DE MONTFORT UNIVERSITY LEICESTER

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

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

What Is Network Music?

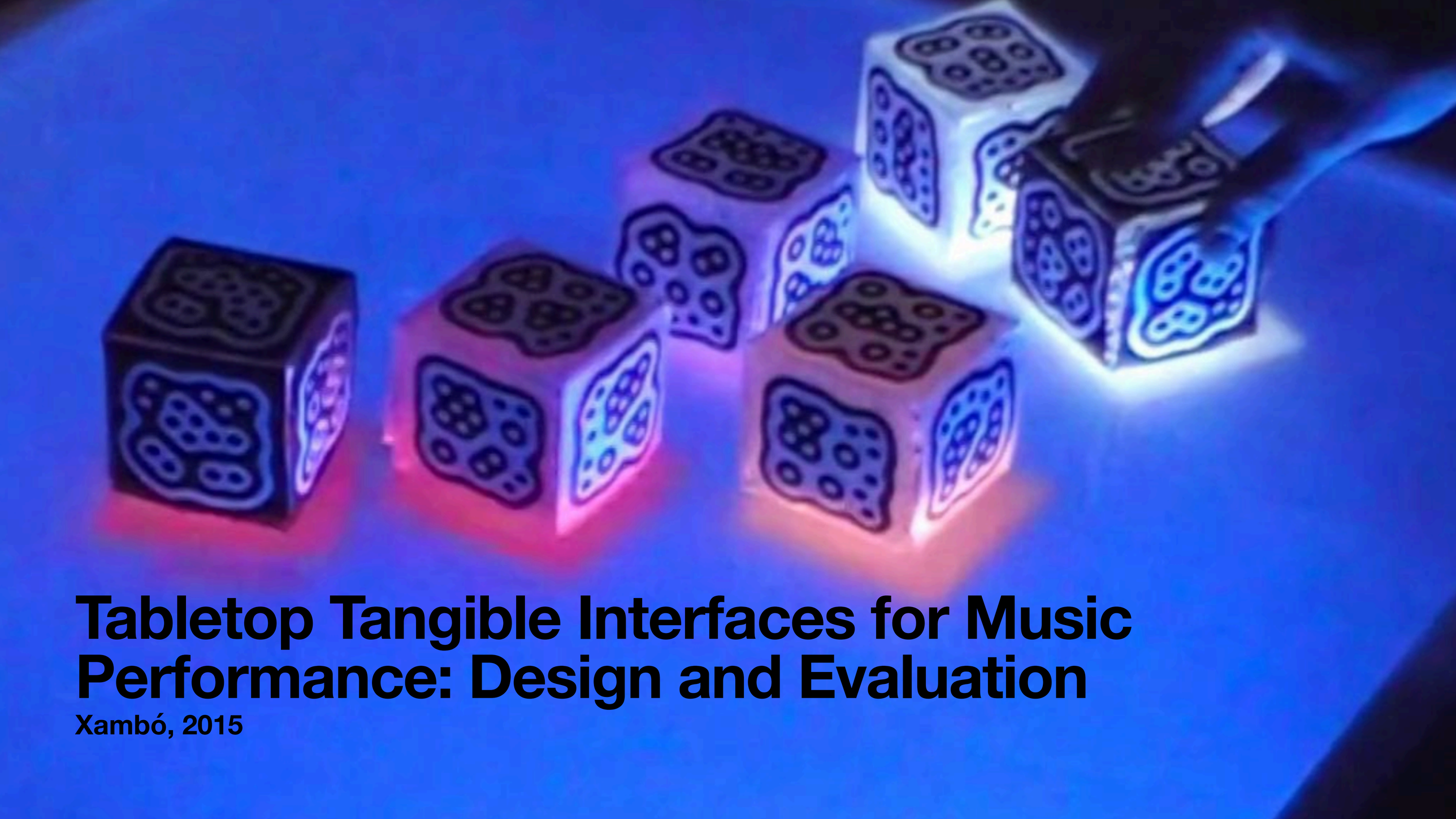
- **Musical networks (local or remote)**: Musicians and computers connected by a network, independent of the musicians' locations.

- **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

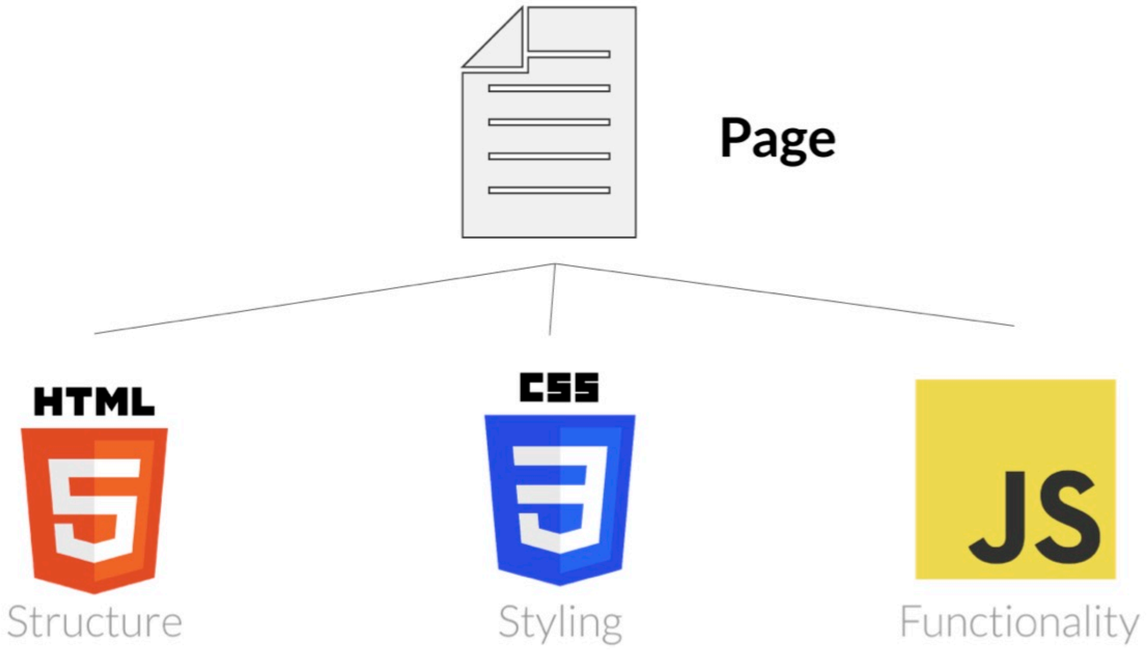
- **1951** Imaginary landscape no. 4 (John Cage)
- **1964** Mikrophonie I (Stockhausen)
- **1978** Concert at the Blind Lemon by The League of Automatic Music Composers
- **1998** Hub 2: The MIDI Hub by The Hub
- **2003** ensemble powerbooks_unplugged / Republic 111
- **2008** SLOrk ensemble
- **2014**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

