

EDUARD TAMPU
2017 - 2023

A multi-purpose digital synesthetic system that investigates the correlation between colors and sounds.

What if it would be possible to listen to a painting or see colors while listening to music?

THE HIDDEN HARMONY

FREQUENCY 218 Hz

NOTE A3

MIDI 57

A PREFACE

What if it would be possible to listen to a painting or see colours while listening to music?

The Hidden Harmony is a multi-purpose digital synthetic system that investigates the correlation between colors and sounds.

In time this relationship has been studied with more than one theory. From Greeks with Aristotle (*On Colours*)¹, to Isaac Newton (*Opticks*)² and many other artists like Wassily Kandinsky (*On the Spiritual in Art*)³ and Alexander Skrjabin (*Prometheus: The Poem of Fire*)⁴, have explored this correlation in their artworks.

Following these routes, The Hidden Harmony is a set of tools that explores this multisensorial space, trying to augment our perception,

opening new possibilities for artists and creating new experiences for viewers.

The concept for this project started in 2017 when I was attending my senior year of high school. The first realization was a live electronic performance based on the painting '**Several Circles**' by **Wassily Kandinsky**. Realized entirely inside the Pure-data environment, in 2019 it followed an elaboration of the concept using Max/MSP.

At this moment, The Hidden Harmony is a creative tool for artists and an installation concept that let the users explore the auditory dimension of a painting-image.

1. Aristotle. (1984). *On Colours* (T. Loveday and E. S. Forster, Trans.). From: Complete works of Aristotle, Volume 1: The Revised Oxford Translation (J. Barnes, Ed.). Princeton University Press.

2. Newton, I. (1704). *Opticks: or, A treatise of the reflexions, refractions, inflexions and colours of light*. London, Printed for S. Smith, and B. Walford.

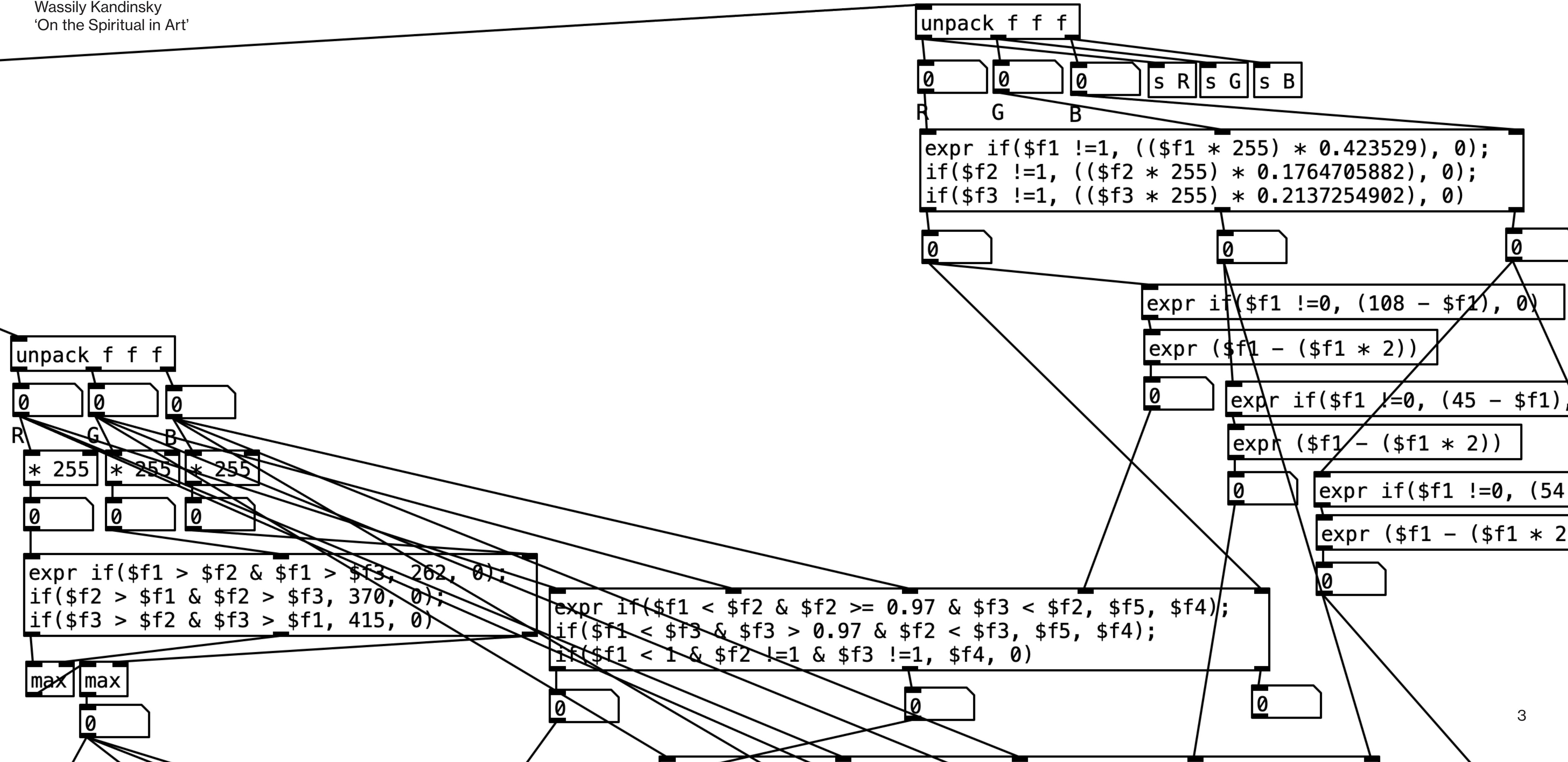
3. Kandinsky, W. (1946). *On the spiritual in Art*. (H. Rebay, Ed.). New York City, The Solomon R. Guggenheim Foundation.

4. Skrjabin, A. (1911). *Prométhée: Le Poème du feu*. Symphony no. 5, op. 60. Berlin, Editions Russes de Musique.

Colour is the keyboard, the eyes are the harmonies,
the soul is the piano with many strings. The artist, is
the hand that plays, touching one key or another to
cause vibrations in the soul.

Wassily Kandinsky
'On the Spiritual in Art'

First realization in 2017, Pure-data
environment. Inside view of the
conversion process



01

AN OVERVIEW OF
THE PROCESS

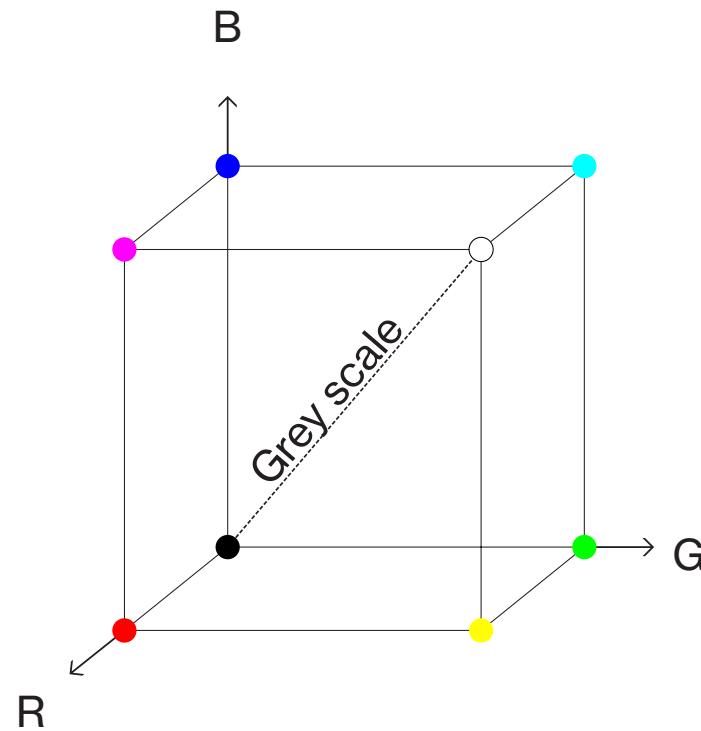
THE PROCESS

The core element inside the applications is the algorithm that allows the translation of an RGB value to a frequency.

The rules for the conversion are following a logical relation between the 360° evaluation of the hue and the 12 tones contained inside an octave. At the same time the evaluation of the luminosity of a color retrieves information about the octave in which a tone sits.

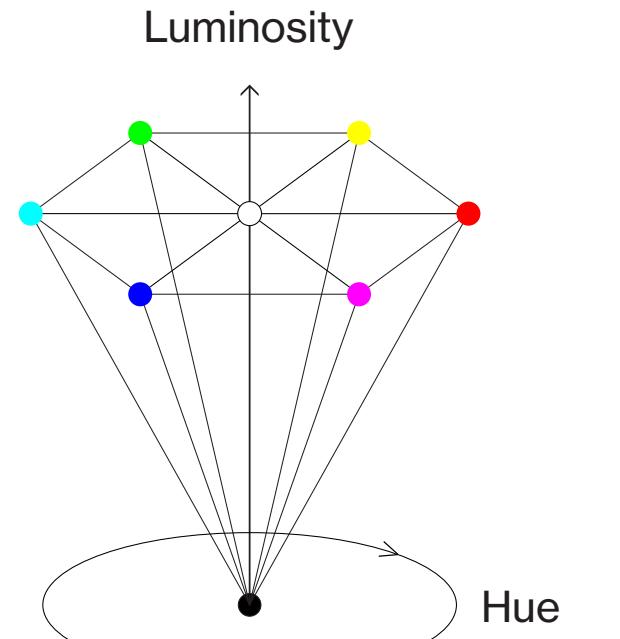
1.

