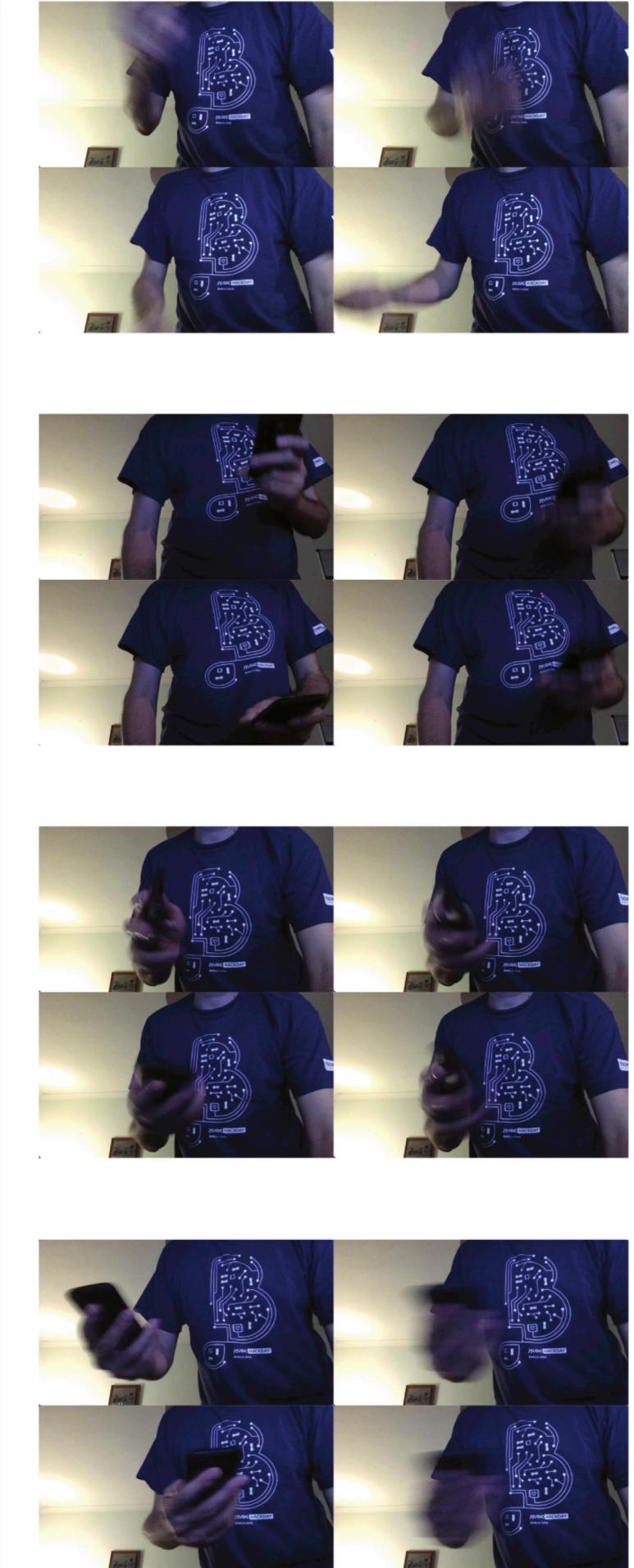
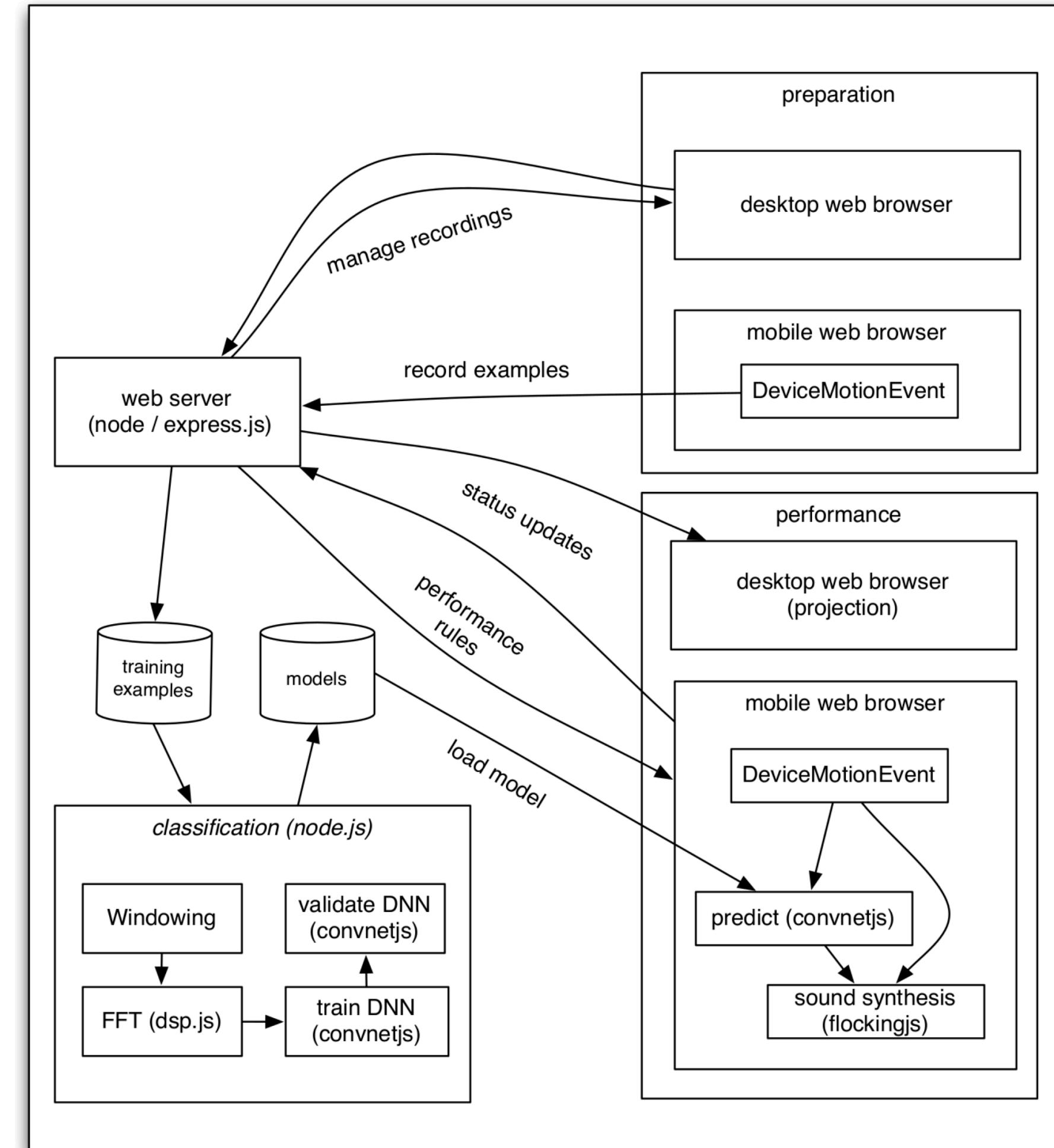
Participatory Mobile Pieces

Algorithmic processes / Rules for music creation

Handwaving

Roma, Xambó & Freeman, 2017

- System for participatory mobile music based on **accelerometer gesture recognition**.
- System for **recognition** and **mapping** of arbitrary gestures to sound synthesisers implemented in web standards.
- Developed a **web application** to collect examples of each gesture and train a Deep Neural Network (DNN) classifier, as well as to support the performance.