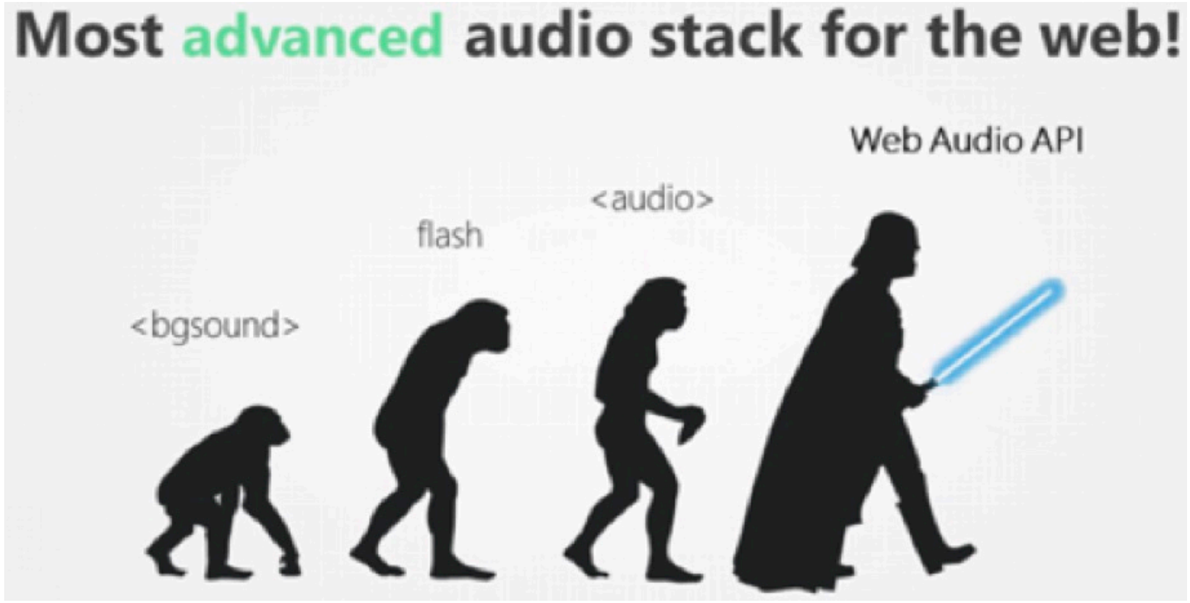


Tabletop Tangible Interfaces for Music Performance: Design and Evaluation

Xambó, 2015

Web Standards & Web Audio API



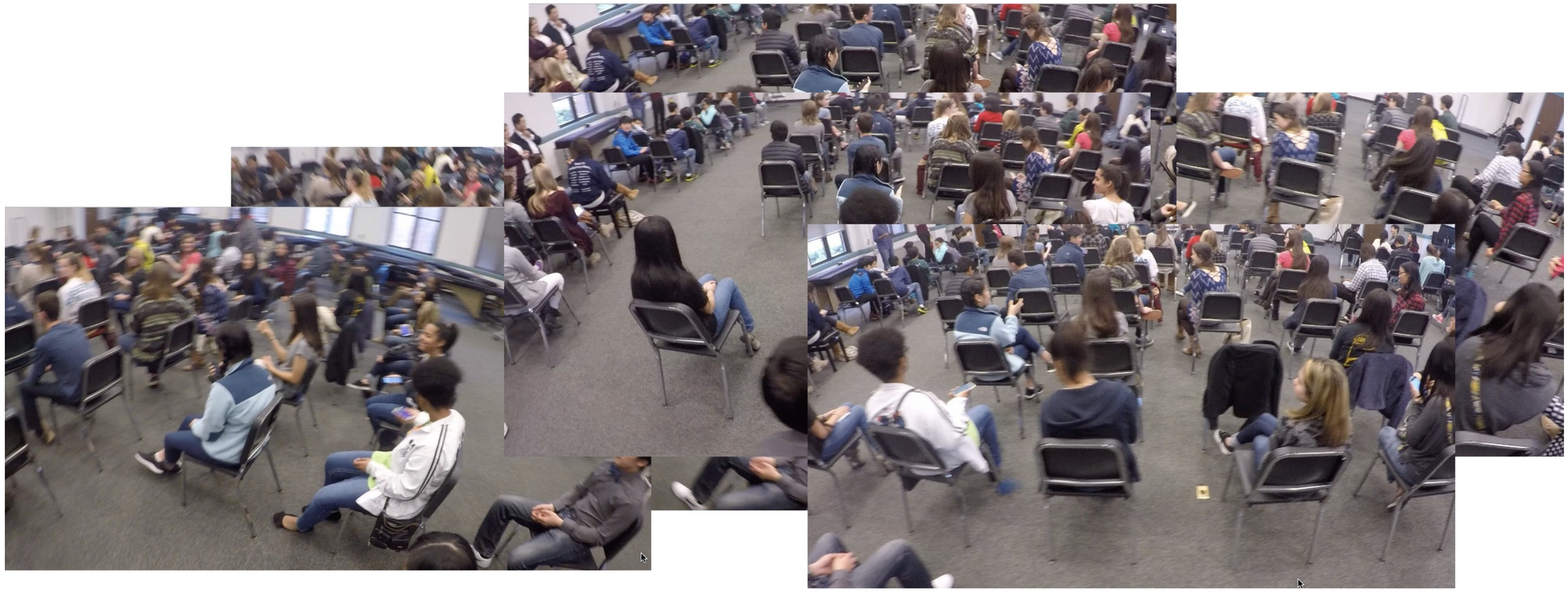


Outline

- 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!

