

Backyard Sounds: An Immersive Sound Experience in Almenara-Vale do Jequitinhonha, Brazil

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ABSTRACT

This article is a study on the immersive sound installation “Backyard Sounds”. The union of our artistic practice to theoretical research resulted on the birth of this project. One of the main objectives of “Backyard Sounds” was the consideration of the sounds of contemporaneity. Seeking to lead users to experience videos and sounds in a dark room, since sounds were only set off with the users’ approach, sounds of nature and those produced by humans were used intentionally to demonstrate the inherent paradoxes of contemporary life. This research consists of a study on the immersive sound installation “Backyard Sounds”. The authors approach the artistic process involved in its creation and the concepts, notions, and reflections related to the computational artifact. The sounds heard were reveries of the soundscapes (concept of sounds of nature and others produced by humans), and it was intended to bring users the extreme paradoxes of contemporary life.

KEYWORDS

Artistic Practice, Computational Artifact, Contemporary, Immersive, Installation, Nature, Sounds, Soundscapes

1. INTRODUCTION

The installation made from this artefact is part of the research project “Backyard Sounds: A path to sound immersion”, of the PhD studies in Media Digital Art - Universidade Aberta of Portugal. Using the artefact and theoretical concepts, we attempt: to create an interaction between the sound space and the user; to stimulate auditory awareness through soundscapes.

“Backyard Sounds” is an immersive sound installation, whose theme is sounds activated by human interaction. The artefact is produced from an Arduino Uno Rev3.; a protoboard; four infrared approach sensors and programming in Processing. The installation aims to reflect on sounds in the contemporary epoque, with the intention of leading the audience to experience being alone in a dark room whilst viewing a video and interacting with the sounds, which are only performed with the viewer’s participation. The present sounds are reflections of soundscapes from nature and sounds produced by the humans; they seek to bring calm and chaos to the audience; the extreme paradoxes of contemporary life.

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The author Gonçalves (2013) states that with the evolution of technologies, there was also the need to capture and reproduce sound environments and scenes, containing sound sources in different positions, giving rise to the concept of virtual reality and systems capable of creating artificial spaces with in order to immerse one or more spectators, taking advantage of their sensory abilities.

In the first version of the artifact, it was sought from the sounds to reflect on the soundscapes bringing sounds of nature and sounds produced by the human being. Currently, it seeks to present sounds from the Jequitinhonha Valley. In order to promote cultural interaction through technology. It is intended to bring to the enjoyer, the extreme paradoxes of contemporary life, such as calm and chaos.

The sound environment is linked to the individual (as a listener) and their auditory space. We constantly engage in a complex sound exchange with our environment, transforming, selecting and altering sounds. In a context in which the impact of sound effects is increasingly aggressive, it is important to sensitize the individual seeking to understand their relationship with sounds, thus increasing their hearing awareness.

The research described here consists of a study on the immersive sound installation “Backyard Sounds”, approaching the artistic process involved in its creation and the concepts, notions and reflections related to the computational artifact.

Another metaphor used is “the heart”, which with its sound permeates the entire soundtrack. The current version of the installation introduces sounds captured in the city of Almenara in Brazil. These sounds represent characteristic sounds of the municipality and popular songs that represent the city and a little bit of the Vale do Jequitinhonha.

Throughout the chapter the concepts of Art and Technology are considered, namely: Sound art (s); Soundscapes; Sound installation; immersion, and final considerations are made.

1.1. Artifact Objectives

- Aims to establish a relationship of empathy between the public and the artifact through audio and kinetic experiences;
- Understand how an immersive atmosphere takes place;
- Understand how everyday life sounds relate and create questioning atmospheres;
- Relate the senses in an atmosphere of contemplation;
- Stimulate the questioning of contemporary (interdisciplinary) art with visual narratives.

2. CONTEXT

2.1. Contemporary Art and the New Media Art

According to Heinich (2014, p.375) modern art requires the artist to express his interiority, which highlights the need to surpass the figurative standards of classical art. And contemporary art requires the artist to push the boundaries of art itself, the notion of what is common sense in art. The author reflects on contemporary art and its ruptures; warns that “this is a new paradigm that completely transforms the art world”. The author takes up the term “paradigm”, used by Thomas Kuhn to emphasize that contemporary art represents a specific system, a revolution in art.