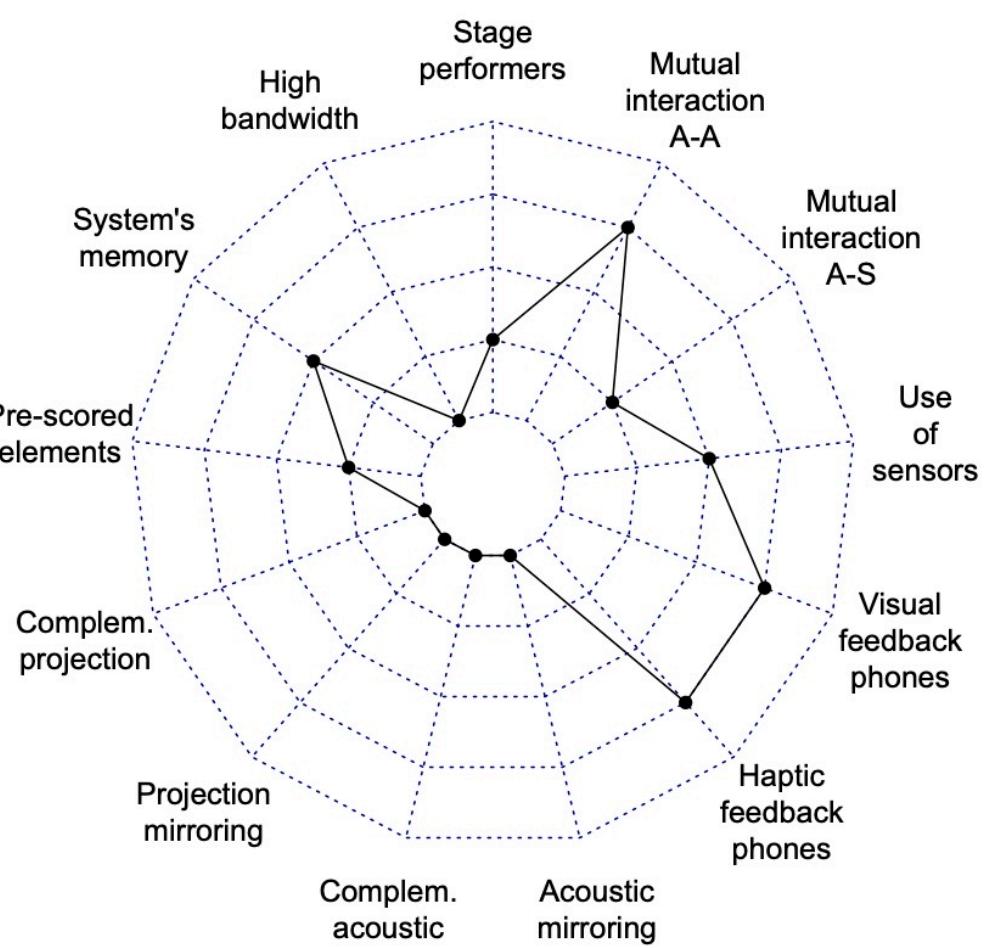
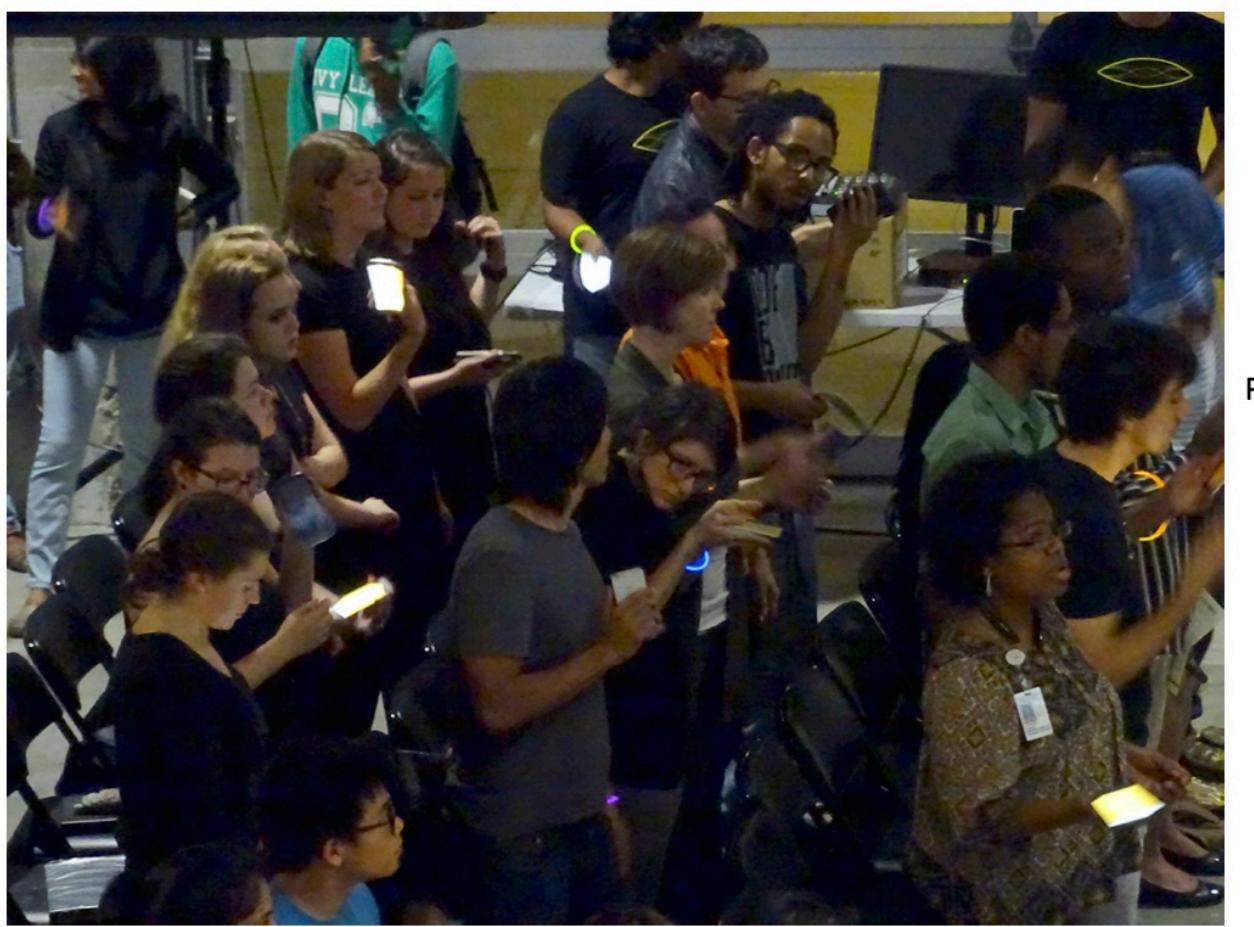


Performing Audiences: Composition Strategies

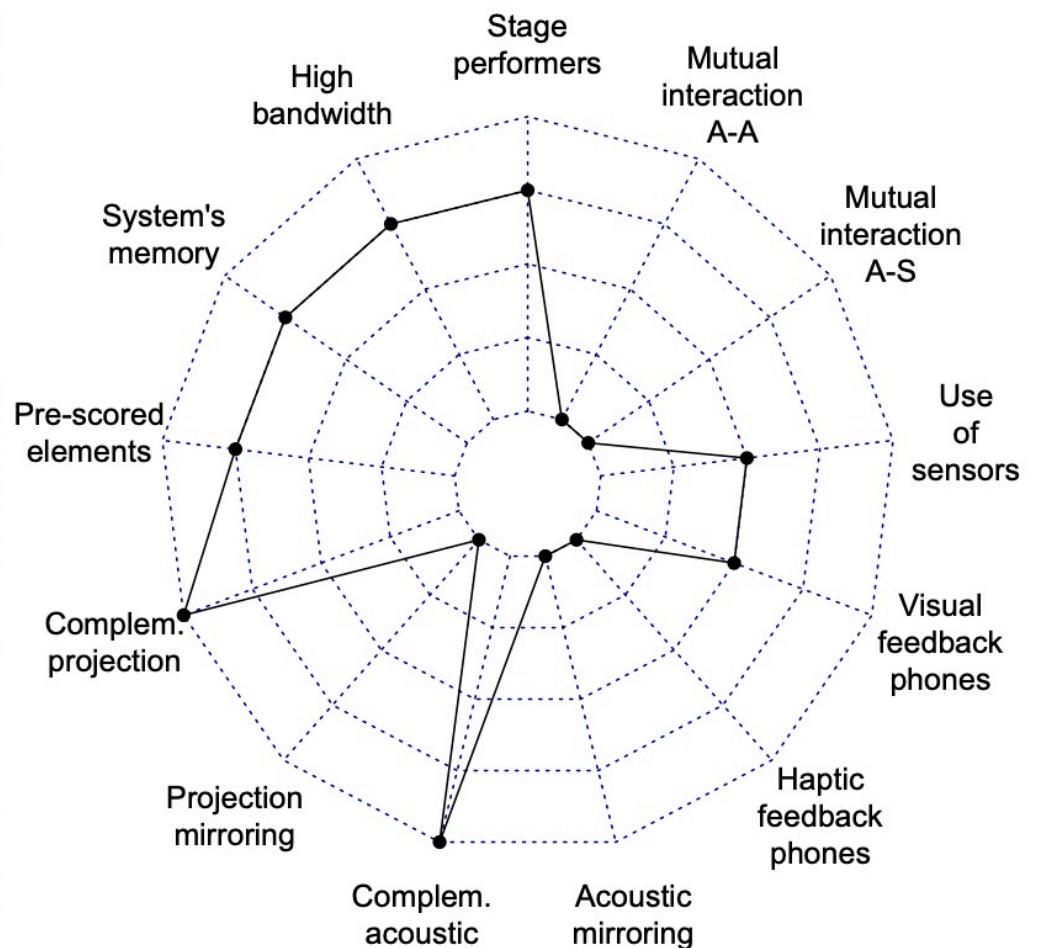
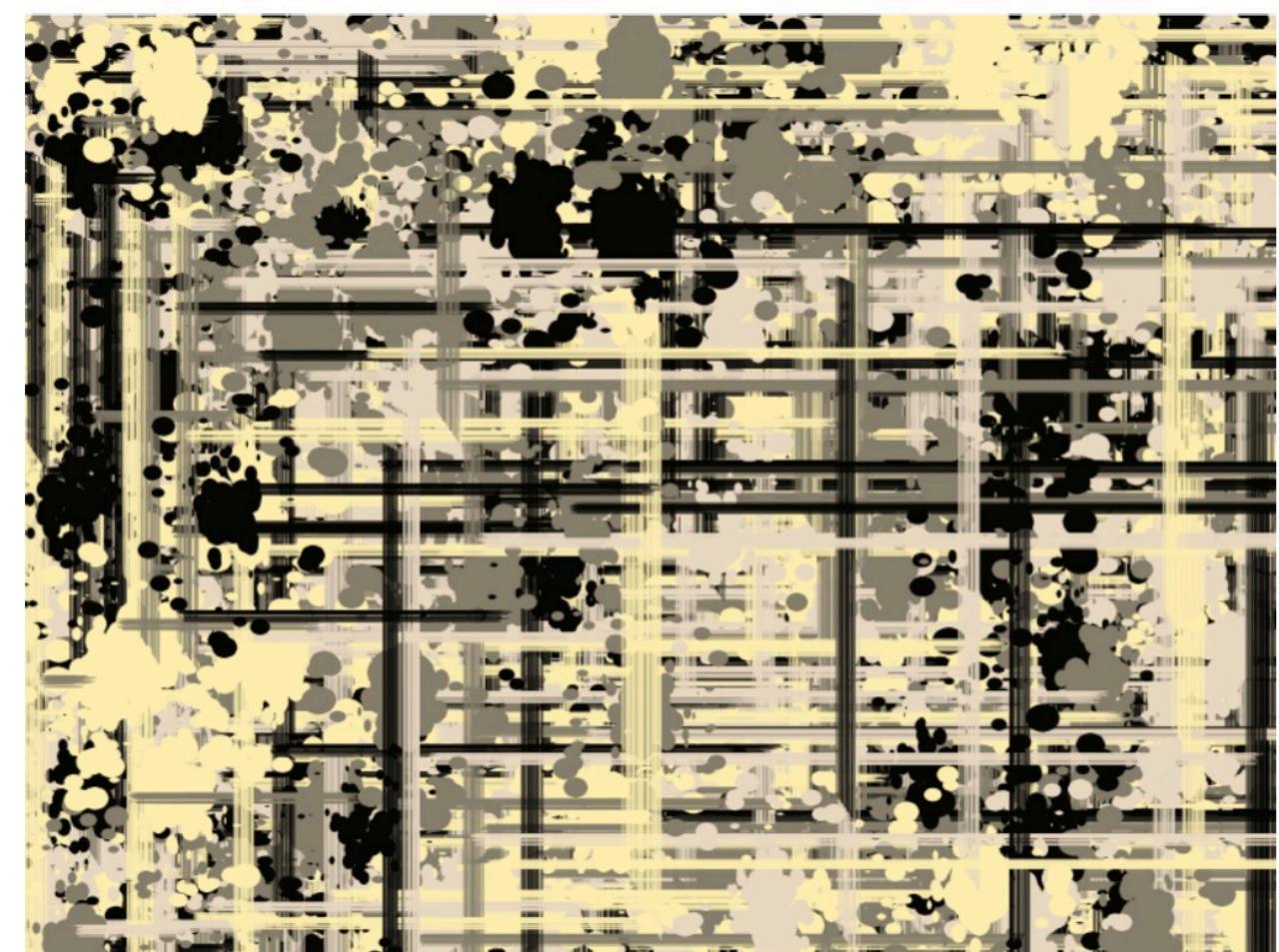
Xambó & Roma, 2020