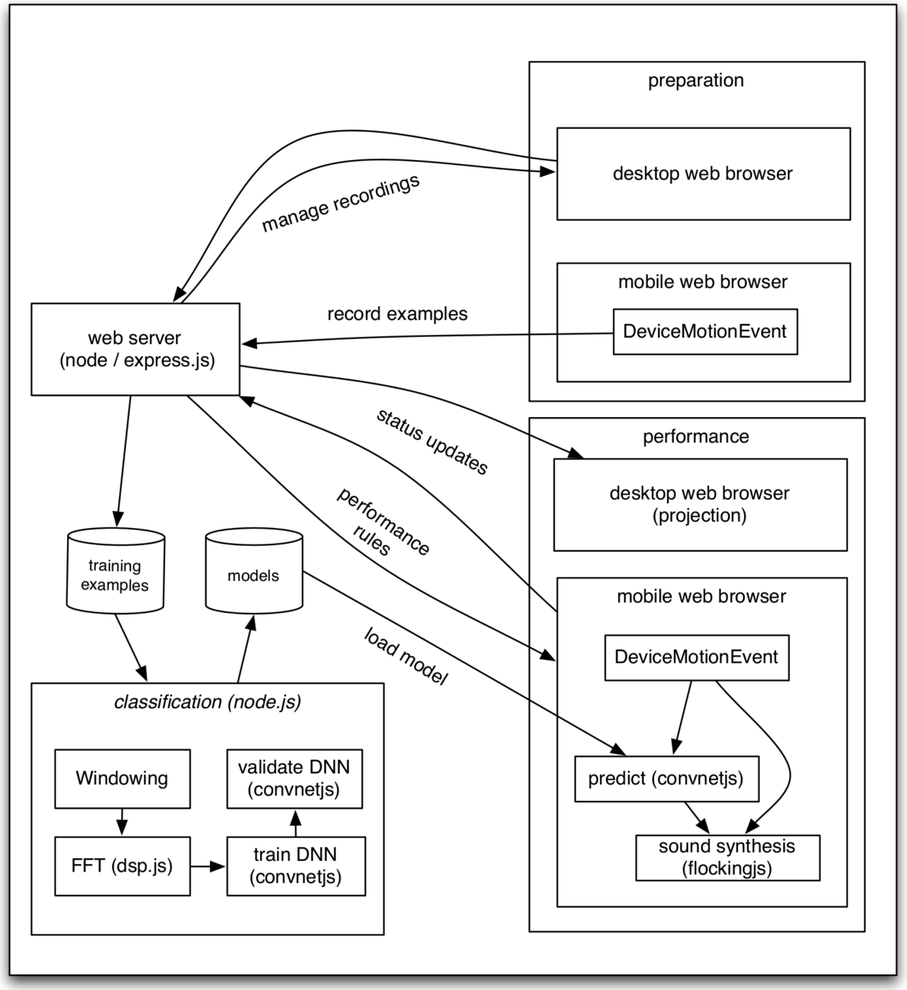
Participatory Mobile Pieces

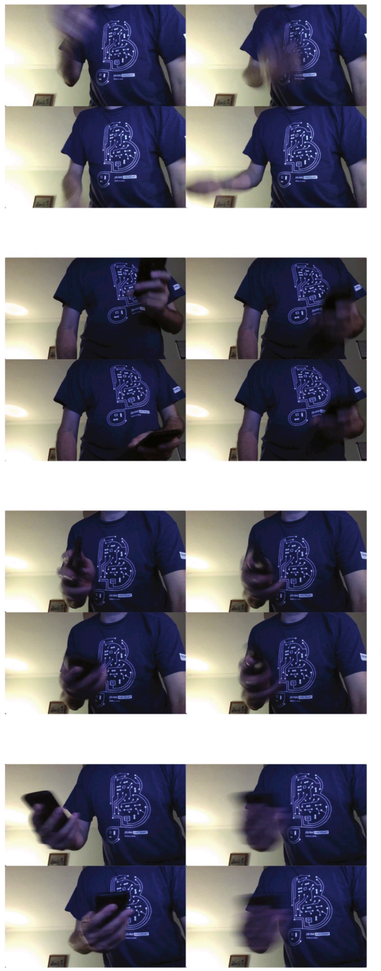
Algorithmic processes / Rules for music creation

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.



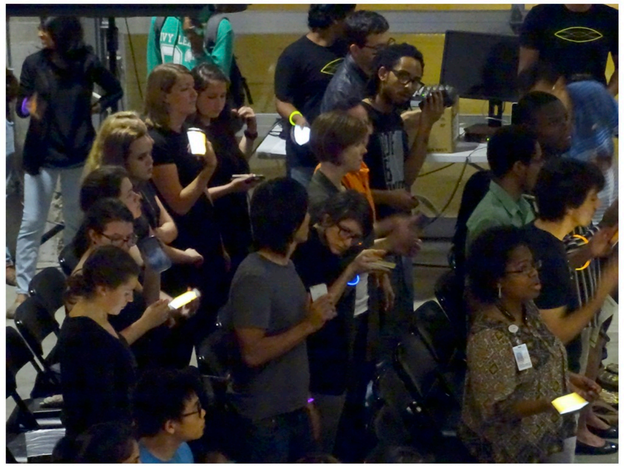


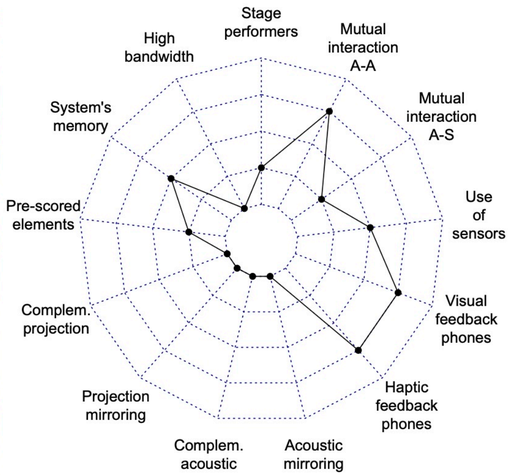
Performing Audiences: Composition Strategies

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.