The transgression of the limits of art represents the acceptance of new materials and forms of presentation. The extension beyond the materiality of the object, that is, the discourse about the work is also included in the context, be it written by the artist, expert or curator.

In this regard, apart from the transgressions, the manifestos and all the social issues involved in this modern society that has a need to leave open wounds and punctuate its errors and its prejudices. Humberto Eco in his book “Work Open” (1991, p.12) reflects on the new interactive character of the work. The modern artist seeks “open”, unfinished alternatives, under construction that are configured

as a bundle of mobile, flexible and interchangeable possibilities that best adapt to the conditions in which modern man develops his actions.

In this scenario of technological advances, new media and hybridizations in the arts, the technology in this is not just a media or a support; it is part of the very conception of the artistic object. Many artists work in partnership with machines or, going further, they work with machines. According to Brandão (2016, p. 29) “today the media do not transmit only ideas, suggestions or points of view, but, above all, they structure new concepts of facing social life, its interpretation, its legitimation, its values and conduct. Thus, it is necessary to reflect on contemporaneity to contextualize the installation and, through sounds and related poetics, bring reflections on the listening of individuals.

2.1.1. Liquid Sonorities: Everything That Sounds Dissolves in the Air

Bauman, in the book *Liquid Modernity* does not use the term post-modernity. He named the concept of “liquid modernity” to define the present time. He selected the “liquid” or fluidity metaphor as the main aspect of the state of change. A liquid undergoes many changes at all times and adapts to new forms at all times.

According to Cunha (2017) when punctuating central points of Bauman’s work:

Immediate modernity is ‘liquid’ and ‘fast’, more dynamic than the ‘solid’ modernity it has supplanted. The transition from one to the other has brought about profound changes in all aspects of human life. Liquid modernity would be ‘a world full of mixed signals, prone to change quickly and unpredictably.’

Berman (1986, p.15) in turn states that the set of experiences of time, space, awareness of oneself and others, of the possibilities and dangers of life that are shared by men and women worldwide is a type of vital experience which he calls “modernity”. Berman stresses that to be modern is to be in an environment that promises adventure, joy, power, growth and transformation of things around. The experience of modernity cancels the geographical and racial, class, ideological and diverse frontiers. In this context, the author stresses that modernity unites the human species, however, this is a paradoxical unit, as it spills out without any previous selection, a whirlwind of changes, struggles and contradictions, anguish and ambiguity. In this way, the phrase “everything solid is cut in the air” makes perfect sense; many of the crystallized concepts, plastered for centuries, fall apart, are lost in the face of new experiences. When paraphrasing the two phrases transforming Bauman’s “Liquid Modernity” (2001) into liquid sounds and every sound is dissolved in the air, from the Communist Manifesto (1988, p.44) by Marx and Engels, we seek to associate this concept with volatile materiality of the sound. Martins (2016, p.13) quotes Italian pianist Ferruccio Busoni, considered pre-futuristic, in his manifesto “Rascunho” for a new aesthetic of sound art, originally published in 1977, where he describes that music was still a child, when compared to others art forms such as poetry and sculpture, however, unlike the older sisters she:

floats in the air! She does not touch the earth with her feet. She does not know the laws of gravitation. It is practically incorporeal. Its material is transparent. She is airborne. It is almost nature itself. She’s free! MARTINS. (2016, p. 13, quotes BUSONI (2012, p.77)

In addition to the physical immateriality, fluidity and lightness of sound, the concept of sound liquidity is linked to new musical aesthetics and the way in which hits are passengers.

3. RESEARCH METHODOLOGY AND ARTEFACT CENTRALITY IN DIGITAL MEDIA-ART

In view of the centrality of the artefact, research based on artistic practice allows itself to be instantiated as a process of investigation in digital medium-art in that “some practical results are capable of providing an insight into their own production. They can appear next to descriptive and analytical texts, but no type of text is necessary for them to communicate and constitute knowledge”. In this case, the production of the artefact “is aimed at solving problems, but the outputs are not entirely instrumental. On the contrary, they are demonstrative. As a demonstration, these outputs create an interpretive structure that derives from the configuration of a problem in itself. (Grennan, 2015, p. 252, our translation.). They represent a type of problem solving that aims to make your processes explicit in your outputs, rather than trying to make changes with the output as the solution to a problem. In this context, Grennan (2015, p. 252) cites Douglas et al. (2000) and clarifies that “the results of the research process are ... evidenced ... within the final product. In this way, the artifact is considered central to research based on artistic practice because it constitutes both the path and the work itself that it materializes “is the result of a digital art process that takes the form of artistic experimentation and research in art, allowing to expand meanings and senses that are revealed through successive interpretations of complex relationships that are continuously created, recreated and transformed.