- **13 composition dimensions** that deal with the role of the performer, the role of the audience, the location of sound and the type of feedback, among others.
- **5-point Likert items** related to the presence or absence of each component and its importance in the piece. Authors' discussions about four of their web-based pieces.
- This approach can be useful to **analyse** existing pieces as well as to **compose** new ones.

Do the Buzzer Shake



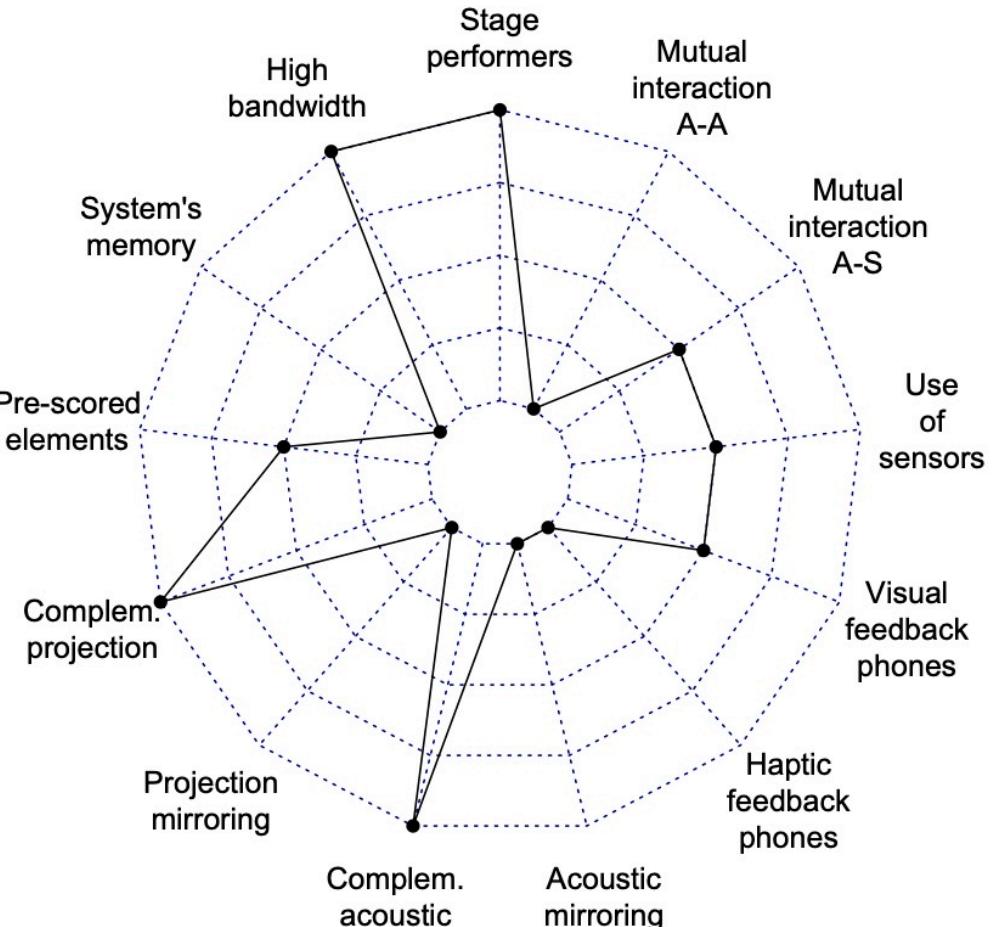
Hyperconnected Action Painting



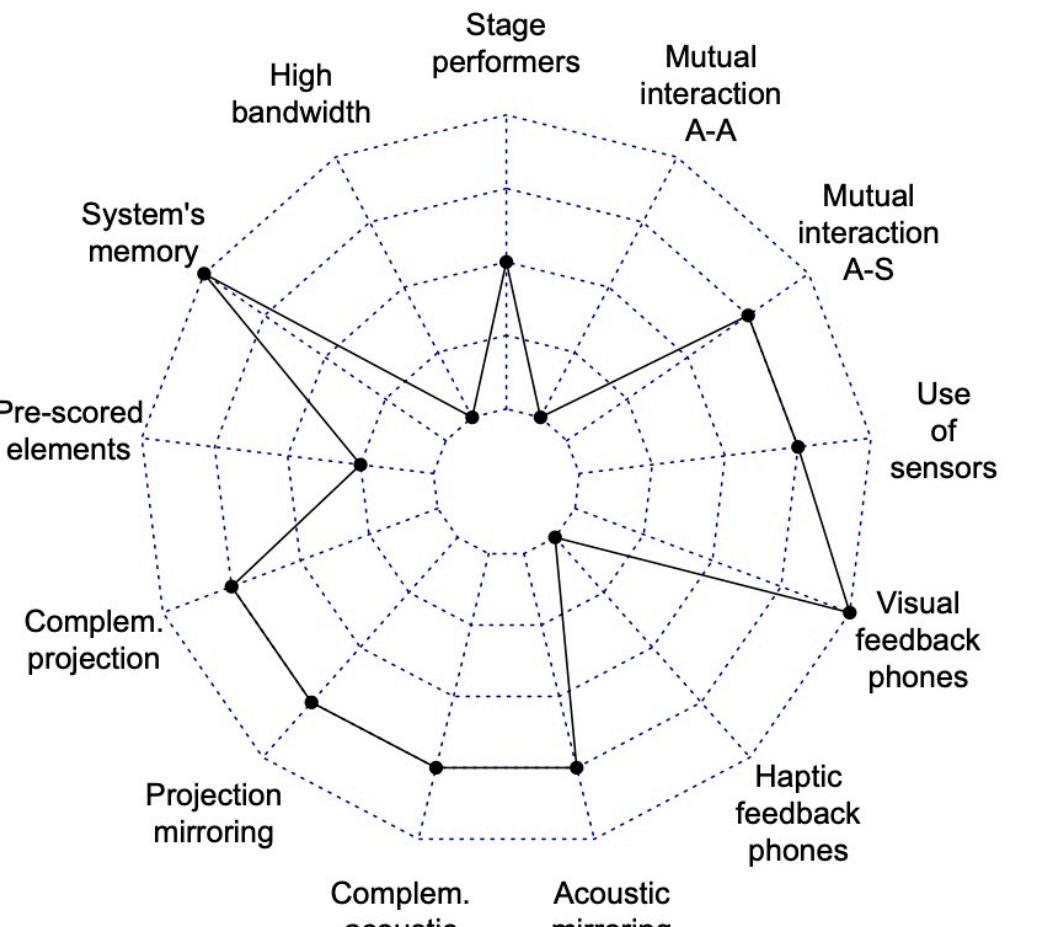
<https://youtu.be/jp48n3a3vfw>

<https://vimeo.com/241486914>

Imaginary Berlin



No Merge Conflicts



<https://youtu.be/v7FwOEy0jK4>

<https://youtu.be/n1T5dw71KQI>

Audience-Led Performances

The audience become composers/influencers.