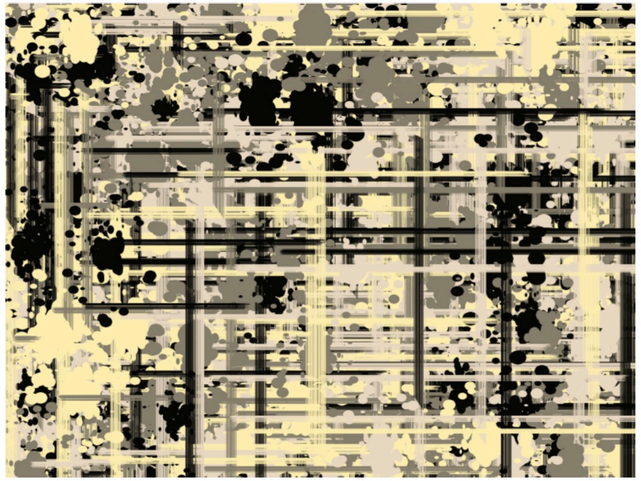
Do the Buzzer Shake

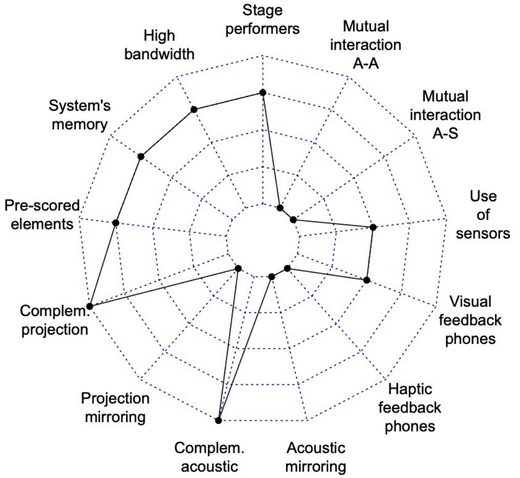




https://youtu.be/jp48n3a3vfw

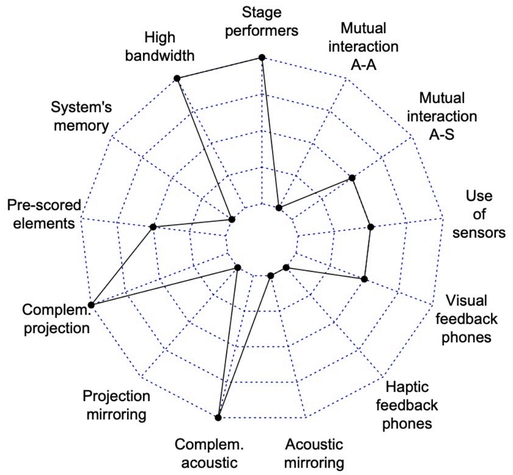
Hyperconnected Action Painting





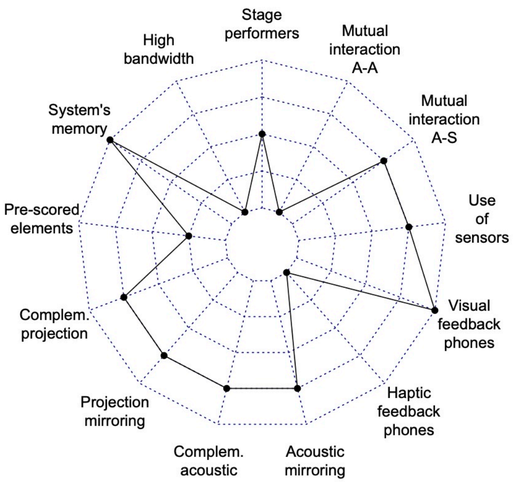
https://vimeo.com/241486914

Imaginary Berlin



https://youtu.be/v7FwOEy0jK4

No Merge Conflicts



https://youtu.be/n1T5dw71KQI

Audience-Led Performances

The audience become composers/influencers.

Constellation

Madhavan & Snyder, 2016

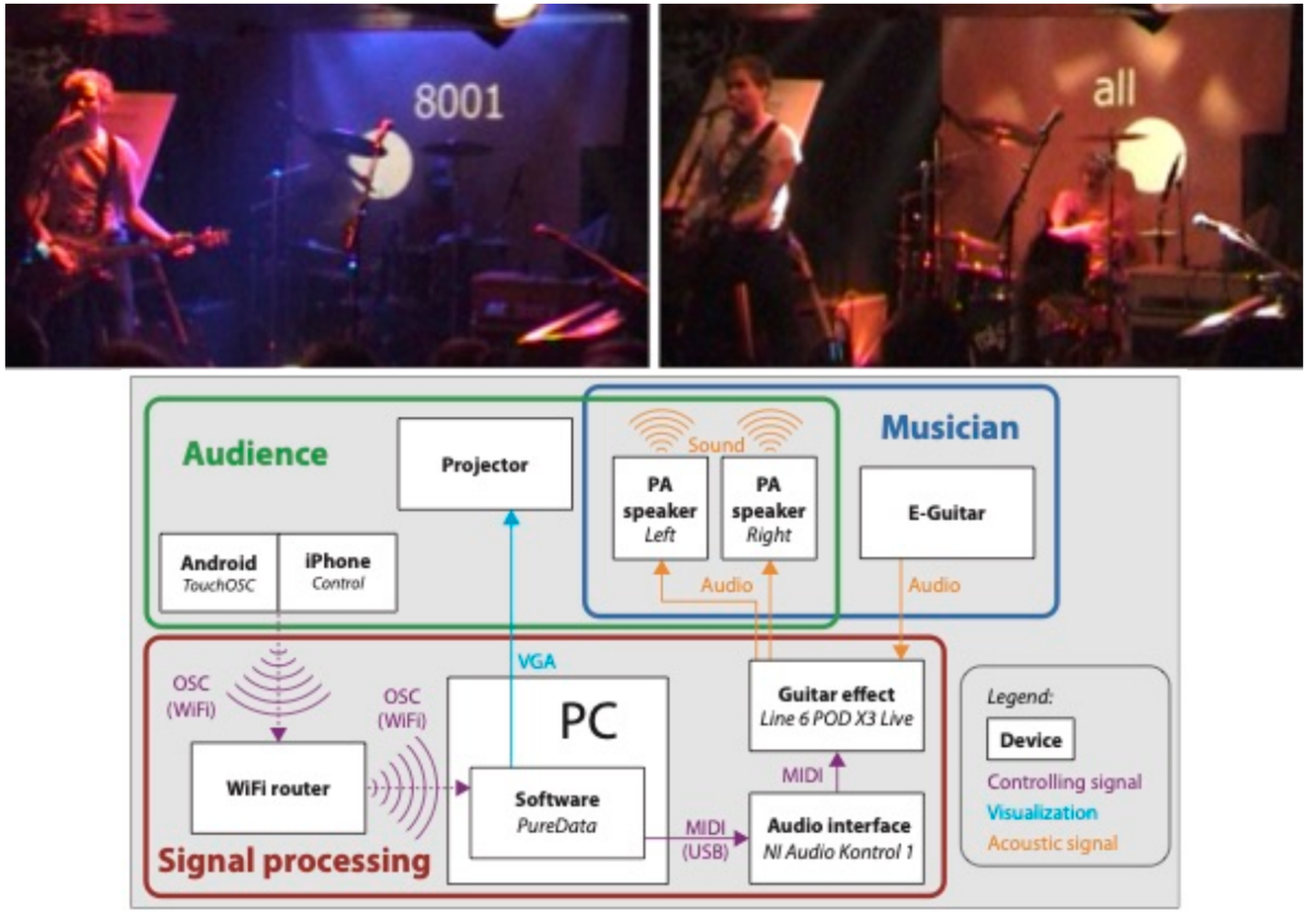
- On the third segment of Constellation experimented with allowing the audience to meaningfully control music played by onstage performers.
- Created projected 8-beat percussive sequencer grids that could be crowdsourced.
- Performers interpret the grids. Audience members can vote on the exact sequence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