FROM RGB



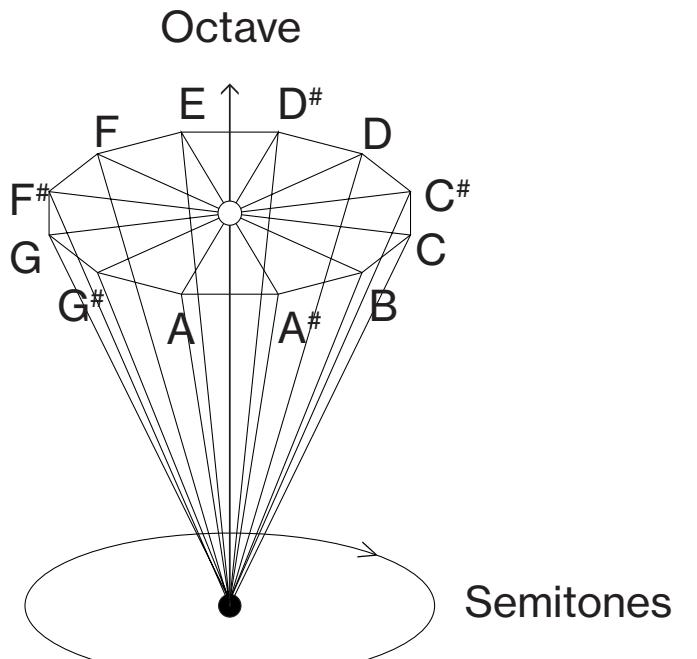
2.

TO HSL



3.

TO FREQUENCY



What if it would be possible to listen to a painting or see colors while listening to music?

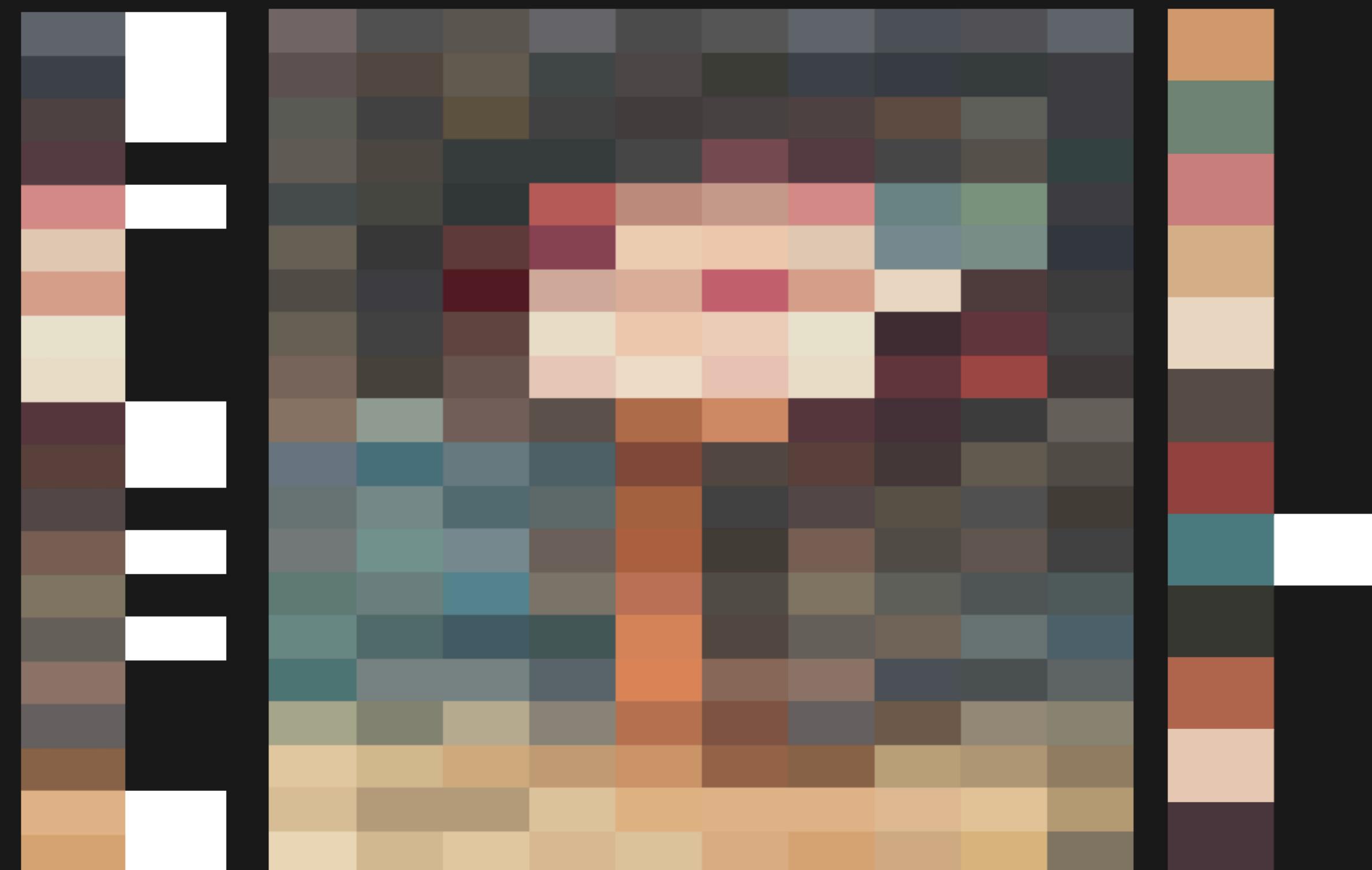
02

DEEP INTO
THE METHOD

THE METHOD/PROJECT VIEW

THE HIDDEN HARMONY

a project realized by eduard tampu
© Eduard Tampu. 2017 - 2023



Vertical selection Select position <input type="text" value="6"/> Position	Chord setup NEW CHORD <input type="text" value="13"/> N. notes	Image setup LOAD <input type="text" value="10"/> X <input type="text" value="20"/> Y	Scale parameters <input type="text" value="12"/> Dimension RANDOM SELECTION RANDOMIZE VOLUME
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An interface that allows the user to:
(1) choose a vertical portion of the
painting and (2) to choose manually a
color from the image surface.

THE METHOD/PROJECT VIEW



Roses • Hercules Brabazon Brabazon (English, 1821-1906)
Yale Center for British Art, Bequest of Joseph F. McCrindle, Yale LLB 1948

A visualization of the original painting overlaid with info-graphics of the played colors.

THE METHOD/HOW IT WORKS

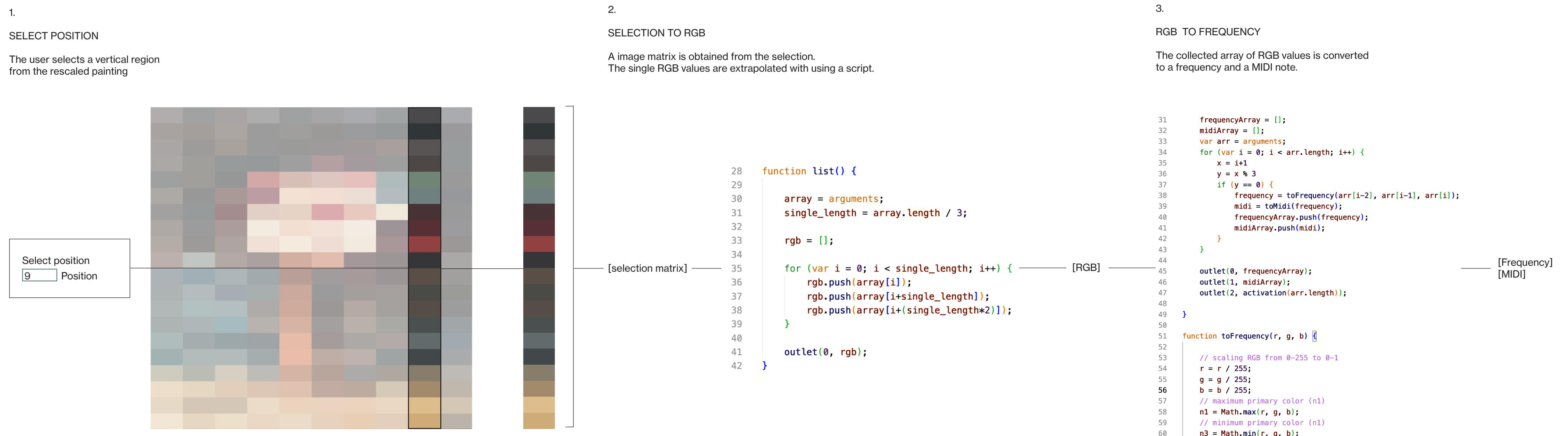
The patch is designed in such a way for which the user can load an image and is able to listen to the sound of those colors. The sound is generated through a set of oscillators to which is applied a series of effects.

