INTERACTIVE EXPERIENCE OF SPATIAL SOUND SCULPTURES: "BETWEEN THE LEAVES" AND "À L'INTÉRIEUR DES CLOCHES"

Núria Giménez-Comas
Freelance Composer
nuriagimenezcomas@gmail.com

Marlon Schumacher
Hochschule fuer Musik Karlsruhe
schumacher@hfm.eu

Résumé

We propose an interactive experience of two works for a physical sound installation, to be interactively explored by JIM participants through individual avatar control within virtual loudspeaker and room binauralization. Three options are envisaged :

1. **Telematic :** Broadcasting multichannel audio for real-time binaural rendering

2. **Interactive :** Video + embedded (multichannel) audio file for local playback and binaural rendering

3. **Fixed Media :** Video + embedded (binaural) audio file for local playback

1. INTRODUCTION

Thanks to developments resulting from an artistic research residency [1], in the proposed works different models for relating temporal, spatial and spectral features are explored based on a holistic approach to sound- and spatial attributes. An unorthodox loudspeaker setting immerses the visitor in 3D projections of multi-layered sound objects and textures with varying densities, shapes and directivities. To our knowledge there has not yet been such a format or performance for physical sound installations to be synchronously, yet individually experienced. For more information on research concepts and approaches the reader is referred to the Appendix.

2. BINAURALIX

Binauralix [2] is a Spat-based [1] standalone app for Mac OS and Windows, intended for the personalized experience of not only acousmatic and mixed music, but sound art (installations, spatial audio topologies, plays, etc.), in particular with active listener/spectator participation. It offers an alternative experience in the context of social distancing, travel bans, and restriced concert venue access. Using a peer-to-peer audio streaming plugin [3], it is possible to broadcast multichannel audio through the internet and receive it directly within the binauralization app. This is achieved by transmitting compressed audio and dynamic adaptation of audio buffer sizes and network settings.

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1 . https ://zkm.de/de/veranstaltung/2018/09/musical-sculpture
2 . https ://github.com/marleynoe/Binauralix
3 . https ://sonobus.net

Figure 1. Physical installation setup at ZKM, Karlsruhe.

3. PIECES

3.1. Between the Leaves

"Between the leaves" is a study in promenade format creating polyphonic textures in space (granular synthesis). This granulation is sculpted by various density areas and filtering layers to obtain mixed textures in space. There is a dialog of 2 areas : centered loudspeakers in the scene versus the virtual surrounding space. This installation features image fragments of Dan Browne's installation "An Island is land".

3.2. l'Interieur des Cloches

"l'Interieur des Cloches" explores the resynthesis of bell sounds in space, aiming to achieve a spectral distribution in space and separating the noisy, transient content from partials into individual entities. Through this resynthesis and by transforming spectral content, a diffuse auditory image of polyphonic bells in space is produced. The audio part is complemented with images of Dan Browne's "Nude descending (after Duchamp)".

4. REALIZATION

For the **telematic** and **interactive** options a video quick guide will be made available online by mid-June (see Appendix). Hardware and software-wise no specific tools are required, as everything is already provided with the *Binauralix* application and respective media files.

Figure 2. *Binauralix* GUI showing meterbridge and *spat.viewer* windows.

5. REFERENCES

[1] Carpentier, Thibaut "A new implementation of Spat in Max", *Sound and Music Computing Conference, Limassol, Cyprus, 2018*

[2] Garcia et al., "Tools and Applications for Interactive-Algorithmic Control of Sound Spatialization in Open-Music", *inSONIC2015, Aesthetics of Spatial Audio in Sound, Music and Sound Art, Karlsruhe, Germany 2015*,

[3] Schumacher, Marlon "A Framework for Computer-Aided Composition of Space, Gesture, and Sound. Conception, Design, and Applications.", *PhD thesis, Schulich School of Music of McGill University, Montreal, QC, Canada, 2016*

[4] Stuchlik, Julian "Virtuelle Raumakustik als modularer Ansatz, basierend auf physikalischen, perzeptuellen und signalbasierten Verfahren", *Bachelor Thesis, Hochschule für Musik Karlsruhe, Germany, 2016*

Appendix

Beyond Sound Source Spatialization

Despite today's digital technologies allowing to synthesize spatial audio for massive amounts of individual sources and channels, when it comes to control nuances for spatial sound synthesis, artists find themselves too often restricted with the animation of point-sources in a geometric model. When dealing with more complex spatialization scenarios, it becomes apparent that more flexible and structured models are needed to achieve control on a more morphological level. To this end, novel tools have been developed allowing algorithmic setting of large amounts of parameters, including interfaces for designing directivities, extension, shapes, etc. On the dsp side, a flexible framework has been developed which allows to design dsp-graphs combining sound synthesis, processing and spatial rendering algorithms in an integral approach [3, 4].

Spatial reproduction setup

Most commonly, listening situations for spatial sound reproduction can be divided into ego-/allocentric projections of virtual spatial scenes, vs practices in which reproduction properties, such as loudspeakers, room reverberation, etc. are treated less as an "artefact" but are recognized and appreciated as an intrinsic part of the artwork as would be the case with acoustic instruments [2]. The former is typically found in concert and media projection venues (cinemas, theatres, etc.), the latter in audiovisual art-based contexts, such as installations, vernissages, etc. (the "speaker orchestras" in the tradition of the acousmonium are classical examples). In the proposed project we were interested in creating a new approach in terms of creating a hybrid and "active" listening situation combining the two approaches in the sense of allowing the audience to traverse and explore a sonic topology similar to the freedom of viewing objects individually such as in the context of an art museum.

Instructions and Media Files

Required resources are available online as a *github* release [4] – JIM participants will gain access to media files, settings for the *Binauralix* app, as well as quick guide / tutorial for the different presentation formats. The figures below show a schematic drawing, outlining the options 1. *Telematic* (Fig. 3), and 2. *Interactive* (Fig. 4).
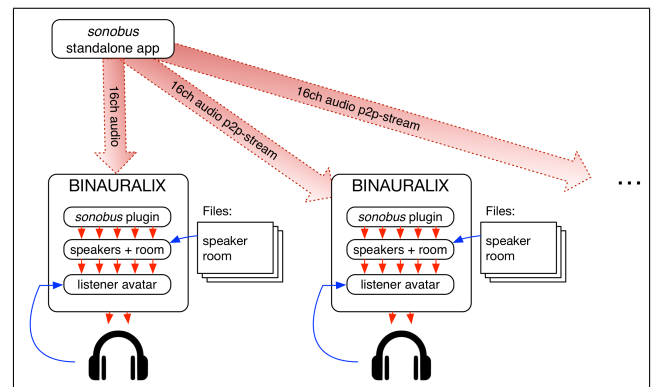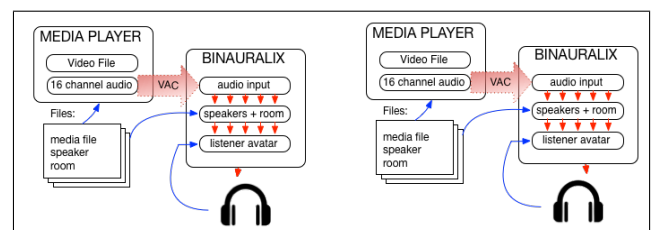

Figure 3. 1. Option : *Telematic*

Figure 4. 2. Option *Interactive*