Marcos (2001, p. 13-15) states that the creation process in digital/computational art is horizontally crossed by generally long cycles of deep reflection on the process itself and the ongoing creation, “where the artist continually questions himself (referring to the interior - “me”) about its primordial vision and the initial concepts / ideas in the light of the “other” (outward sense - “other”) whether this is the creation process, the materials, the technologies and tools, prototype artifacts, etc.”. Since, during this process there is a continuous review of the three forms of artistic/philosophical, based on Aristotle, thought / knowledge on which a / r / tography is based on:

1. The primordial vision of the artist (*theoria*) that evolves throughout the creation process, which has sustained the work since its first act of creation;
2. Practical experimentation with technologies and materials (*praxis*);
3. The effective construction / materialization of the artefact (*poesis*), where several prototypes can be realized, which are refined and adopted or abandoned, while its ignored shape and form is redefined.

4. SOUND ART (S)

According to Solomos (2015), the noise pollution to which we are subjected makes us carefully chose the music to be heard in our headphones; from supermarket music to the most beautiful moments of a concert; from an inconvenient sound from a cell phone to an interval of silence consciously desired as a possibility among others, the sounds are “poured out” continuously, mixing with each other, producing masking effects or multiplying. Due to the advent of recording and technological progress, it has become possible and inevitable to listen to it wherever we are, permanently; and thanks to globalization, in theory, you can listen to everything you want - and what you don’t want. We live like this, in a musical and sonic ubiquity that calls for continuous listening.

Sound art has sound as its primary material and can be connected to many areas, such as: acoustics, psychoacoustics, electronics, noise, soundscapes, exploration of the human body, sculpture, architecture, film or video and other aspects of current speech contemporary art. According to Morais (2014, p.8), “Sound art is the mixture of artistic manifestations, in which sound is a reference, which generates a process of union between sound, image, space and time. This takes sound as an essential element of a creation.”

In this context, Campesato and Iazzetta (2006, p.2) state that sound art can be understood as “the meeting of artistic genres that are on the border between music and other arts, in which sound is reference material within an expanded concept of composition, generating a process of hybridization between sound, image, space and time”. It is understood that there were many movements, manifestations, manifestos and artists that promoted the process that culminated in what we will here call sound art (s). It was decided to use the plural form of the term in order to better represent the diversity and plethora of influences from different artistic and historical fields that dialogued and constituted an avant-garde role in the exploration of sound, I understand it as an element of artistic creation and generator of meanings.

According to Campesato (2007), the hybrid form of the sound art can be associated with multiple roots that include the happenings of the Fluxus Group; the new musical conceptualization promoted by John Cage; Pierre Shaeffer’s experiments; Murray Schafer’s Schizophonia; Nam June Paik’s pioneering audiovisual works; experimental sound animations by Normam McLaren; the “visual music” of Oskar Fischinger’s animations; The Intermediate proposal that triggered the realization of the Phillippe Pavilion by Xenakis, Le Corbusier and Varèse; the music of the futurists, with Luigi Russolo as the main author; Höpfiel and radio art; the audio lab setup by Dziga Vertov; Steve Reich’s minimalist music; Harry Patch’s sound sculptures; furniture music by Erik Satie; Brian Eno’s background music; Plunderphonics by John Oswald, the exploration of the phonograph’s potential made by László Maholy-Nagy, among many other artists who simultaneously or over very short spaces of time contributed intensively to rethink the way of creating, producing and consuming music.

The importance of the microphone and the phonograph is represented not only in their ability to amplify or record sound, but in the opportunities they enabled. Before the microphone, only singers with a lot of vocal potential had career opportunities. Before the phonograph, only the songs with scores were registered for posterity. In this perspective, Boss (2009) shows that with the advent of the recording cylinder, researchers no longer depended on paper for the preservation of music. It was possible to record the melodies and study them until you understood how they worked. The machine changed the way people listened to folk music, for example, because it was possible to become aware of its profound differences. The phonograph itself helped to eliminate such differences.