Based on the re-sampling of the image, the user can explore two main sonification approaches: (1) a vertical selector that will translate a specific portion of the image and (2) a set of manually selected colors to be freely played

What if it would be possible to listen to a painting or see colors while listening to music?

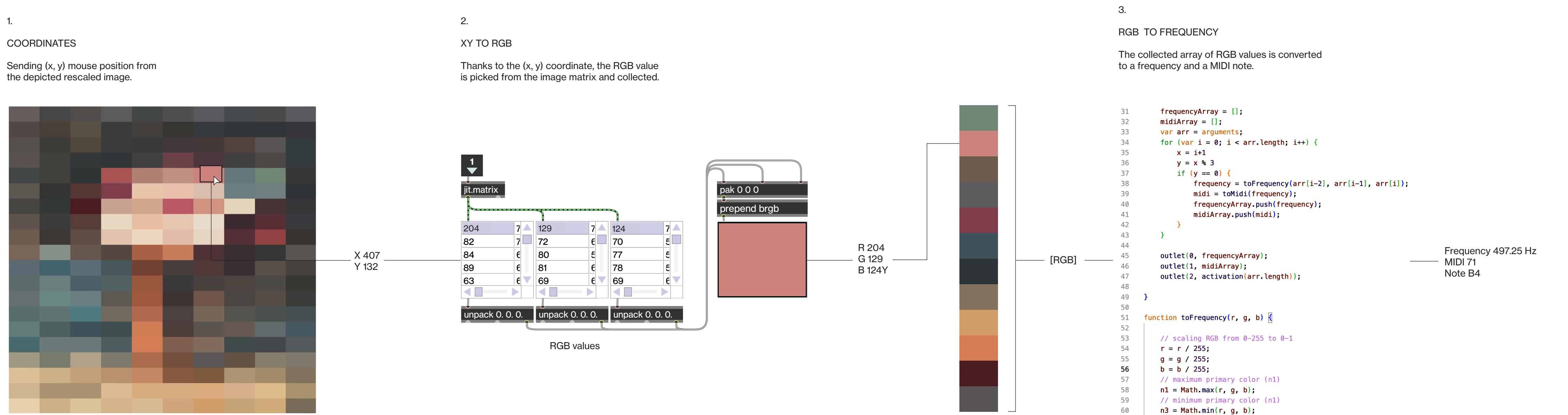
THE METHOD/COLOR COLLECTION/VERTICAL SELECTION

Process overview of vertical selection of colors that then will be used to create series of chords.



THE METHOD/COLOR COLLECTION/MANUAL SELECTION

Process overview of the manual selection of colors that the user can then freely play.



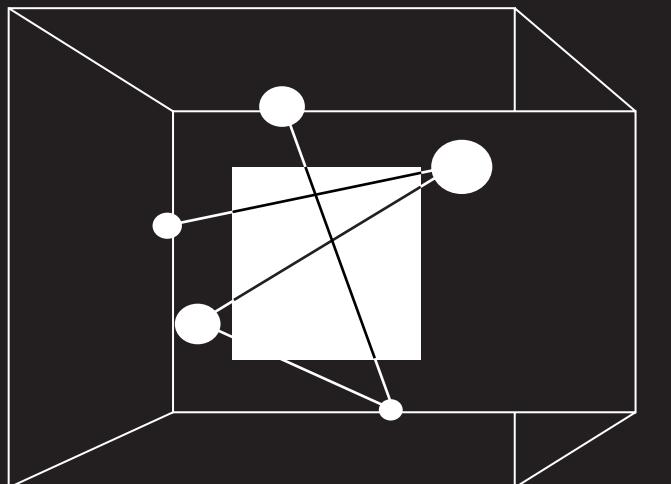
3

APPLICATIONS AND BEYOND

Installation prototypes

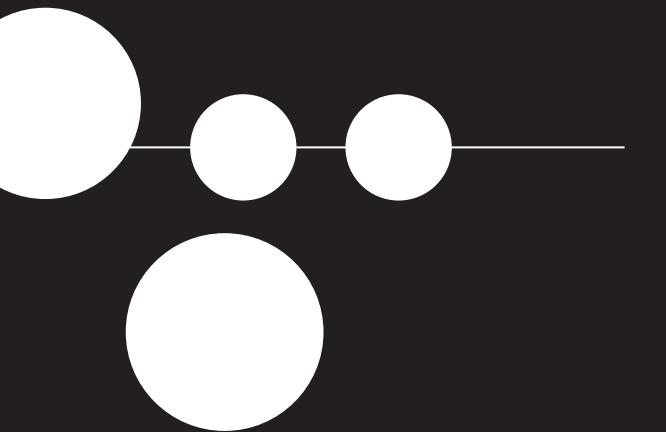
APPLICATIONS AND BEYOND

At the moment, The Hidden Harmony as an installation is just a concept, nevertheless, the ideas for such realization are multiple. The multi-faced possibilities of this project allows us to imagine different applications of the same concept in different contexts and with different types of interactions.



AS AN INTERACTIVE INSTALLATION

For example, it can be realized as an interactive installation with which the user can explore the color dimension of a painting exposed inside a gallery or represented as a virtual depiction.

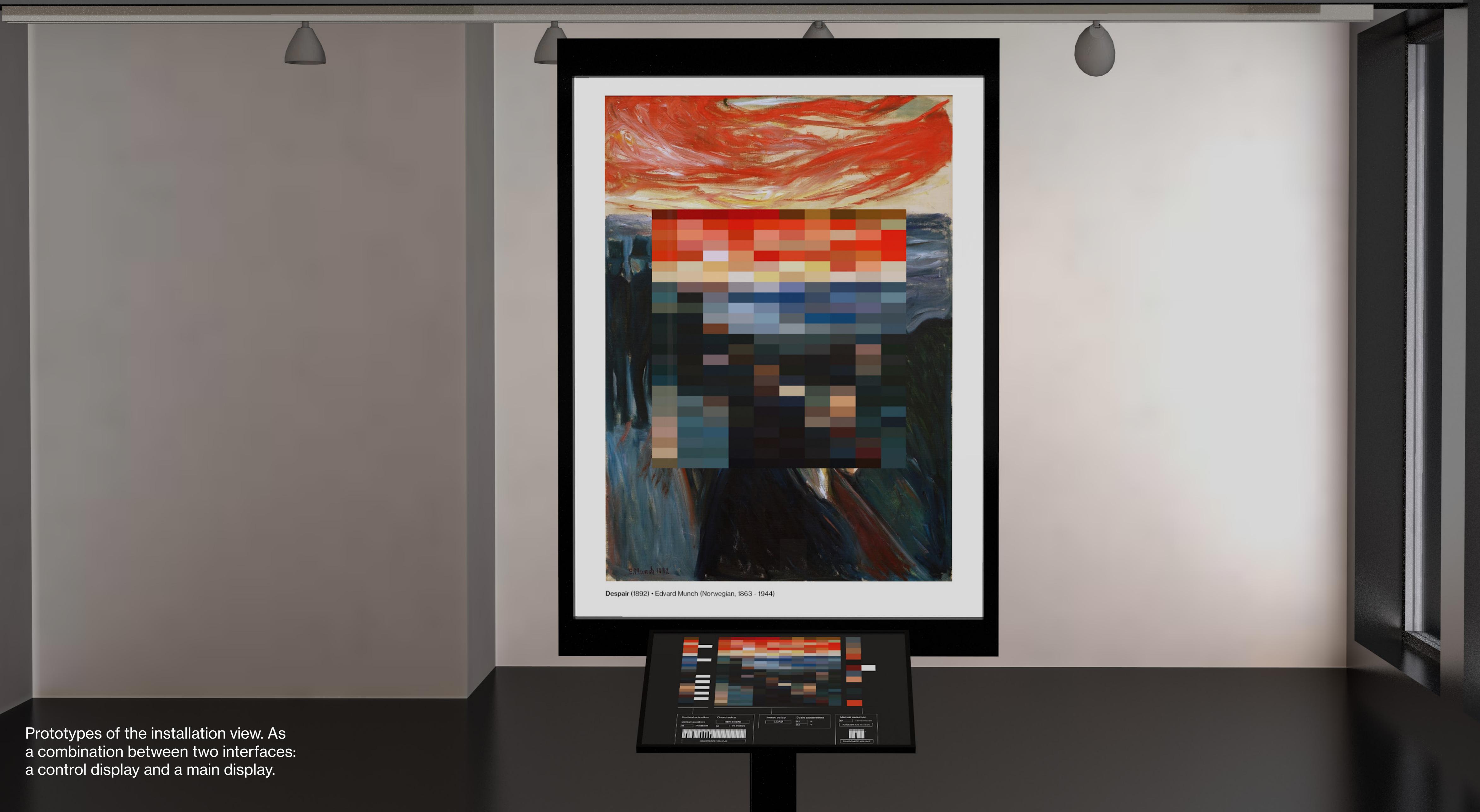


OR A SOUND INSTALLATION

Or, as a sound installation, static or generative, exploring materials exposed inside a museum or as a stand-alone artwork.