Constellation

Madhavan & Snyder, 2016

- On the third segment of Constellation experimented with allowing the audience to meaningfully control music played by onstage performers.
- Created projected 8-beat percussive sequencer grids that could be crowdsourced.
- Performers interpret the grids. Audience members can vote on the exact sequence that the performers will play.

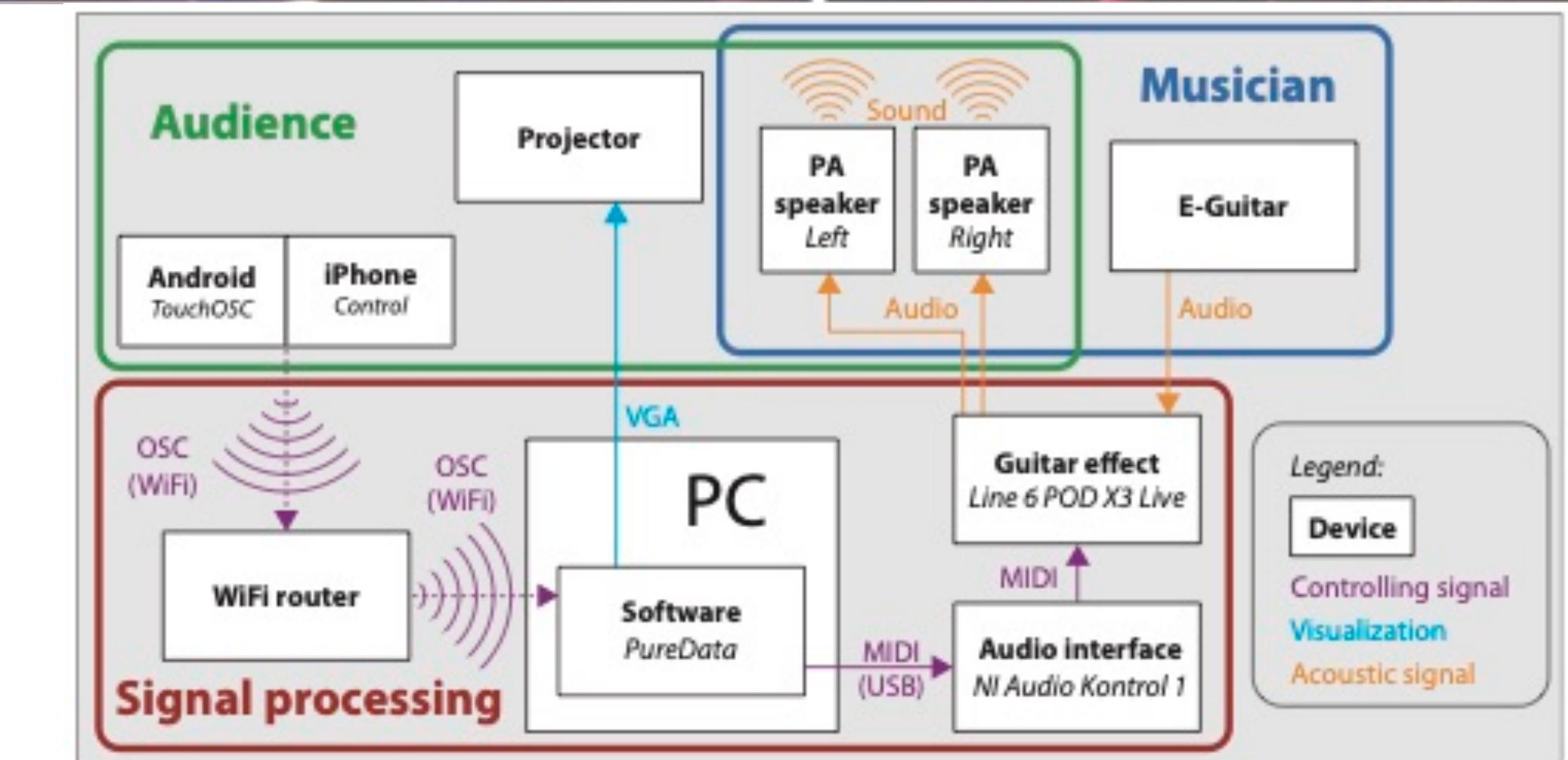


[https://smartech.gatech.edu/bitstream/handle/1853/54645/constellation_videostream.html?sequence=8&isAllowed=y \(8:00\)](https://smartech.gatech.edu/bitstream/handle/1853/54645/constellation_videostream.html?sequence=8&isAllowed=y)

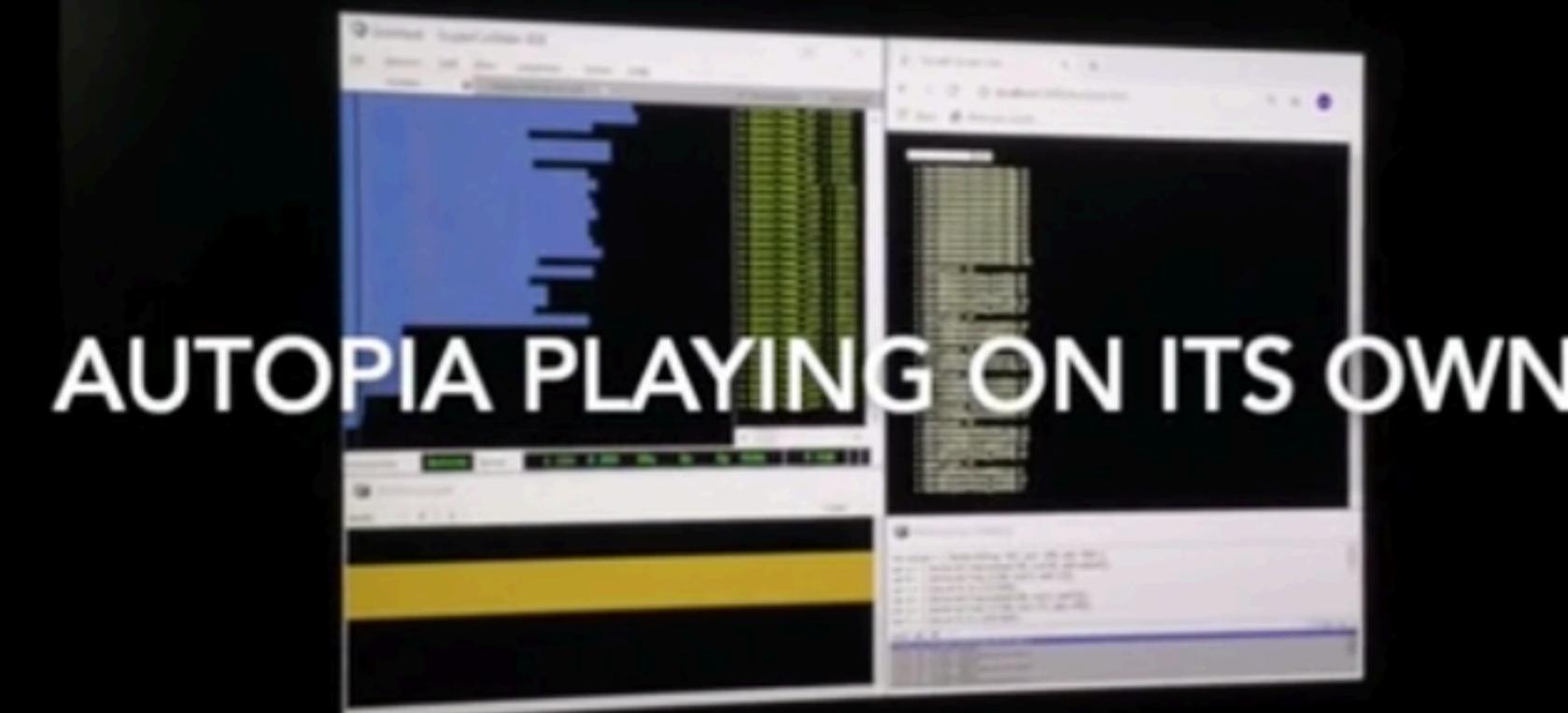
Who controls the guitar?

Hödl, Kayali & Fitzpatrick, 2012

- Smart phones are moved left and right to control the stereo panorama of the lead guitar sound coming out of the PA speaker.
- Some tensions found: musicians prefer to keep control, audience prefers to control.
- Great potential but subtle use is recommended.