Bairon (2005, p.29) points out that in the 30s and 40s of the 20th century, the use of electronic tools spread and from that point on, several montages and recordings began to appear, which several authors and composers generalized as “sound thinking”. One of the most significant to the approach to sound textures in hypermedia is found in 1948 in the work of Pierre Shaeffer, creator of concrete music.

Safatle (2014) argues that thanks to the critical power of compositional experiences like those of John Cage, in view of his strength to think originally of music that did not represent or was reduced to an unfolding of European avant-garde production forms (usually centered on serialism), she inaugurated the New York School and stimulated a specific type of reaction to tradition. This reaction was able to think about the specifics of North American music (formal structures and strategies of composition) in the case, in particular, of the minimalism of Steve Reich and John Adams.

The word Soundscape is a neologism created by Schafer with a union of words Sound and Landscape - Soundscape - A soundscape, according to Schafer, is any field of acoustic study. “We can refer to a musical composition, a radio program or even an acoustic environment such as soundscapes.

Soundscapes, according to Santos (2006, p.35), are cited by quoting Truax (1996, p.55-56) as “the presence of environmental sounds in recognizable contexts”, whose purpose is “to invoke associations, memories and imagination of the landscape-related listener”. Gomes (2015, p.10) says that “the soundscape is increasingly relevant in contemporary culture. It is a ‘photograph’ of a place. A radiograph of its character and activities, both shapeless and amorphous as full of meanings and subtleties.” Still in this context, the author states that the soundscape is a unique impression of the place to which it belongs, its history and the people who inhabit it.

The author Obici (2008, p.47) assumes an expression of sound territories as opposed to the soundscape, due to its transitory, ephemeral and mobile character. And under the aspect pointed out by Schafer as schizophonia, he says that he can be disassociated from this profile of madness and thought a machine capable of making sense.

According to Schafer (2011, p.277) the sound environment of a society is an important source of information. And that the modern world is becoming increasingly noisy and threatening, due to the unrestricted multiplication of machines and technologies in general, resulting in a “world-wide soundscape, the intensity of which grows steadily.” door of the concert hall and encourages street noises to pass through his compositions, he ventilates the art of music with new and seemingly formless concepts. ” SCHAFFER (2011, p.108). That “When Cage opens the door to the concert hall and encourages street noises to pass through his compositions, he ventilates the art of music with new and apparently formless concepts.

Schafer (2001) defines that the fundamental sounds of a landscape are the sounds that arise from geography and climate: water, wind, animals, natural resources and sources of energy. For the author, these sounds can be imprinted so deeply on the inhabitants that they are part of their listening habits, life without them would be felt as impoverished. An example is the sound of the sea for those who live near the beach. Another example, this time of a personal nature: I spent two years out of my city, Almenara (BR) and in January 2020, when I was there, the sound of native birds was heard everywhere in the background. While living in the city, perhaps due to the habit of listening daily, I had never noticed the constant intensity and frequency of that sound. In this context, Schafer points out that these sounds are rarely heard consciously by those who live among them, “because they are the background against which the figures of the signs become evident” (Schafer: 2001, p.26). They are only noticed when they disappear or when people are absent. Capturing and listening to the sound installation of these soundscapes becomes revealing because it has the power to demonstrate the acoustic ecology of the place.

In Almenara, in particular, there are no manuscripts on local children, so what recordings were made and what records were recorded on folk groups “Coral das Lavadeiras”, “Grupo de Reisado Folia de Reis”, as well as few theses and interviews with local singers who use a base for landscapes soundtracks from Almenara represented by the children present at Backyard Sounds in Almenara in the Jequitinhonha Valley (BR). In the Valley there is a rich and little-known culture, which manifests itself in various ways among its residents. (Nascimento, 2009).

5. IMMERSIVE SOUND INSTALLATION

According to Barros (2016), soundscapes relate directly to the art of installation and immersion, and in many cases are built especially for the place where the intervention will take place. Many of these make use of interactive technologies, interfaces, computers, and sensors, mechanical, kinetic and electronic devices.