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APPLICATIONS/REALITY/MOCK-UP/INSIDE A GALLERY



APPLICATIONS/REALITY/MOCK-UP/INSIDE A GALLERY



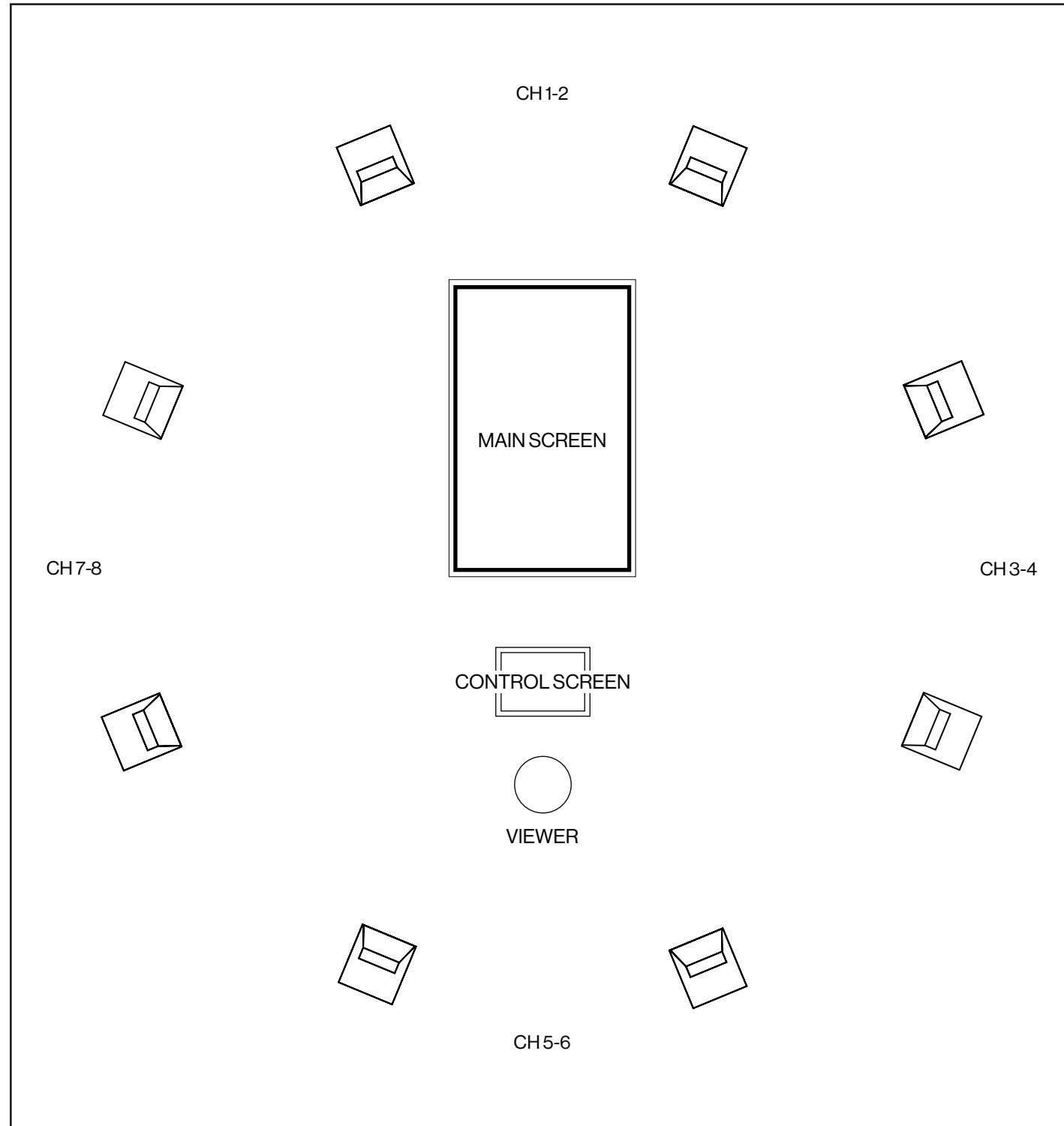
APPLICATIONS/REALITY/MOCK-UP/INSIDE A GALLERY



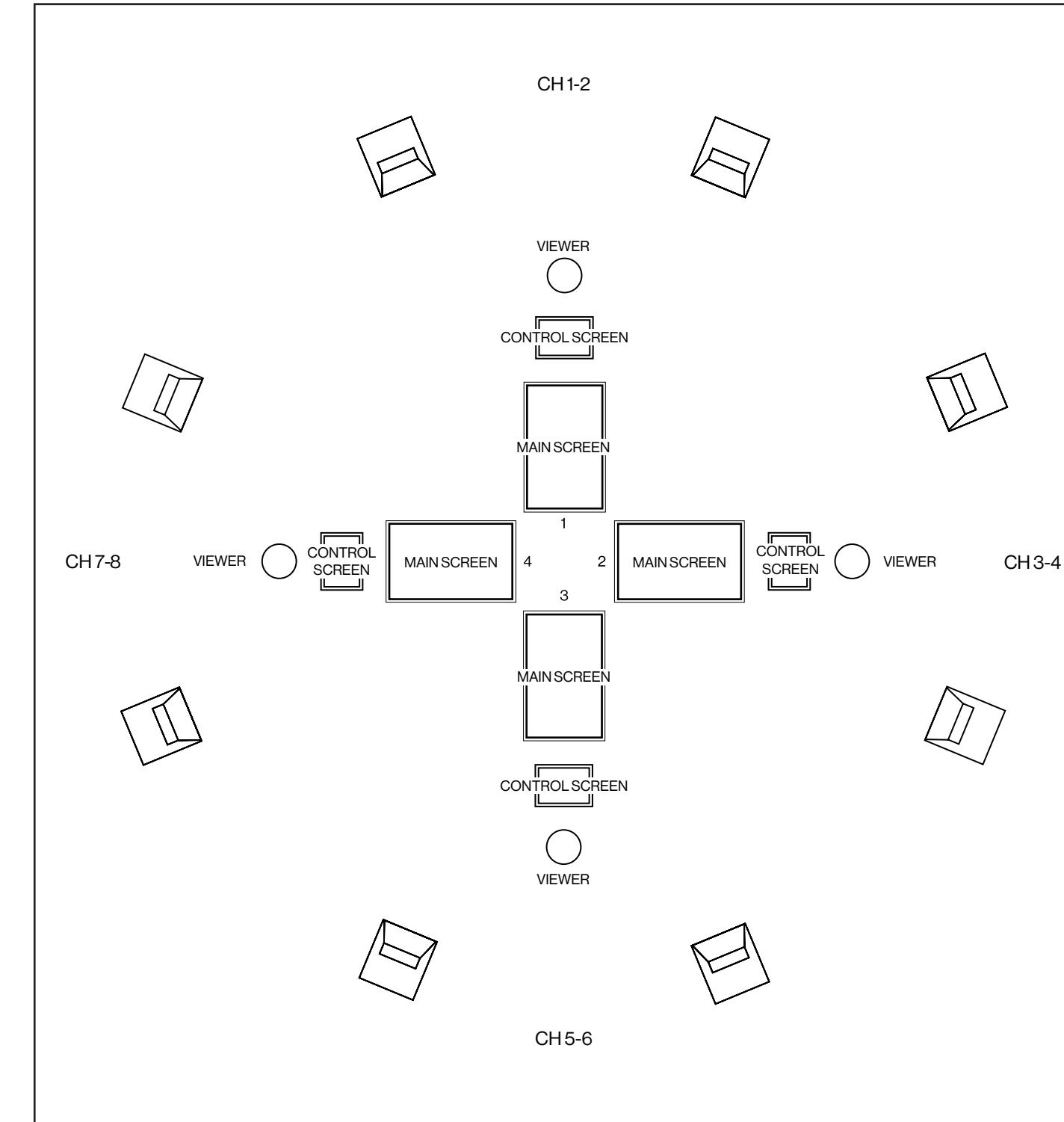
APPLICATIONS AND BEYOND/PROTOTYPES

The installation can be realized in different forms: as an interactive or static sound installation, with a multichannel or stereo realization.