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

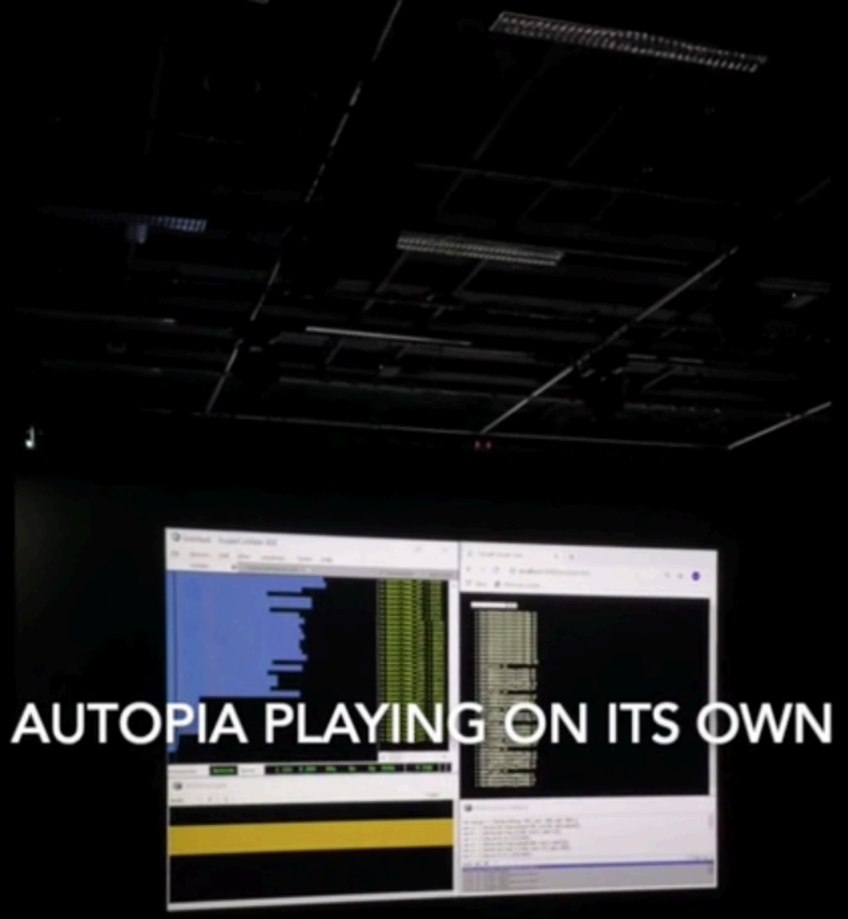
Who controls the guitar?

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.



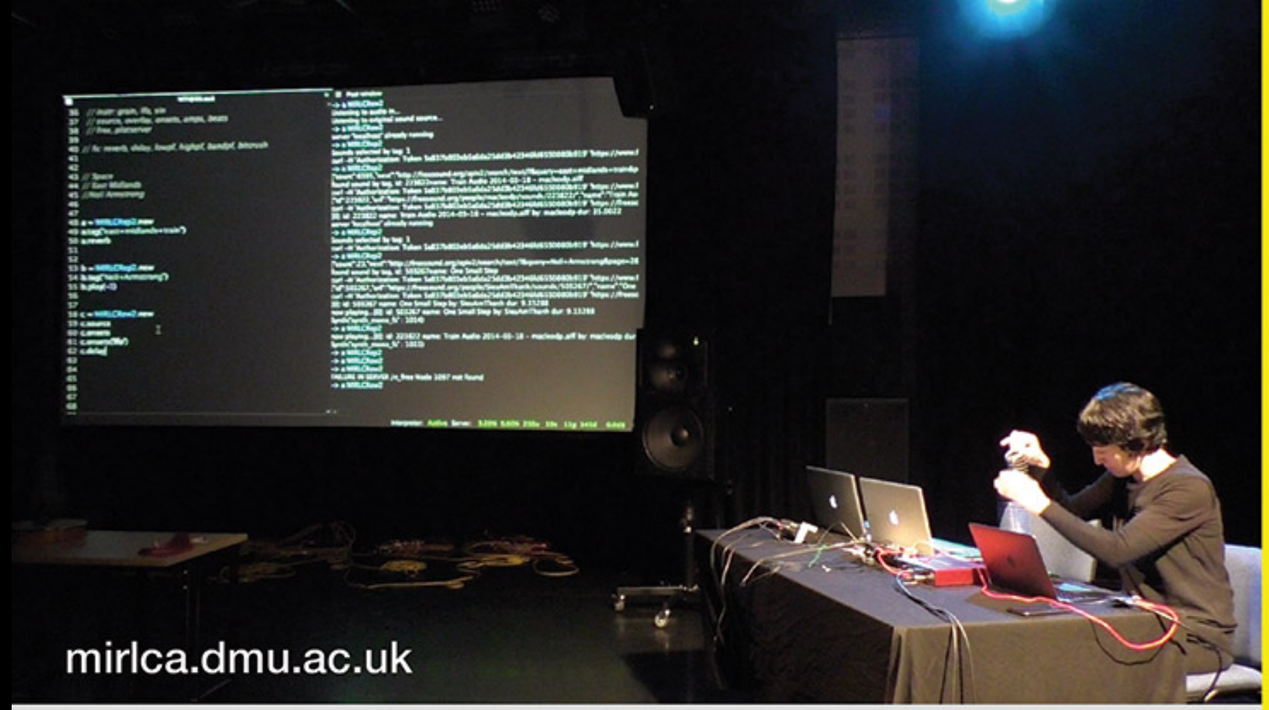
It uses template based genetic programming to write SuperCollider code with audience feedback determining the fitness function of the evolution for the code.



https://vimeo.com/349044280

Autopia: An AI Collaborator for Live Coding Music Performance

Lorway et al. (2019)



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

Partners: IKLECTIK, Leicester Hackspace, L'Ull Cec, Phonos, MTI^2

Collaborators: TOPLAP Barcelona, FluCoMa, Freesound

Awarded with an EPSRC HDI Network Plus Grant

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

Partners

IKLECTIK [off-site]