The facilities have shifted the view of the object to the surrounding environment and the sensations such an environment may cause. The very notion of space has been revisited, in the sense that “the installation may simply be the ‘void’” (Junqueira, 1996, p.567).

With regard to immersive art, many definitions include properties pertaining to the immersion experience. Nachvidal (2011) describes an immersive experience as one in which the individual is surrounded by a feeling of isolation from the real world. Similar meaning is found in Dovey and Kennedy (2006) who define immersion as a sense-losing experience in the present, while concentrated in a mediated environment. Bachelard (2008), in turn, defines immersion as the condition of performing in a circumstance defined or not by representations, such that all the conduct of the user involved are motivated by interactions with objects constituted on the horizon of this circumstance.

In this sense Gonçalves (2016) states that through the development of a sound installation with varying degrees of interactivity / immersiveness, the learning process can be facilitated, promoting environmental education; using this type of intervention with recording of vocalizations of different species, will explore not only the connection with the source causing the sound but also the evaluation of the sound itself and its characteristics as a focus of attention (pitch, timbre) and its stimulation in the individual.

The sound installation developed in this investigation: “Backyard Sounds”, has this name because it portrays a sequence of very familiar sounds: sound of wind, river water, sea, walking and all the time there is a constant, pulsating sound: The sound of the beat cardiac. These sounds are related to the author’s experience in Vale do Jequitinhonha, a calm place surrounded by nature. Still in the sequence of the sounds, we have the disturbing sound of the traffic of the big cities that refers to the change of the author to the city of Salvador, Bahia (BR), at the Federal University of Bahia, where she studied the master’s degree and then to Portugal where she dedicates herself PhD. In the end, there is a mantra; an invitation to reflection, to stop for seconds and rethink the moment, to live. It seeks to lead individuals to an involvement and immersion capable of providing them with really experiencing the sensations proposed in the installation. The updated version of the installation, in addition to soundscapes captured in Almenara, also includes recordings of songs representative of the Jequitinhonha Valley.

6. THE BACKYARD SOUNDS ARTIFACT

Backyard Sounds is an immersive sound installation, whose theme sounds activated by human interaction. The artefact is produced from an Arduino Uno Rev3. a protoboard; four infrared approach sensors; a projector, a notebook; a sound column and programming in Processing. Just as there is no music without human intervention. The computer system was designed to reproduce sounds only with human presence.

6.1. Installation Description

6.1.1. *Moment 01- Opening / Reception*

The individual (s) is alone in a room. Upon entering the room a video begins to play. This video features the following narrative: “The sound of the universe; the wind; the first sound that human beings hear (heartbeat). Then we have a motto: “I want to talk about something, guess where it is, it may be inside your chest or walking through the air”. Heart (sound of heartbeat will be constant throughout the video); Heart that walks (sound of walking), that passes through (rivers and seas), and crosses the ocean. Live the chaos of the present (life in transit: instability, anguish, bus, metro, travel, irritation ...). But he wants to rest, reflect, be what he is: “essence”, and disconnect from the world (black screen, no images), get out of chaos and just be a heart (relaxing mantra / sound).

6.1.2. *Moment 2- Interaction*

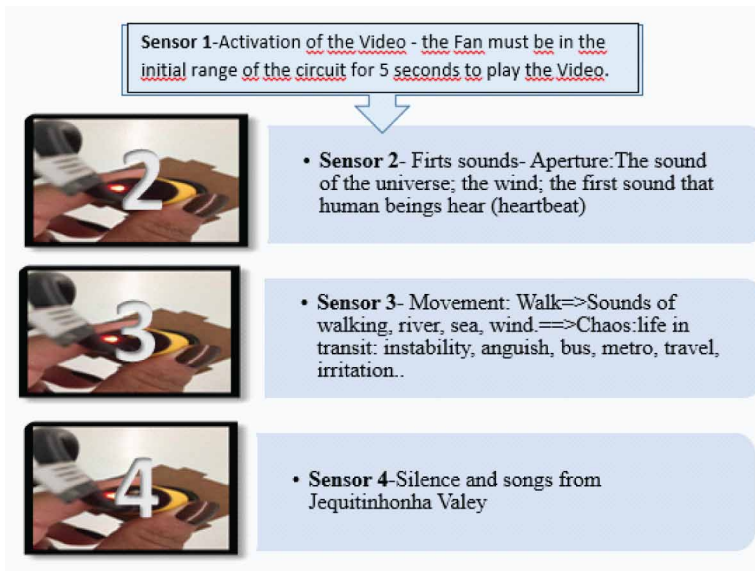
As soon as the video starts playing, according to the instructions on the screen, the user interacts through the sounds. All sounds of the narrative are inspired by soundscapes related to the author’s musical experience and academic trajectory. After the first image on the screen, the user steps on the first track and the proximity sensor 1- emits the sounds of the first file (the sound of the universe); this audio ends with the sounds of the walk (at that moment an invitation appears on the screen for the audience to advance to the second track). When being on the second strip, after the screen is completely dark, the user advances to the third strip, sits down and puts on a blindfold.