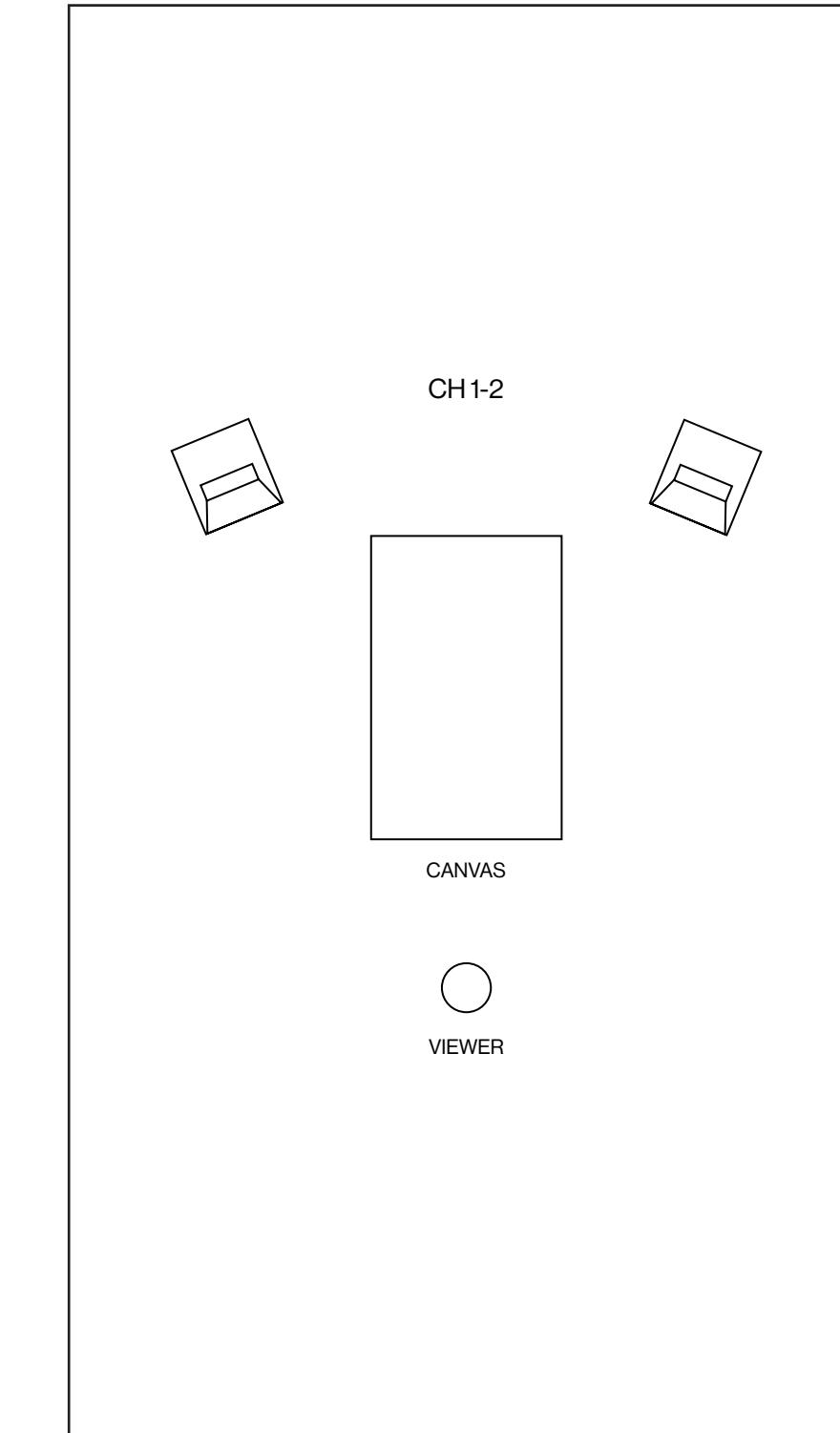
PROTOTYPE_1

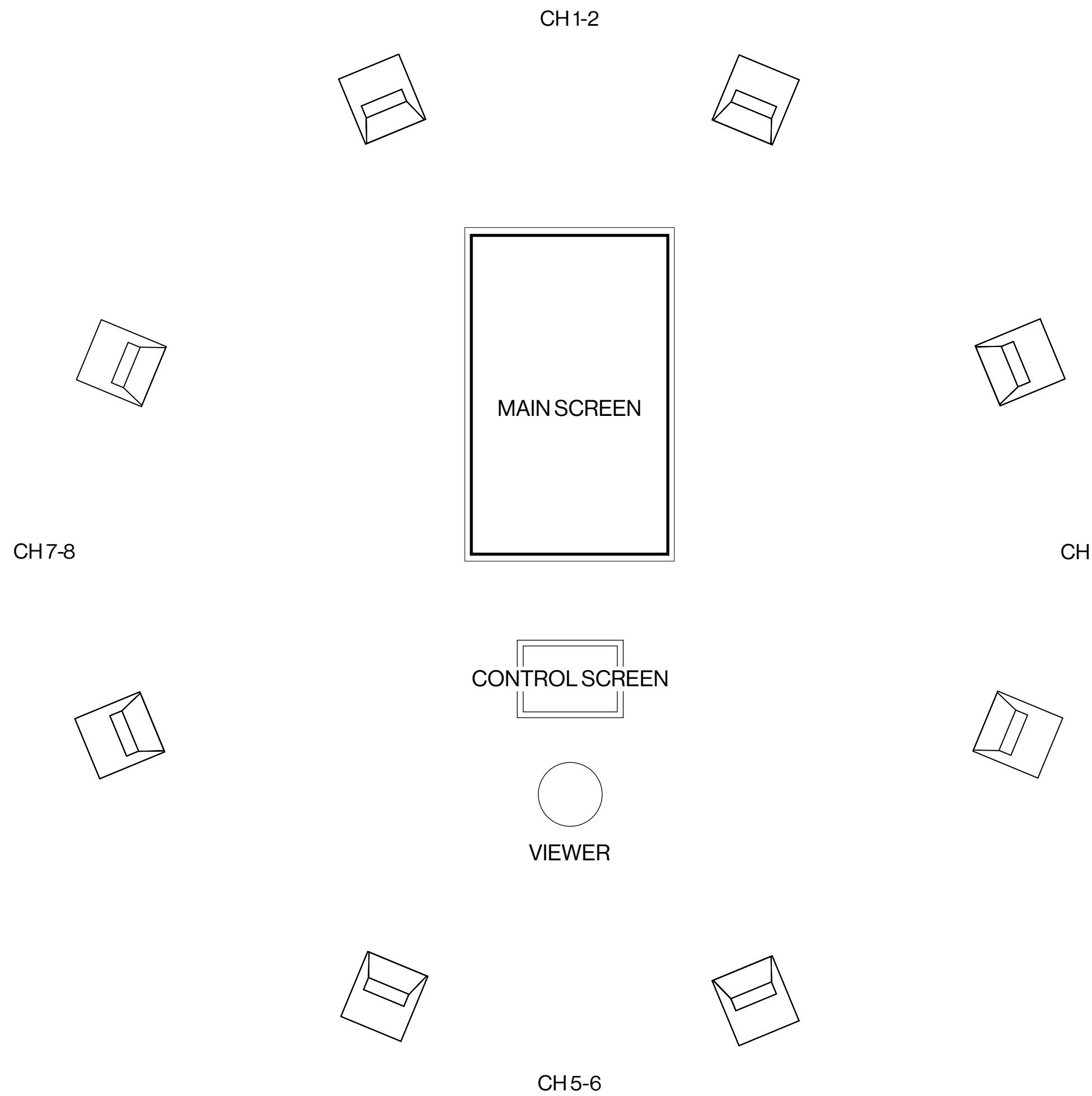


PROTOTYPE_2



PROTOTYPE_3



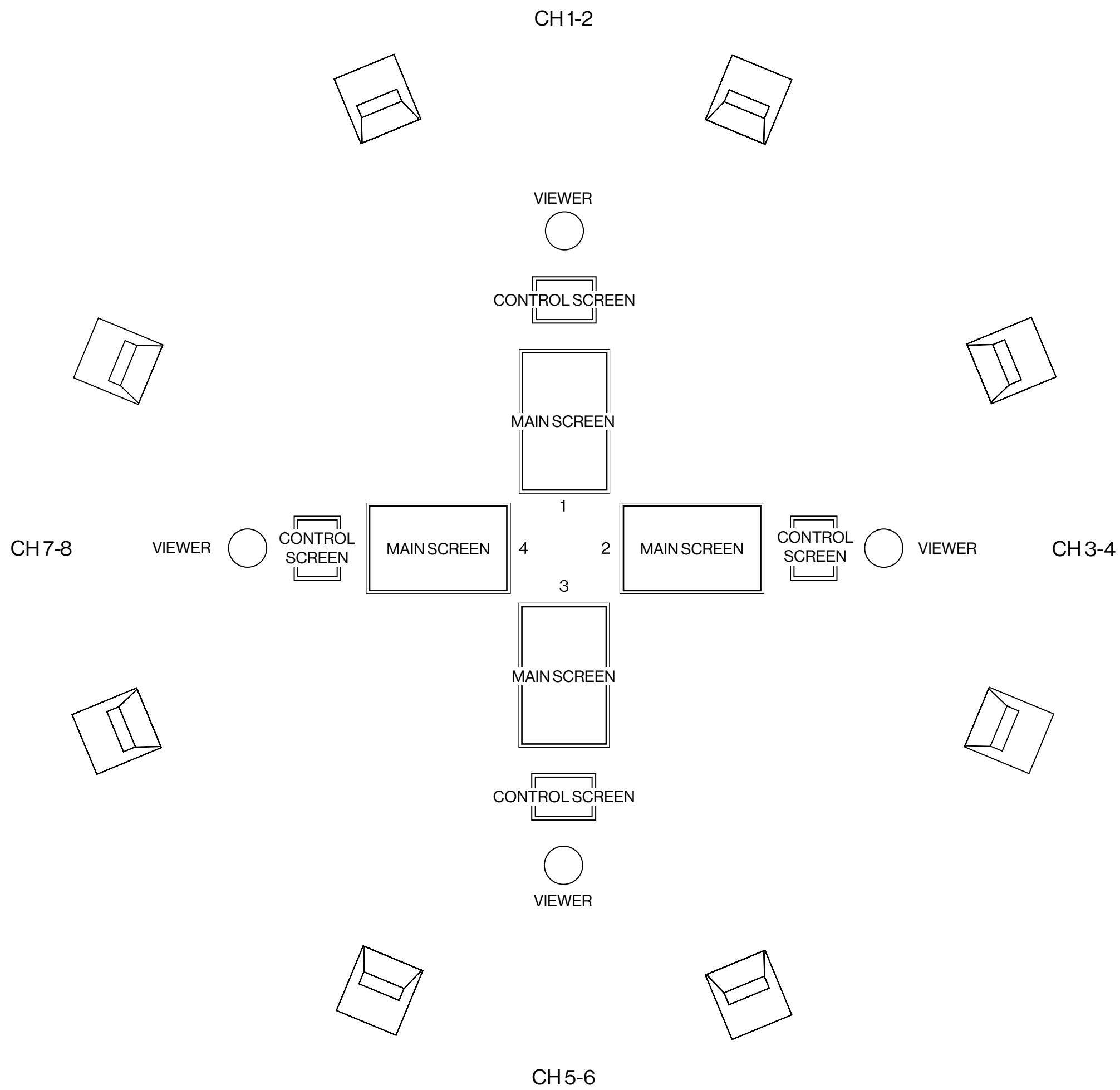


PROTOTYPE_1

The installation can be realized using a 8 channel sound system, generating an immersive sound experience in which the user can explore the sounds inside the space by moving between the speakers. The project is realized in a way for which, thanks to the multichannel modules provided inside Max/MSP, 50 channels can be redirected into a different PA system.