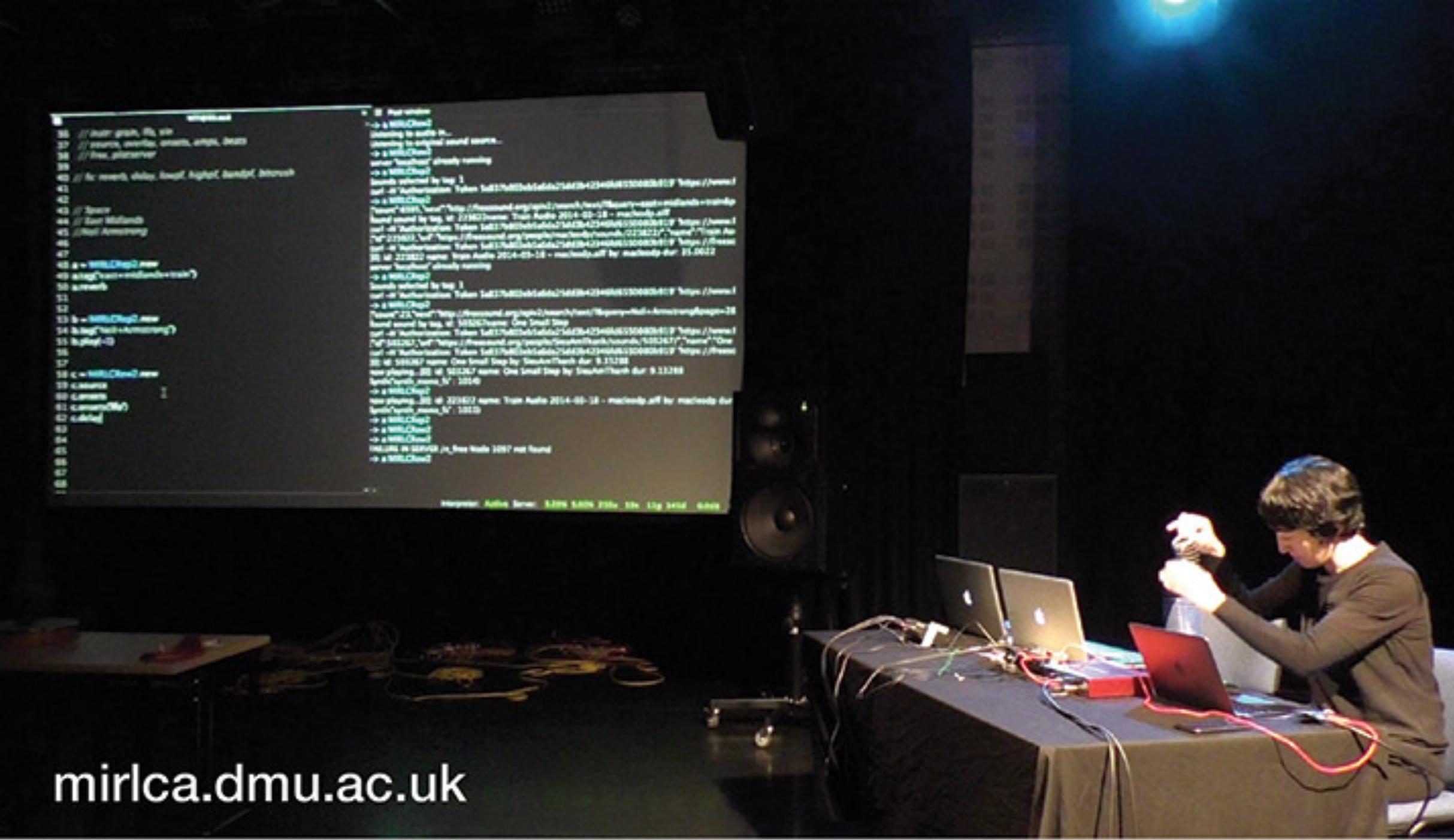
It uses template based genetic programming to write SuperCollider code with audience feedback determining the fitness function of the evolution for the code.



<https://vimeo.com/349044280>

Autopia: An AI Collaborator for Live Coding Music Performance

Lorway et al. (2019)



mirlca.dmu.ac.uk

MIRLCAuto: A Virtual Agent for Music Information Retrieval in Live Coding

Partners: IKLECTIK, Leicester Hackspace,
L'Ull Cec, Phonos, MTI²

Collaborators: TOPLAP Barcelona, FluCoMa, Freesound

Awarded with an EPSRC HDI Network Plus Grant

Partners

IKLECTIK [off-site]



phonos



Collaborators

toplaphc



freesound

Online Workshop Performing with a virtual agent: machine learning for live coding

London (IKLECTIK)

7/9/11.12.2020 - 19:00-21:00 (GMT)

Barcelona (L'Ull Cec)

11/13/15.1.2021- 19:00-21:00 (CET)

Leicester (Leicester Hackspace)

25/27/29.1.2021 - 19:00-21.00 (GMT)

More info at:

mirlca.dmu.ac.uk/workshops

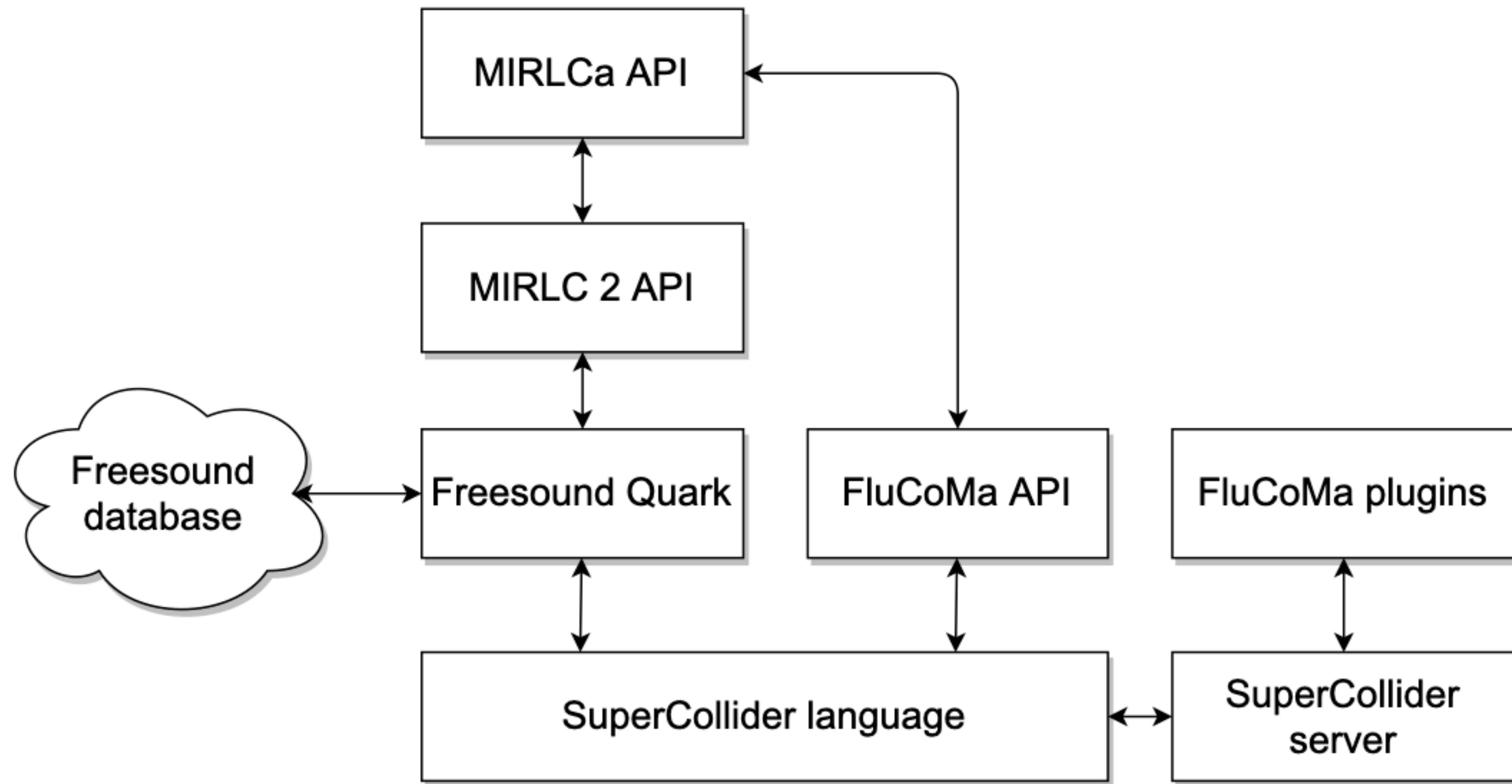


Diagram of the system's architecture (Xambó et al. 2021).

```

2 // hydrophones
3
4 a = MIRLCa.new
5 a.tag("hydrophone+running+water")
6 a.similar
7 a.similarauto(1, 3, 10)
8 a.autochopped(20, 1)
9 a.bitcrush
10 a.bypass
11 a.fadeout(30)
12
13 b = MIRLCa.new
14 b.tag("hydrophone+running+river")
15 b.similar
16 b.autochopped(20, 1)
17 b.delay
18 b.bypass
19 b.playauto(4, 2)
20 b.fadeout(30)
21
22
23 c = MIRLCa.new
24 c.tag("hydrophone+glass+water")
25 c.similar
26 c.similarauto(0,3,10)
27 c.playauto(10,10)
28 c.reverb
29 c.fadeout(20)
30

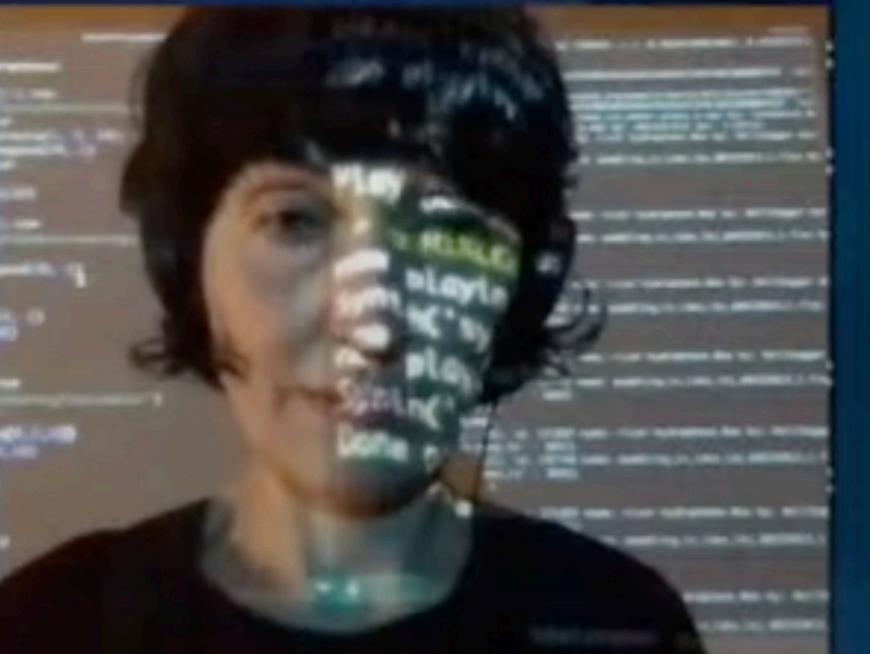
```

```

Test complete
503261
curl -H 'Authorization: Token 5a837b803eb5a6da25dd3b42346fd6550080b919' 'htt
MIRLCa: Do you like this sound?
{"id":503261,"url":"https://freesound.org/people/akester612/sounds/503261/",'
curl -H 'Authorization: Token 5a837b803eb5a6da25dd3b42346fd6550080b919' 'htt
[0]: id: 488319 name: hydrophone_mono_ice_water_glass_3.wav by: leonsptvx du
[1]: id: 503261 name: Water Bottle.wav by: akester612 dur: 5.94211
now playing...[0]: id: 271897 name: river hydrophone.Wav by: NeilSeggar dur:
Synth('synth_mono_fs' : 1031)
now playing...[1]: id: 197748 name: paddling_in_lake_lbj_08232013_1.flac by:
Synth('synth_mono_fs' : 1036)
-> a MIRLCa
-> a MIRLCa
0.2107161283493
now playing...[0]: id: 271897 name: river hydrophone.Wav by: NeilS...
Synth('synth_mono_fs' : 1031)
now playing...[1]: id: 197748 name: paddling_in_lake_lbj_08232013_...
Synth('synth_mono_fs' : 1036)
Play backwards <<
0.99745547771454
now playing...[0]: id: 271897 name: river hydrophone.Wav by: NeilS...
Synth('synth_mono_fs' : 1031)
now playing...[1]: id: 197748 name: paddling_in_lake_lbj_08232013_...
Synth('synth_mono_fs' : 1036)
Play forwards >>
0.35729622840881
now playing...[0]: id: 271897 name: riv...
Synth('synth_mono_fs' : 1031)
now playing...[1]: id: 197748 name: pad...
Synth('synth_mono_fs' : 1036)
Play backwards <<
0.34760677814484
now playing...[0]: id: 271897 name: riv...
Synth('synth_mono_fs' : 1031)
now playing...[1]: id: 197748 name: pad...
Synth('synth_mono_fs' : 1036)
Play forwards >>
0.8658105134964

```

IKLECTIK [off-site]



Collaboration with IKLECTIK in *virtual* London

Performance by Anna Xambó.

<https://youtu.be/ZRqNfgg1HU0>

MIRLCAuto

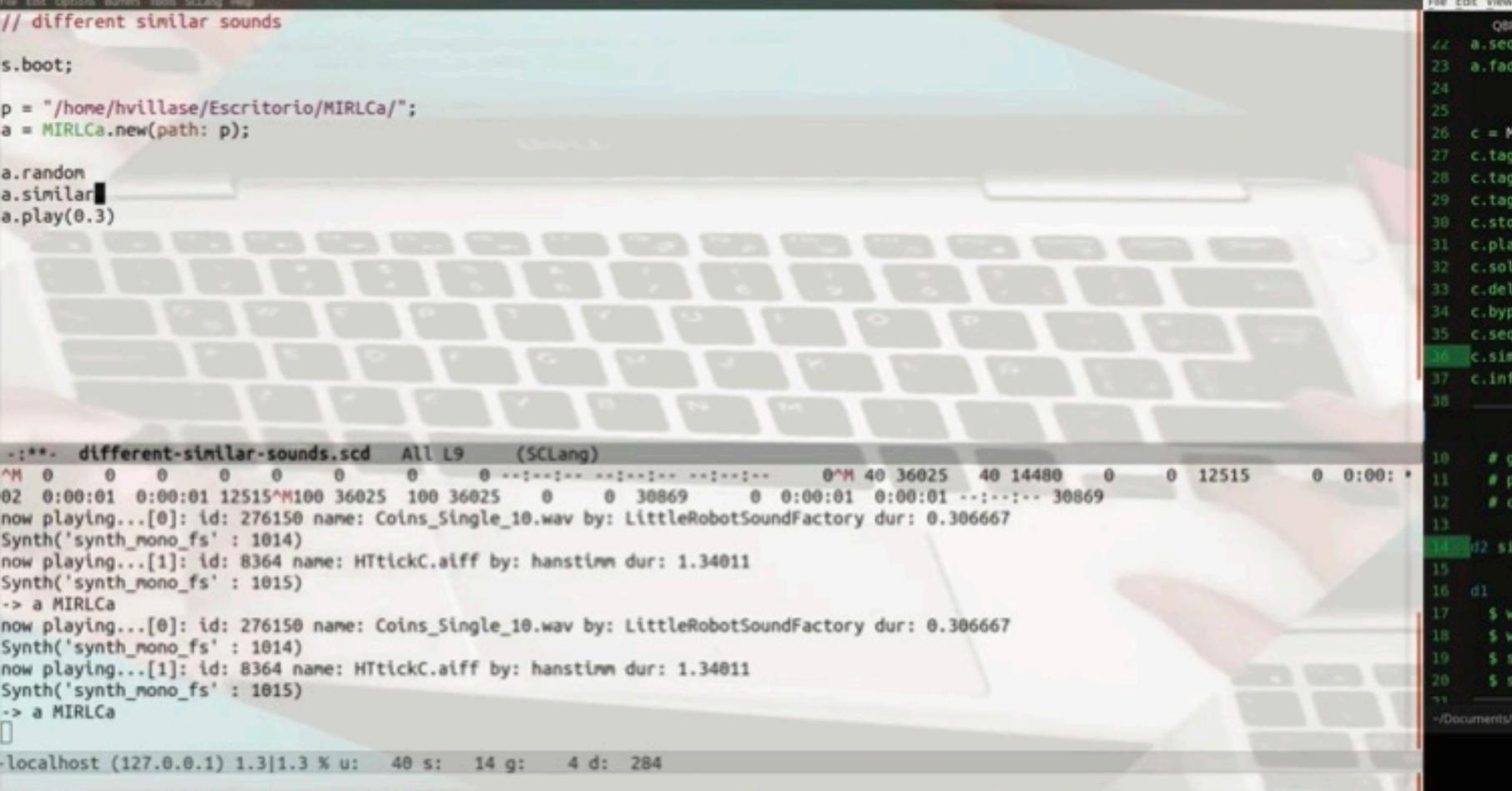
The three tenets @hdinetwork

- **Legibility:** *Making the processes of sharing data about a person, and others' analysis and use of that data, comprehensible to that person.* **Show us your screens. Code and processes should be clear.**
- **Agency:** *Giving a person the capacity to interact with their systems so as to control and correct the above-mentioned processes.* **Learning and influencing from 'situated musical actions'.**
- **Negotiability:** *Giving a person the capacity to interact with the people who do the above-mentioned analysis and use, so as to change and correct what those people do.* **Co-design as an ongoing conversation.**