The author Penna (2014, p.22) defines that music is an essentially human, intentional, meaning-creating activity. In this sense, the proposed installation is only carried out with human interaction. That is, if the individual does not make the journey there is no sound.

6.1.3. Narrative / Interaction of the User - Details

As soon as the user (s) enters the room and is positioned at the beginning of the circuit, the infrared sensor detects the presence and sends the message to the arduino uno rev.3/ protoboard / processing which, through computer programming, activates the video that has 3 minutes and 45 seconds. In the room, there are 3 tracks on the floor. Each strip represents the precise position that the user (s) must be in the room to activate the proximity sensor that is located on the floor, in the same direction as each strip. Each sensor as soon as it detects the approach (programmed in distance) of the user activates the sounds that are in sync with the images. Each track is detailed below.

Figure 1. Sensors scheme



The sounds present in the first version of the installation are representative recordings, selected from videos from free libraries, because at the time of production, the author could not go to Almenara (BR) to capture the real sounds. So these sounds were gradually replaced by the recordings made in January / 2020. Where the author sought to record the sound of the Jequitinhonha River, the birds, the soundscapes of the tourist spots and traditional songs that represent the region: “Jequitivalé” (Verono, 2005) <https://www.youtube.com/watch?v=II314dRVBO4> and “No Jequi tem onha” (Gonzaga Medeiros, 1979) <https://www.youtube.com/watch?v=QHeHSrPga2Y&t=17s> .Singing author versions were specially created for installation.The video that was inserted as an immersive factor such as impacting images and a lot of brightness, is being replaced by an initial informative video and completely dark screen in search of the sound surrounding overlapping the visual dispersion.

Through the first infrared approximation sensor as soon as visitors enter the room (which you want to have the lights off), the audience must position themselves in the first lane (altogether there are 4). This sensor, like the others, is connected to a system created for the arduino and activated in processing. The user must remain on this track for 5 seconds to play the video, which, regardless of the individual’s subsequent movement, passes until the end. In this situation, if the user decides not to evolve to the other tracks, he will watch the entire video in silence, since it is the other tracks that activate the sounds.

Figure 2. Sensor 2- As soon as the user enters the room and approaches the first track, its presence is detected by the infrared sensor and the video starts 5 seconds after the user approaches the first track. When positioning on the first track, the proximity sensor will play the first audio, which brings the sound of the Universe; the wind; the first sound that human beings hear (heartbeat). Cut 01, from 00:00 to 1:06.

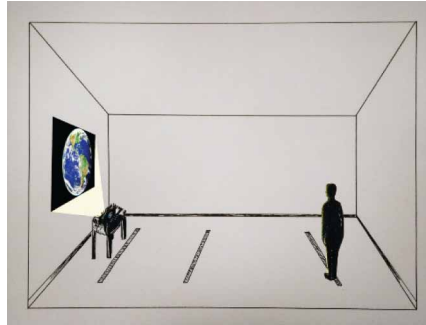


Figure 3. Sensor 3- When viewing the command on the screen, the user should walk to the second lane. As soon as it approaches, Sensor 2- activates the sounds of the “Motion” audio. That represents the Heart that walks (sound of the walk), that passes through (rivers and seas), and crosses the ocean (My crossing Brazil / Portugal). Live the chaos of the present (life in transit: instability, anguish, bus, metro, travel, irritation ...) - Cut 02- from the minute 1:06 to 2:38.