The prototype itself could be realized with others sound system configurations: from stereo to hypothetically a channel for each sine-wave.

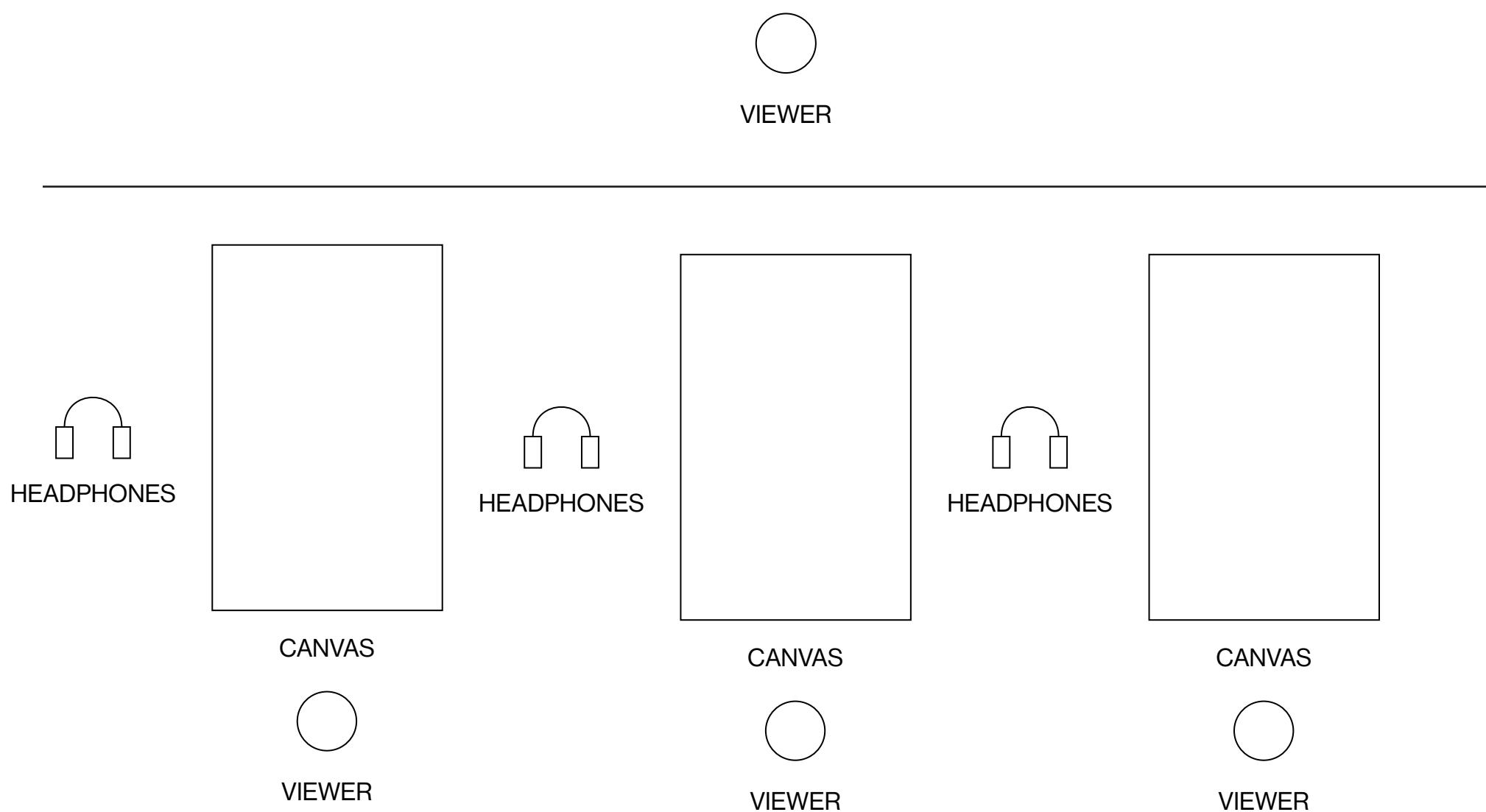
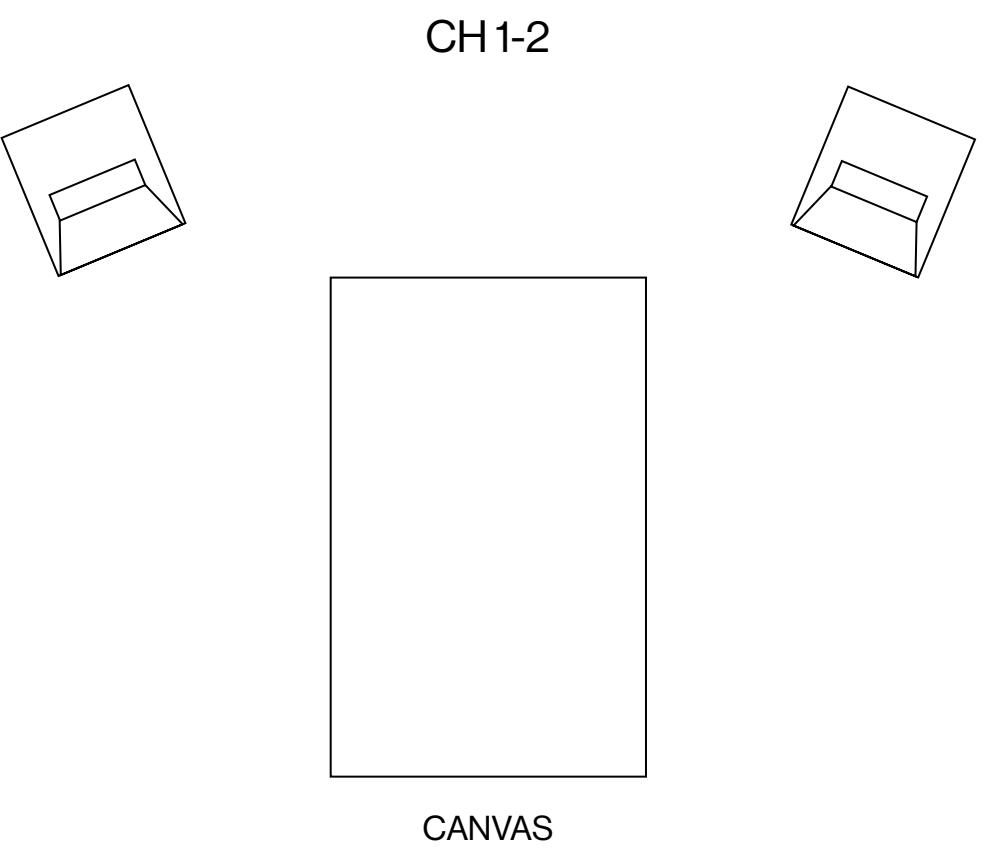
In this installation, the purpose is to generate a system in which the users can explore the correlation between colors and sound, in an environment that would allow the sound to be explored as a spatial form.