phonos

MTI^2 INSTITUTE FOR SONIC CREATIVITY

Collaborators

toplap BCN

freesound

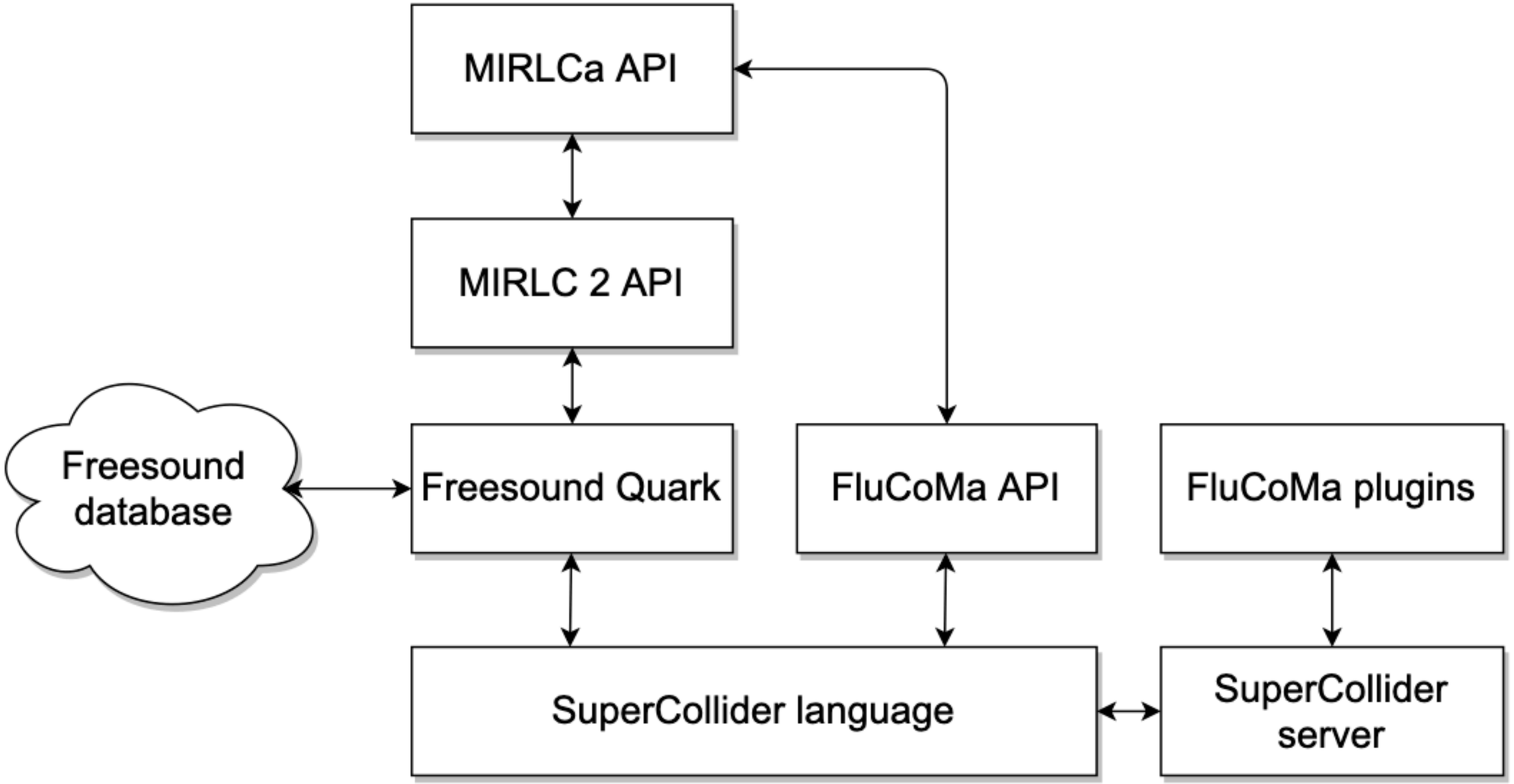


Diagram of the system's architecture (Xambó et al. 2021).

IKLECTIK [off-site]

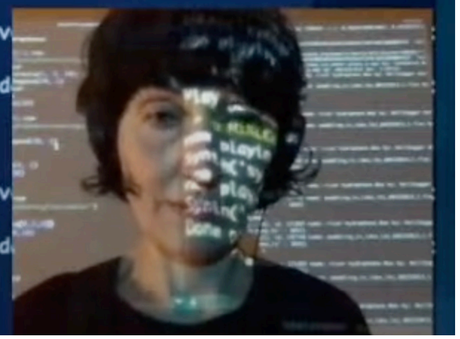
```
// hydrophones

a = MIRLCa.new
a.tag("hydrophone+running+water")
a.similar
a.similarauto(1, 3, 10)
a.autochopped(20, 1)
a.bitcrush
a.bypass
a.fadeout(30)

b = MIRLCa.new
b.tag("hydrophone+running+river")
b.similar
b.autochopped(20, 1)
b.delay
b.bypass
b.playauto(4, 2)
b.fadeout(30)


c = MIRLCa.new
c.tag("hydrophone+glass+water")
c.similar
c.similarauto(0,3,10)
c.playauto(10,10)
c.reverb
c.fadeout(20)
```

```
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_1.flac by:
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
```



Collaboration with IKLECTIK in *virtual* London
Performance by Anna Xambó.
https://youtu.be/ZRqNfgg1HU0

MIRLCAuto

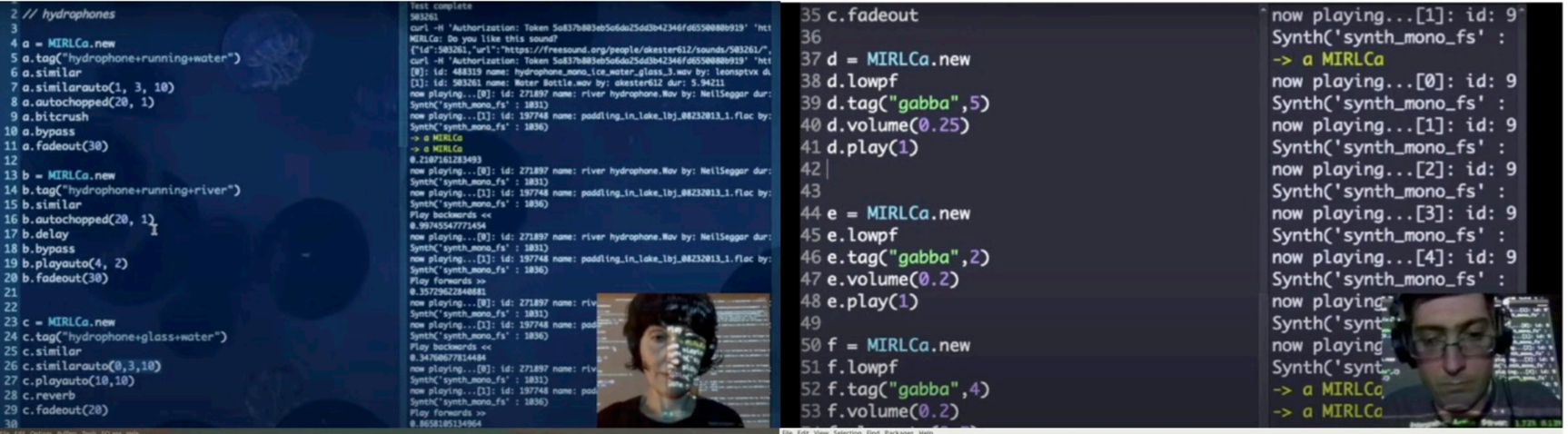
The three tenets @hdinetwork

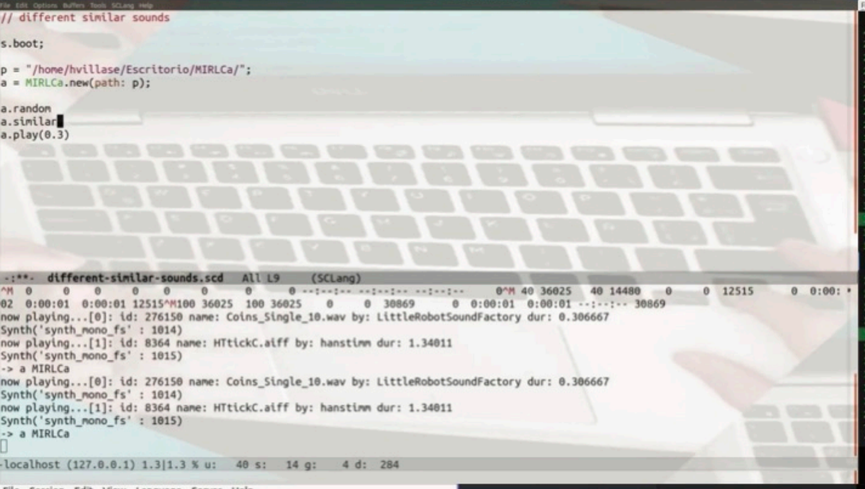
- **Legibility**: *Making the processes of sharing data about a person, and others' analysis and use of that data, comprehensible to that person.* **Show us your screens. Code and processes should be clear.**