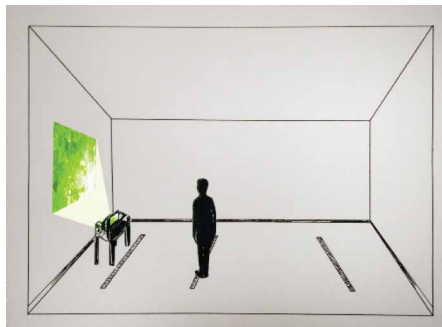
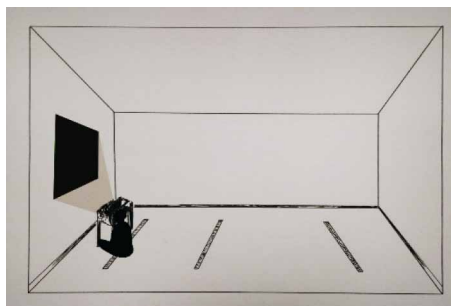


Figure 4. Sensor 4- Band 4- When the screen goes black, a command appears asking the user to proceed to the third band, where he is invited to place a blindfold and sit down. Sensor 3 activates the “Mantra” audio. After experiencing busy sounds and at the end an irritating sound; the user is encouraged to disconnect from the world (from images) and meditate, reflect, be what he is: “essence; get out of chaos and just be a heart (mantra of the heart). Cut 03- from minute 2:06 to 2:38.



The minutes shown in Figures 1,2,3 indicate the duration of the clippings made in the audios according to the proposed narrative. In the current version of the artefact, the times are maintained and the sounds of the mantra were replaced by the songs of Vale do Jequitinhonha in the programming of the last sensor. In the current version, the video does not present images, all immersiveness is concentrated on hearing sounds. If the listener does not advance on the tracks, he / she will remain silent for 3 minutes and 45 seconds.

Before entering the room, the user will receive a postcard with information on the installation steps. However, the same instructions will be on the screen. As a way of perceiving and evaluating the reaction of the participants, direct observations will be made, conducting a daily face-to-face monitoring of the installation, recording of photos and videos. The sounds in this first version presented are representations of the sounds that inspired the author. In the updated version, soundscapes were captured in the city of Almenara, Minas Gerais, Brazil: sounds of birds, the Jequitinhonha River and recordings of songs that portray the place.

Figure 5. Exhibition “Backyard Sounds”, Braga, 2019



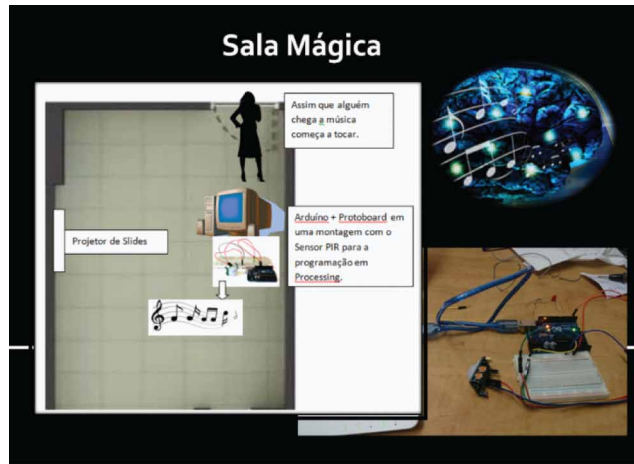
6.2. The Artifact

The science of artefacts or arteology uses the combination of “ars” from Latin (art, technique) and Greek “logos” (work, knowledge) presented to us by Rotio (2003). Arteology studies the semiotics of artifacts, of any nature, their functionality and usability, beauty, the message and the surroundings, processes of investigation and categorization, among others. It thus proposes the comparative study of various artefacts in order to help understand the activity inherent to their production, their creation processes and their creators, thus promoting the development and advancement of the study of *latu sensu* artefacts. Marcos (2017, p. 138) quotes Rotio (2003).

The artefact built for the Backyard Sounds installation, initially aimed to use PIR sensors, leds and ultrasonic sensors. The first version of the artifact is described in the sketch shown in Figure 6.