PROTOTYPE_2

A second prototype, similar to the previous would rely even more on the participation of the users. It would create a space in which the users can interact with each other in the sound domain, as a participatory sound installation, in which the users can explore different colors at the same time and combine them together.

In this case, the PA system would be more a combination of 4 stereo systems (one per each of the processes). At the same time, it could be also explored with bigger systems (like 16 or 32 channels, meaning 4 or 8 channels for each of the processes).



PROTOTYPE_3

This last prototype wants to show also the versatility of this project. The installation could also be realized as a generative sound installation (with a stereo or multichannel PA system), that would not require any interaction from the user.

It can also be realized as a series of compositions representing the different canvases/pictures. In this case for example, a set of headphones could be used in order to generate a more intimate and immersive experience in the listening.

04

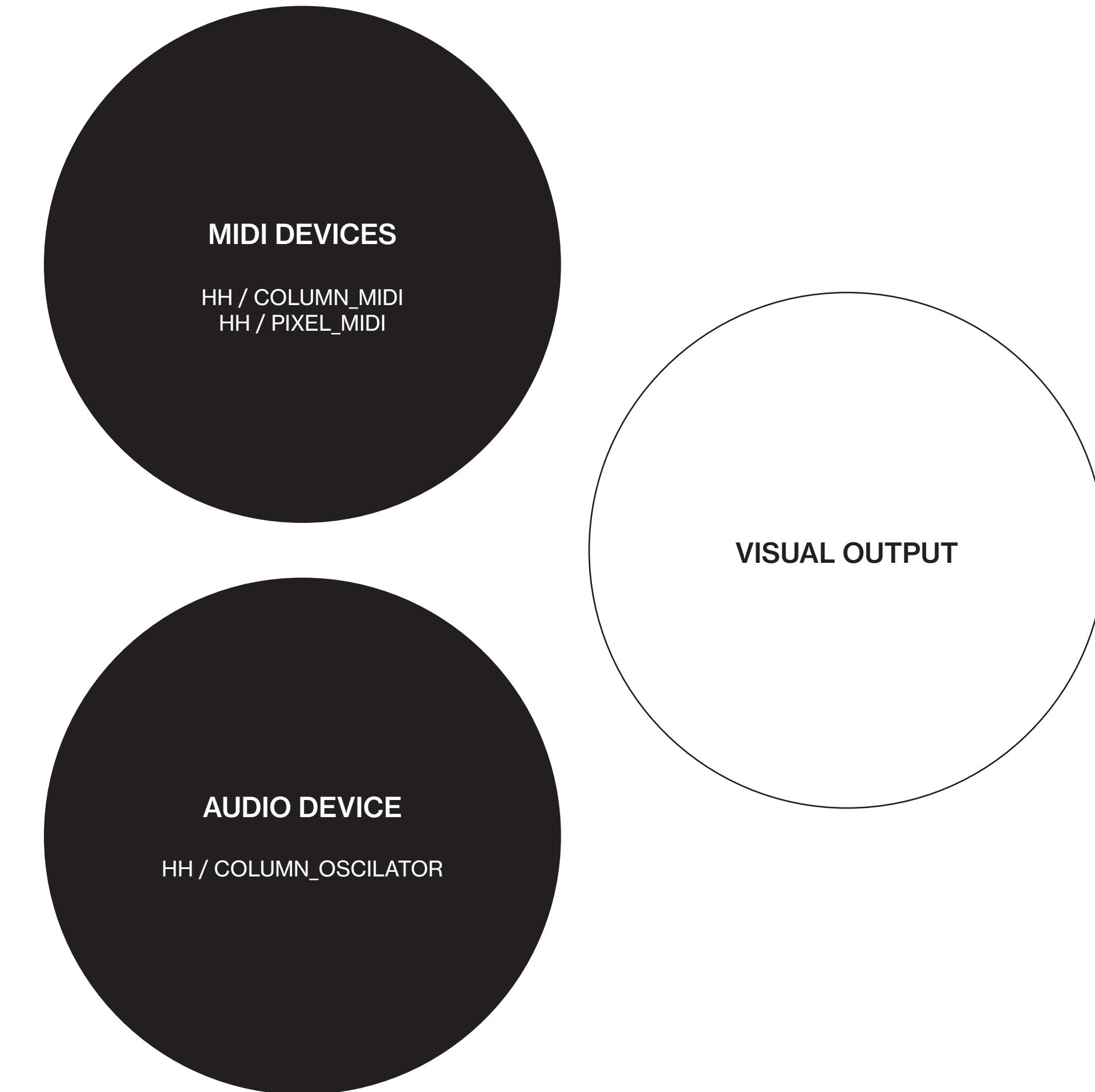
AS CREATIVE TOOL TO OPEN THE IMAGINATION

an Ableton Live plugin

AS CREATIVE TOOL/3 TYPES OF PLUGINS

The tools are created as max4live externals, allowing their use both inside Ableton Live and Max/MSP. At this point in time, I developed three main objects: two of them have as output a MIDI value that can be played and manipulated by the user and one audio unit, that has as output a maximum of 25 sine-waves. Moreover, a visualization tool can be activated in a second window as a representation of the process.

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MIDI DEVICES

The two objects are structured similarly but have a major difference: with the **HH / COLUMN_MIDI** the user selects a vertical portion of the image (containing a maximum of 25 colors), on the other hand with **HH / PIXEL_MIDI** the user can create his own selection (containing a maximum of 12 colors) or generating a random selection. Moreover **HH / PIXEL_MIDI** allows the use of a MIDI device to play the chosen set of notes.

Generally, the user can load an image that is re-sampled and displayed. At its right, a vertical set of colors is placed as graphic representation of the selected materials, with a set of white boxes indicating which color is played at the moment. A set of parameters allows the user to change the scale of the image.

As common point the two externals can be played as a sequencer, sequencing from top to bottom the selection of colors,

or as a chord generator, that creates a chord randomly choosing from the set of colors with a maximum dimension that the user decides.

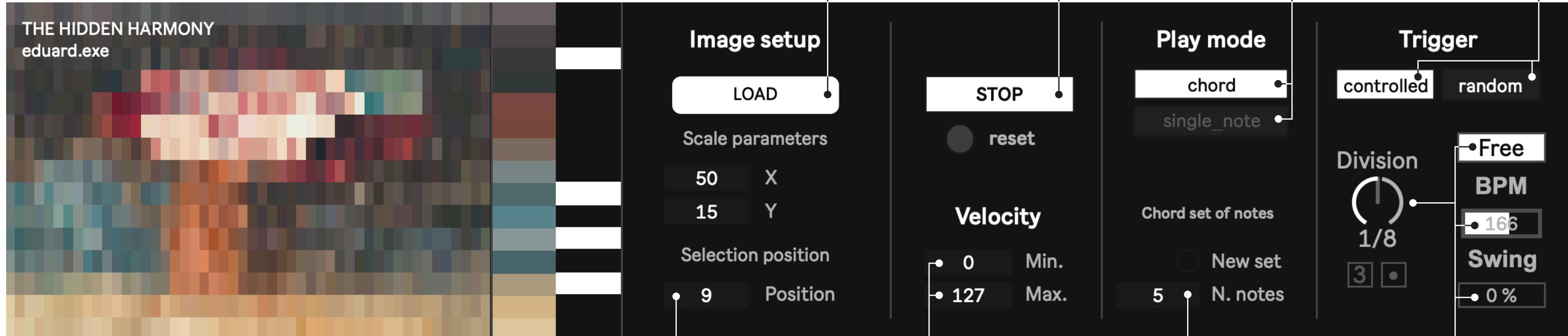
Both this play modes work with a random velocity parameter, meaning that at each time a note-chord is triggered, a new set of velocities is placed, creating a constant diverse sensation. The user is able to change the range of action of the velocity.

A third play mode of **HH / PIXEL_MIDI** is the ability to generate a 12 or 7 color tone scale that the user can play. At the moment, any octave of a keyboard will perform the same pattern. With further development the idea is to test the use of a multi-octave system, that from the selected pattern is able to generate different octaves.

AUDIO DEVICES

HH / COLUMN_OSCILATOR has similar functions as **HH / COLUMN_MIDI**. In this case the only play mode available is as random chord generator and the output of the external is an audio signal. This object allows to explore more the frequency relation between the different colors, generating a complex output timber.