<https://hdi-network.org/about/>

```
2 // hydrophones
3
4 a = MIRLCa.new
5 a.tag("hydrophone+running+water")
6 a.similar
7 a.similarauto(1, 3, 10)
8 a.autochopped(20, 1)
9 a.bitcrush
10 a.bypass
11 a.fadeout(30)
12
13 b = MIRLCa.new
14 b.tag("hydrophone+running+river")
15 b.similar
16 b.autochopped(20, 1)
17 b.delay
18 b.bypass
19 b.playauto(4, 2)
20 b.fadeout(30)
21
22
23 c = MIRLCa.new
24 c.tag("hydrophone+glass+water")
25 c.similar
26 c.similarauto(0,3,10)
27 c.playauto(10,10)
28 c.reverb
29 c.fadeout(20)
30

Test complete
503261
curl -H 'Authorization: Token 5a837b883eb5a6d025dd3b42346fd65500880b919' 'http://mirlc.ca/api/sounds'
MIRLCa: Do you like this sound?
[{"id":503261,"url":"https://freesound.org/people/akester612/sounds/503261/"},
curl -H 'Authorization: Token 5a837b883eb5a6d025dd3b42346fd65500880b919' 'http://mirlc.ca/api/sounds'
[0]: id: 488319 name: hydrophone_mono_ice_water_glass_3.wav by: leonsptvx d
[1]: id: 503261 name: Water Bottle.wav by: akester612 dur: 5.94211
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Play backwards <<
0.34768677814484
now playing...[0]: id: 271897 name: river hydrophone.Wav by: NeilSeggar dur: 1031
Synth('synth_mono_fs' : 1031)
now playing...[1]: id: 197748 name: paddling_in_lake_lbj_08232013_1.flac by: Synth('synth_mono_fs' : 1036)
Play forwards >>
0.8658105134964
```



The screenshot displays two code editors and a terminal window. The left editor shows SuperCollider code for sound file management and playback. The right editor shows TidalCycles code for audio synthesis. Below the editors is a terminal window showing curl command output and a waveform visualization.

```
File Session Edit View Language Segver Help
superdirt_startup x main.scd x practical.scd x SuperDirt.sc x MIRLCRep.sc x +
```

```
50 -repl.play;
51 10.wait;
52 -dirt.loadSoundFiles(-root ++ **);
53 110.wait;
54
55 -path2 = Platform.userHomeDir ++ "experimentoMIRLC/path2/";
56 File.mkdir(-path2);
57 -rep2 = MIRLCRep.new(path: -path2);
58 -resetToken.();
59 -rep2.tag("sunset",6);
60 -rep2.play;
61 10.wait;
62 -dirt.loadSoundFiles(-root ++ **);
63 110.wait
64 }.play
65 }
66
67 s.scope
```

```
Find: sequen
```

```
Post window Auto Scr
```

```
[3]: id: 533422 name: pajaros tarde .wav by: laurasduque98 dur: 12.3253
[4]: id: 519614 name: Piano Happy Solo Sunset Loop Mastered by: szegvari
{"id":545397,"url":"https://freesound.org/people/Santi_SF/sounds/545397/"}
curl -H "Authorization: Token fv54l2ozLlqIeslSuVSISKwUdwMy4D3910r4lY5" -
[0]: id: 436677 name: Sunset Walk by: KiluaBoy dur: 76.8
[1]: id: 395485 name: Sunrise to sunset.mp3 by: NikosDemetriou dur: 7200.
[2]: id: 513740 name: 20200414 Blackbirds at sunset by: BarcelonaConfinem
[3]: id: 533422 name: pajaros tarde .wav by: laurasduque98 dur: 12.3253
[4]: id: 519614 name: Piano Happy Solo Sunset Loop Mastered by: szegvari
[5]: id: 545397 name: Tropical Forest Sunset Anmbient by: Santi_SF dur: 1
```

```
experimentoMIRLC.tidal * LF UTF-8 TidalCycles GitHub Git (0) 2 up
```

```
d1
2 $ slow 2
3 $ chop 64
4 $ s "path0:3"
5 # release 0.5
6 # lpf (range 500 10000 $ perlin)
7 # panbus 0 (slow 3 $ tri)
8 # octave 6
-- # end 0.325
```

```
p = "/home/s/workshop/MIRLC"
a = MIRLC
a.random
a.play(0)
a.similar
a.autocho
a.mute
b = MIRLC
b.random
b.similar
b.autocho
b.play(1)
```

```
fadeout
= MIRLCa.new
lowpf
tag("gabba",5)
volume(0.25)
play(1)

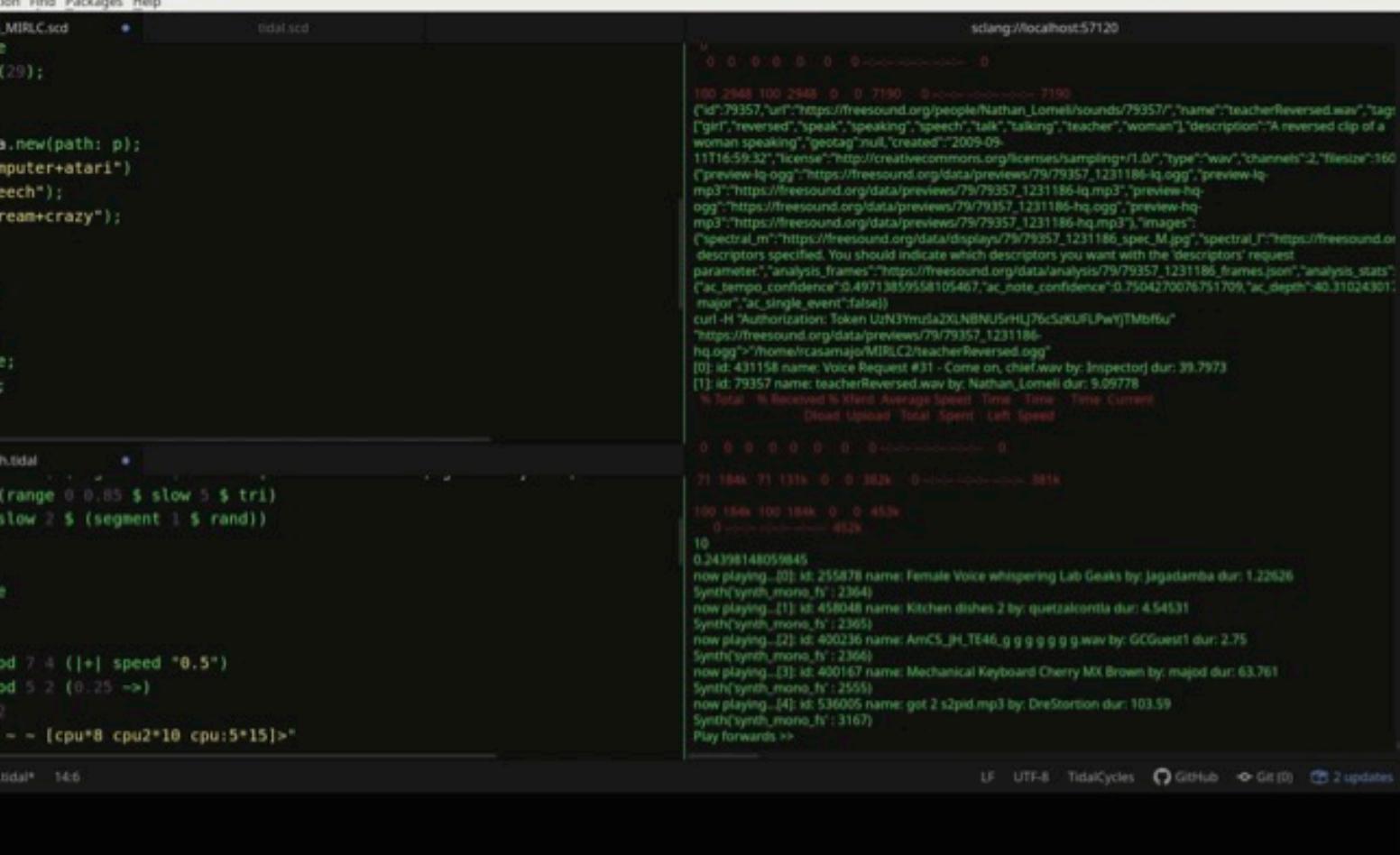
= MIRLCa.new
lowpf
tag("gabba",2)
volume(0.2)
play(1)

= MIRLCa.new
lowpf
tag("gabba",4)
volume(0.2)
```