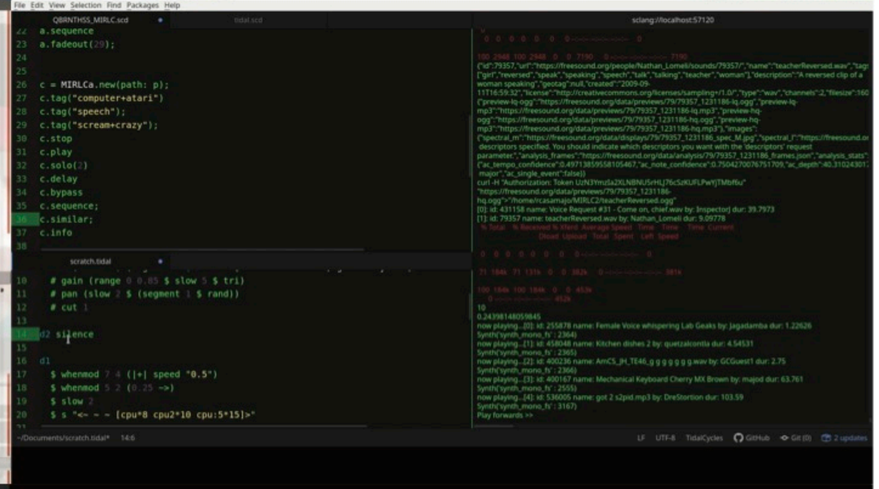
- **Agency**: *Giving a person the capacity to interact with their systems so as to control and correct the above-mentioned processes.* **Learning and influencing from 'situated musical actions'.**

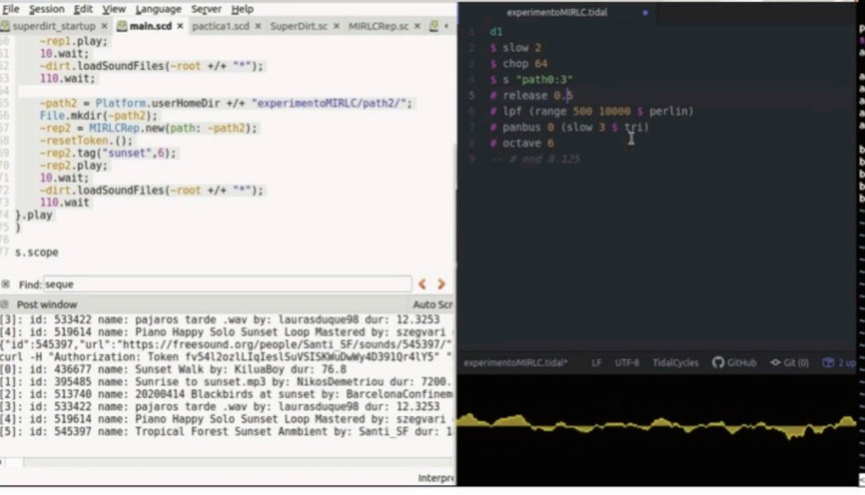
- **Negotiability**: *Giving a person the capacity to interact with the people who do the above-mentioned analysis and use, so as to change and correct what those people do.* **Co-design as an ongoing conversation.**

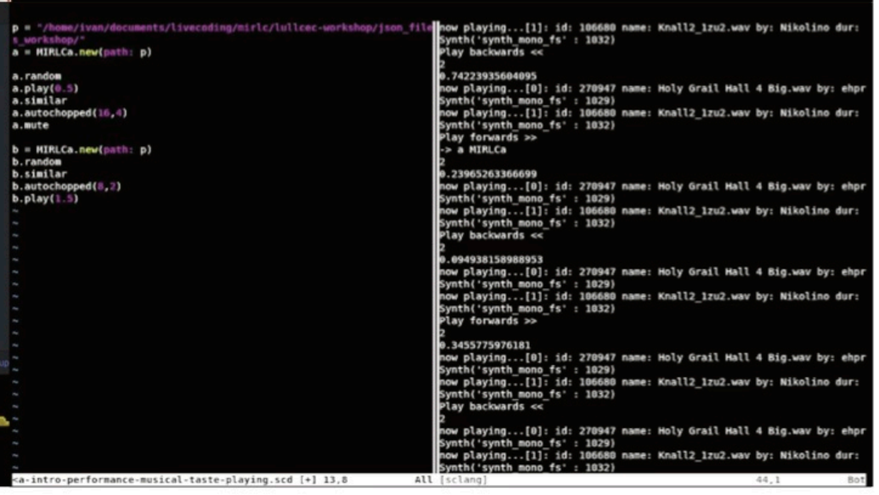
https://hdi-network.org/about/











Audience Engagement?

Legibility?

Agency?

Negotiability?