HH / COLUMN_MIDI



(1) Load an image and set the re-sampling scale parameters that you want

(4) Start or stop the action of the plugin. It will follow the main play control in Ableton Live. But you can also control it from here

(5) Change the play mode between chord and single_note and then change the relative parameters

(6) Change the trigger mode between controlled and random and then change the relative parameters

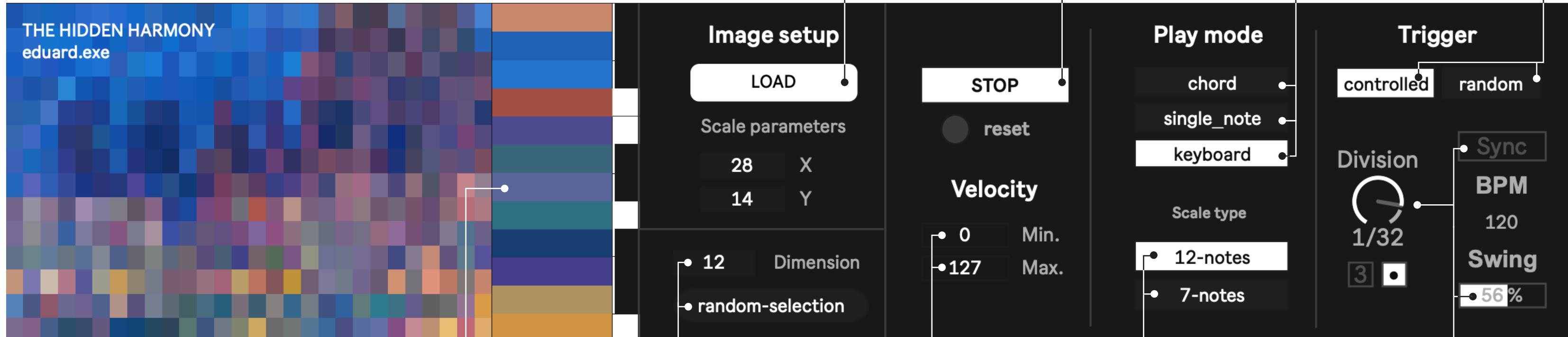
(2) Select a column that you would like to sonify

(3) Set the velocity range that you prefer

(5.1) In chord mode, you can select the number of notes that the chord is composed by
(5.2) In single_note mode you can change between sequencer and random mode

(6.1) In controlled mode, you can choose if to follow the main tempo of Ableton Live, or if to set your BPM value. Then you can choose different types of subdivisions and tempo related features
(6.2) In random mode, a single knob allows the user to have the control of the range of action, between slower and faster

HH / PIXEL_MIDI



(1) Load an image and set the re-sampling scale parameters that you want

(5) Start or stop the action of the plugin. It will follow the main play control in Ableton Live. But you can also control it from here

(6) Change the play mode between chord and single_note and then change the relative parameters

(7) Change the trigger mode between controlled and random and then change the relative parameters

(3) Click on the boxes in order to select the place into which a color will be stored. Then click on the image which color you want to pick

(2) Select the dimension of the selection and, if you want randomize the selection

(4) Set the velocity range that you prefer

(6.1) In chord mode, you can select the number of notes that the chord is composed by

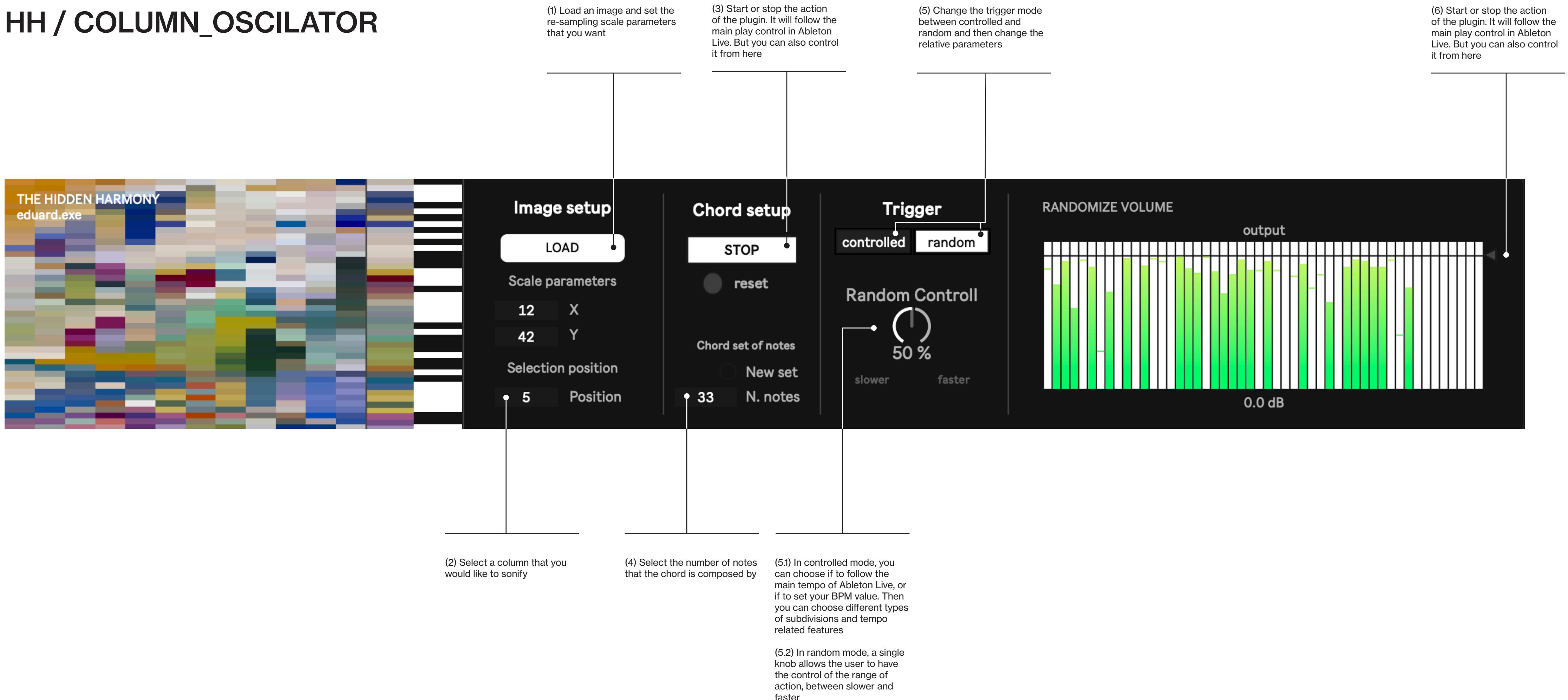
(6.2) In single_note mode you can change between sequencer and random mode

(6.3) In keyboard mode, you will be able to use a MIDI device in order to play the colors selected as a scale of 7 or 12 notes

(7.1) In controlled mode, you can choose if to follow the main tempo of Ableton Live, or if to set your BPM value. Then you can choose different types of subdivisions and tempo related features

(7.2) In random mode, a single knob allows the user to have the control of the range of action, between slower and faster

HH / COLUMN_OSCILATOR



05

THROUGH THE END

reality outcomes

TO CONCLUDE

A brief recap of the project and the future development.

	A BRIEF RECAP	<p>The Hidden Harmony as a concept has many different approaches. As has been seen, it would allow the realization of multiple types of installations, from static to interactive and adapting to different sound systems.</p> <p>As an installation, the idea is to allow the exploration of the 'hidden harmony' behind paintings and images, creating a connection between the senses.</p> <p>Then, thanks to the max4live tool, it allows artists and creators to explore new processes during studio sessions, as a tool that can introduce new elements into a composition or into a live performance.</p>
	FUTURE DEVELOPMENT	
	MAX4LIVE	<p>In the future, the idea is to better refine the max4live application, adding new functionalities in both the MIDI and Audio devices. For example, a better visual output, that could be used also as a tool in order to convert MIDI or Audio into visuals. Additionally, I would like to introduce different synesthetic approaches that will allow users to explore the synesthesia of Alexander Skrjabin or Isaac Newton (for example), based on historical references.</p>
	AS INSTALLATION	<p>Regarding the installation, different are the refinements that could be introduced: as for now, it is running as a standalone version of the Max/MSP patch. It would be interesting to realize such installation in the first place and moreover, creating different possible sound combinations that the user could use.</p> <p>In future versions, I would like to explore different realizations, that could allow to spread even more this idea.</p>
	NEW APPLICATIONS	<p>Few tests have shown the possible realization inside a web page: the main conversion algorithm written in JavaScript, allows the application inside a web browser in combination with dependencies like color-thief.js.</p>



THE HIDDEN HARMONY X SÓNAR+D

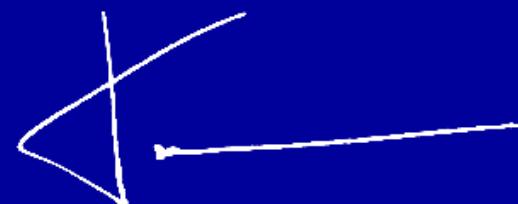
The Hidden Harmony represents a unique approach to exploring the intersection of art, technology, and sound. Sonar Festival, with the long history of exploring and showcasing innovative and cutting-edge projects would represent a great place in which finding a community that could be interested into this synesthetic approach, allowing new views on the topic and new possibilities for further developments.

A multi-purpose digital synesthetic system that investigates the correlation between colors and sounds.

What if it would be possible to listen to a painting or see colors while listening to music?

THANK YOU FOR YOUR ATTENTION

THE HIDDEN HARMONY



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