now playing...[1]: id: 9
Synth('synth_mono_fs' :
-> a MIRLCa

now playing...[0]: id: 9
Synth('synth_mono_fs' :
now playing...[1]: id: 9
Synth('synth_mono_fs' :
now playing...[2]: id: 9
Synth('synth_mono_fs' :
now playing...[3]: id: 9
Synth('synth_mono_fs' :
now playing...[4]: id: 9
Synth('synth_mono_fs' :
now playing
Synth('synth_mono_fs' :
now playing
Synth('synth_mono_fs' :
-> a MIRLCa
-> a MIRLCa





```
van/documents/livecoding/mirlc/lullcecc-workshop/json_file now playing...[1]: id: 106680 name: Knall2_lzu2.wav by: Nikoline dur:  
w(path: p) Synth('synth_mono_fs' : 1032)  
Play backwards <<  
2  
0.74223935604095  
now playing...[0]: id: 270947 name: Holy Grail Hall 4 Big.wav by: ehpr  
Synth('synth_mono_fs' : 1029)  
now playing...[1]: id: 106680 name: Knall2_lzu2.wav by: Nikoline dur:  
Synth('synth_mono_fs' : 1032)  
Play forwards >>  
-> a MIRLCa  
2  
0.23965263366699  
now playing...[0]: id: 270947 name: Holy Grail Hall 4 Big.wav by: ehpr  
Synth('synth_mono_fs' : 1029)  
now playing...[1]: id: 106680 name: Knall2_lzu2.wav by: Nikoline dur:  
Synth('synth_mono_fs' : 1032)  
Play backwards <<  
2  
0.0949381589888953  
now playing...[0]: id: 270947 name: Holy Grail Hall 4 Big.wav by: ehpr  
Synth('synth_mono_fs' : 1029)  
now playing...[1]: id: 106680 name: Knall2_lzu2.wav by: Nikoline dur:  
Synth('synth_mono_fs' : 1032)  
Play forwards >>  
2  
0.3455775976181  
now playing...[0]: id: 270947 name: Holy Grail Hall 4 Big.wav by: ehpr  
Synth('synth_mono_fs' : 1029)  
now playing...[1]: id: 106680 name: Knall2_lzu2.wav by: Nikoline dur:  
Synth('synth_mono_fs' : 1032)  
Play backwards <<  
2  
now playing...[0]: id: 270947 name: Holy Grail Hall 4 Big.wav by: ehpr  
Synth('synth_mono_fs' : 1029)  
now playing...[1]: id: 106680 name: Knall2_lzu2.wav by: Nikoline dur:  
Synth('synth_mono_fs' : 1032)
```

Audience Engagement?

Legibility?

Agency?

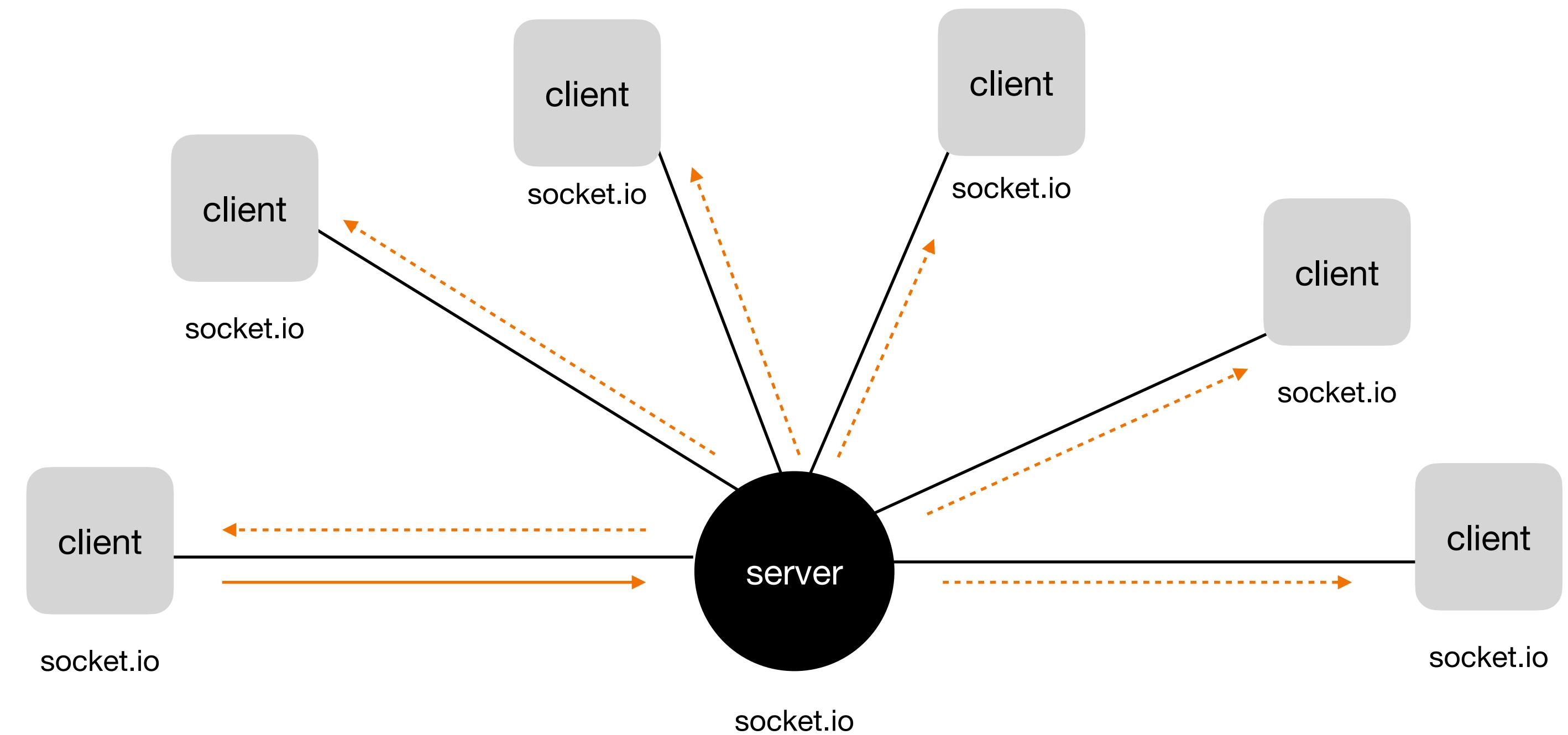
Negotiability?

Hands-on Demo

WebSockets & MIRLCa

WebSockets and Socket.io

- **WebSocket** is a computer communications protocol, providing full-duplex communication channels over a single TCP connection.
 - Socket.io is a JavaScript library used to enable communication between browser clients and the server (WebSockets).





mirica

Messages 0

Settings Log Out

Upload Sounds

search sounds

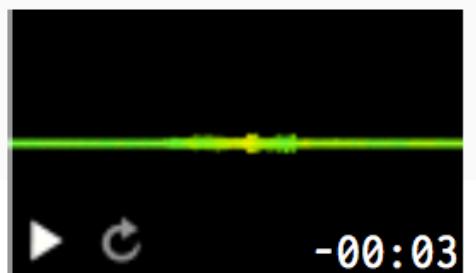
Home

Sounds

Forums

People

Help

Random sound of the day**Zip Opening**

Portfolio zip opening

[portfolio office zip opening](#)

paulocorona

February 2nd,
2016
266 downloads
2 comments**Freesound Blog****SIAS project: Sound Art in Colombia**July 6th, 2020 [Proyecto SIAS](#)

[Guest Blog post by Jorge Mario Díaz Matajira, director of the SIAS project] SIAS stands for "Information System about Sound Art in Colombia" (from the spanish "Sistema de Información sobre el Arte Sonoro en Colombia"). SIAS (<http://uan.sainethost.com/>) is a project that ... Continue reading → [Read Full Entry](#)

Barcelona Confinement SoundscapeApril 29th, 2020 [ilaria](#)

[Guest Blog post by Ilaria Sartori and Gianni Ginesi] Dear fellow Freesounders, May we introduce Barcelona Confinement Soundscape, a collaborative soundmap and soundscape-related network of researchers, artists and neighbors who stay home and actively listen, record and reflect on soundscape ... Continue reading → [Read Full Entry](#)

Welcome to Freesound

Freesound is a collaborative database of Creative Commons Licensed sounds. Browse, download and share sounds.



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your Freesound
T-Shirt!

Select your store:

Europe

US Canada and Asia



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Donate Now

Active Forum Threads<https://freesound.org>

MIRLCa + chat

Go to: <http://crowdj.net:4000>

Type your username

Send messages with suggestions for “tags”

Take-Away Message

- Promising and emerging field of research with multiple approaches possible, both on-site and online, ranging from **performing audiences to composing audiences**.

References

- Barbosa, A. (2003). Displaced soundscapes: A survey of network systems for music and sonic art creation. *Leonardo Music Journal*, 13, 53–59.
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- Madhavan N, Snyder J. (2016) Constellation: A musical exploration of phone-based audience interaction roles. In *Proceedings of the International Web Audio Conference*.
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- Xambó, A., Roma, G., Roig, S., Solaz, E. (Accepted, 2021) "Live Coding with the Cloud and a Virtual Agent". *Proceedings of the New Interfaces for Musical Expression*.

Web Links

- Gerard Roma, Anna Xambó and Jason Freeman: Do the Buzzer Shake: <https://youtu.be/jp48n3a3vfw>
- Hyperconnected Action Painting: <https://vimeo.com/241486914>
- Imaginary Berlin by Anna Xambó: <https://youtu.be/v7FwOEy0jK4>
- No merge conflicts by Gerard Roma: <https://youtu.be/n1T5dw71KQI>
- Constellation by Madhavan & Snyder: https://smartech.gatech.edu/bitstream/handle/1853/54645/constellation_videostream.html?sequence=8&isAllowed=y
- Autopia: An AI Collaborator for Live Coding Music Performances (Demo performance): <https://vimeo.com/349044280>
- MIRLCAuto: <https://mirlca.dmu.ac.uk>
- About the HDI Network Plus: <https://hdi-network.org/about>
- Socket.io: <https://socket.io>
- Freesound: <https://freesound.org>



Thank you!

Image source: Animalz