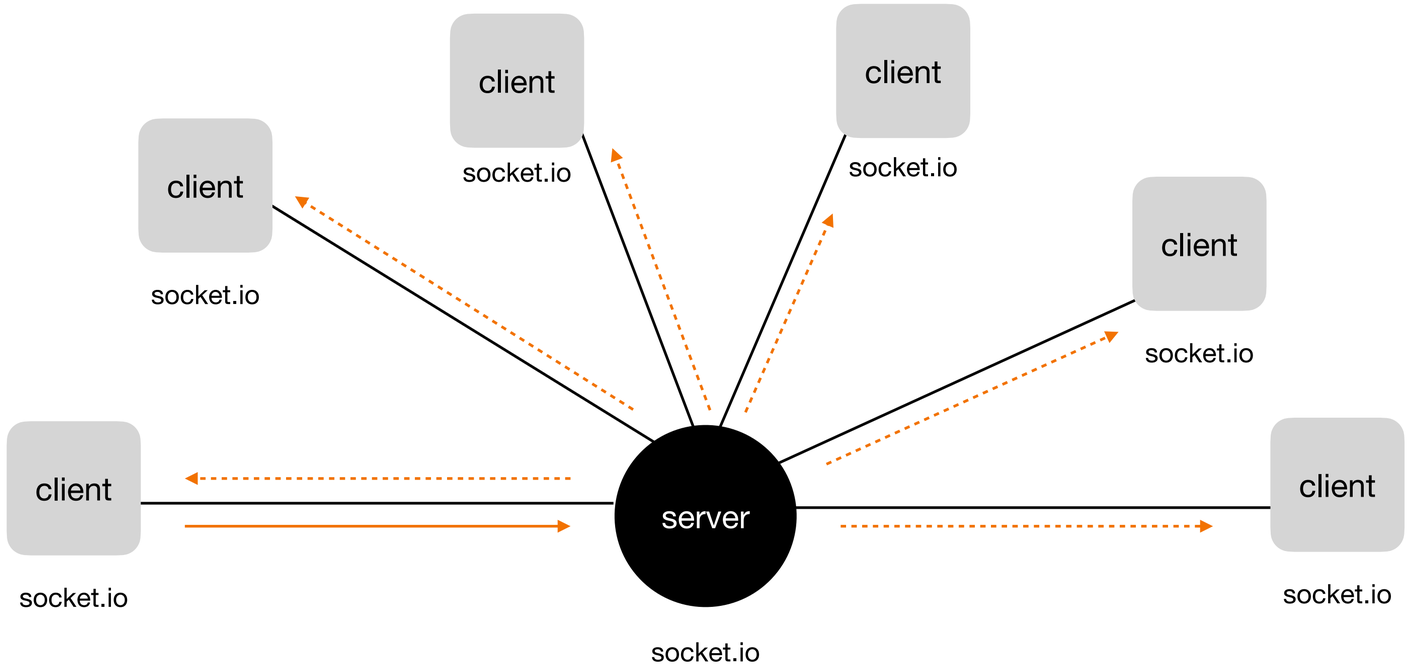
Hands-on Demo

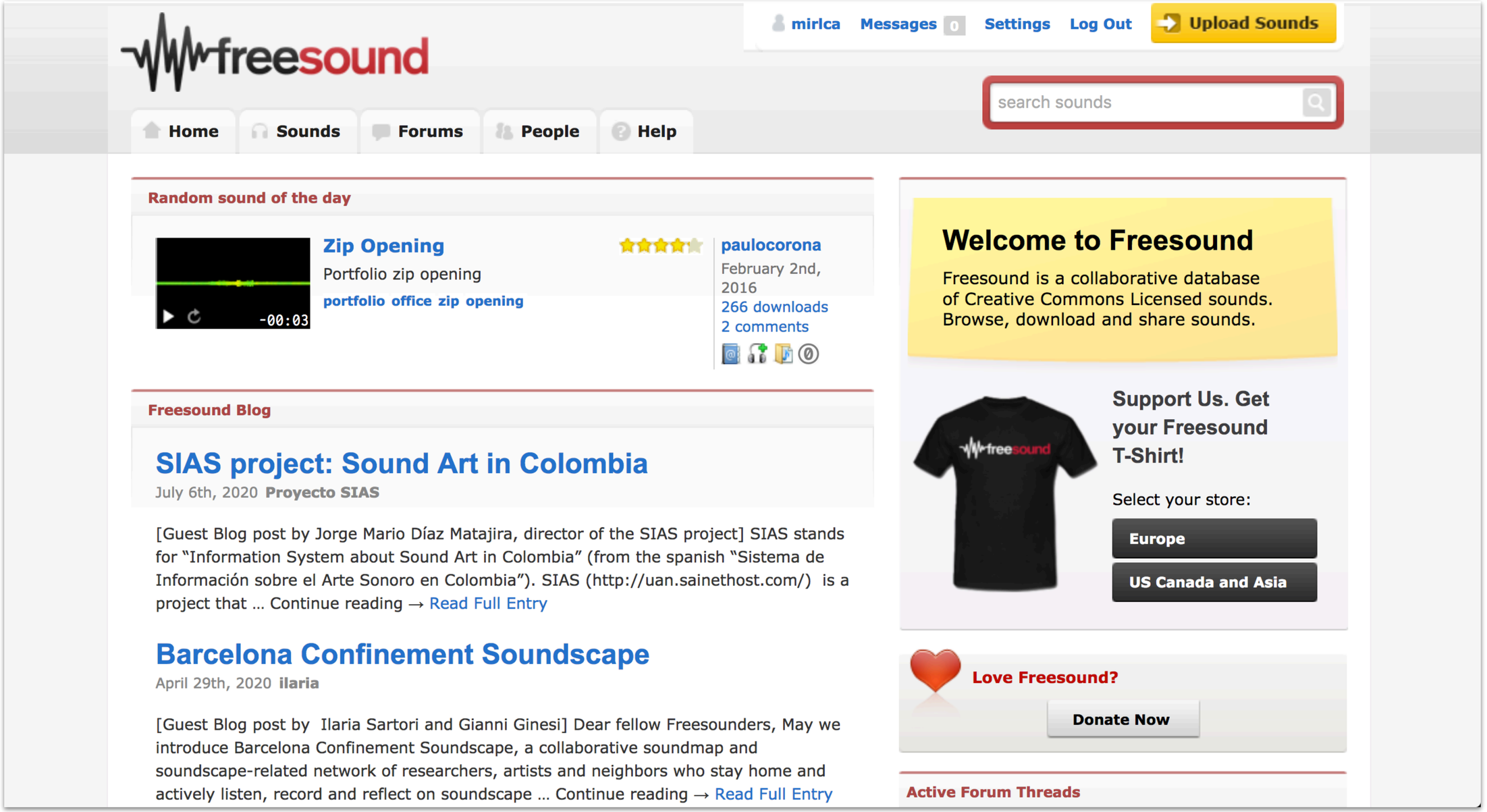
WebSockets & MIRLCa

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).





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.
- Hödl, O., Kayali, F. and Fitzpatrick, G. (2012) ”Designing interactive audience participation using smart phones in a musical performance." In Proceedings of the ICMC.
- Lorway, N., Jarvis, M., Wilson, A., Powley, E. and Speakman, J. (2019) Autopia: An AI Collaborator for Gamified Live Coding Music Performances. In Society for the Study of Artificial Intelligence and Simulation of Behaviour Convention, Falmouth University.
- Madhavan N, Snyder J. (2016) Constellation: A musical exploration of phone-based audience interaction roles. In Proceedings of the International Web Audio Conference.
- Roma, G., Xambó, A., Freeman, J. (2017) “Handwaving: Gesture Recognition for Participatory Mobile Music”. In Proceedings of the Audio Mostly Conference.
- Xambó, A. (2015). “Tabletop Tangible Interfaces for Music Performance: Design and Evaluation”. PhD thesis. The Open University.
- Xambó, A., Roma, G. (2020) “Performing Audiences: Composition Strategies for Network Music using Mobile Phones”. Proceedings of the New Interfaces for Musical Expression. pp. 55-60.
- 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