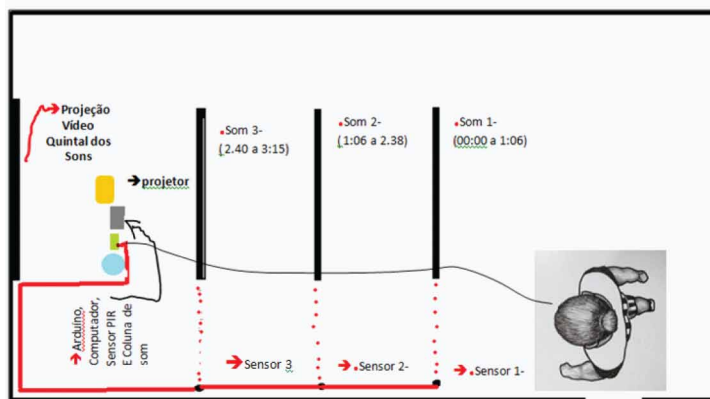
However, the dialectic of contemplation, reflection and revision of the artifact puts us in constant questioning in terms of improvements and needs, whether they are technical (in relation to the equipment and technology chosen) or aesthetic (in terms of the intended visual, sound and synesthetic presentation) by the artist). The second version designed for the device is already closer to the current version. The difference is in the layout of the room and the sensors used. For, it was thought of an installation that would have an exclusive room and the user would, as a result, have an individual experience. However, for the exhibition at Casa José Saramago, in the city of Óbidos, in July 2019, it was informed that there would be no exclusive room and all the works would be in the

Figure 6. Initial sketch: Magic Room. Sound installation.



same space. Therefore, when thinking about the interference that the PIR sensor and the Ultrasonics could cause due to the imprecision in detecting the approach of the users, as well as the number of people that would be circulating in the place at the same time, it was decided to make exchanges of sensors and reduce the space used in a corridor 80 centimeters wide and 3 meters long.

Figure 7. Sketch 2: Sound installation



The third and current version of the artifact maintained the poetics and narrative proposed in the previous version and carried out the changes designed to improve the accuracy of detecting the approach of individuals, as well as reducing interference by placing a minimum distance of 15 centimeters on the sensors in each range. All sensors can be adjusted using a key that allows to increase or decrease the reach distance according to need and the space in which the device will be assembled.

6.2.1. Arduino

As previously explained, the artifact works from the arduino with programming in processing. Cavalcante (2013, p. 580) defines arduino as “an open source hardware platform for flexible electronic

Figure 8. Infrared sensors in the installation exposed at Artech in Braga, 2019. Author's personal file.



prototypes. It is aimed at artists, designers, students and people interested in creating interactive objects or environments”.

The Arduino is a microcontroller that allows association with a wide range of sensors related to pressure, light intensity, movement, approach... and also allows the activation of motors, robots, sounds, LEDs and other actuators. In this way it is possible to send commands from the responses of these sensors, considering that it presents in addition to an A / D converter, a micro controller. The micro controller on the board (Atmel AVR 8 bits) is programmed using a C-based language and the Arduino development environment is based on the Processing language, however, it can be used

Figure 9. Arduino Uno Rev.3-programming

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Rosy_Arduino_Final_V4 | Arduino 1.8.8
Ficheiro Editar Rascunho Ferramentas Ajuda
Rosy_Arduino_Final_V4
//Define os pinos dos sensores infravermelhos
#define SENSOR1 3
#define SENSOR2 4
#define SENSOR3 5
#define SENSOR_ENTRADA 6

// Variaveis para coletar o estado dos sensores
boolean estadoSensor1 = 0;
boolean estadoSensor2 = 0;
boolean estadoSensor3 = 0;

// Declaração dos estados de operação
enum estadosAmbiente {SALA_VAZIA, ZONA_ENTRADA, ZONA1, ZONA2, ZONA3};
estadosAmbiente estadoAmbiente = SALA_VAZIA; // Define o estado inicial

// Duração dos videos e áudios em millisegundos
#define VIDEO_01 23300
#define AUDIO_01 66000
#define AUDIO_02 92000
#define VIDEO_02 23300
```

with several different programming languages. Arduino projects are set up with computers using the USB output. The Arduino board can be purchased ready-made or pre-assembled; the programming software is free and can be downloaded from the arduino website. Commercially, there are several versions available on the market, which can be adapted according to the user's needs. In addition, the blueprints for the assembly of the different plates are available under an open source license, so that users can freely assemble their own adaptations, in addition to those already commercialized.

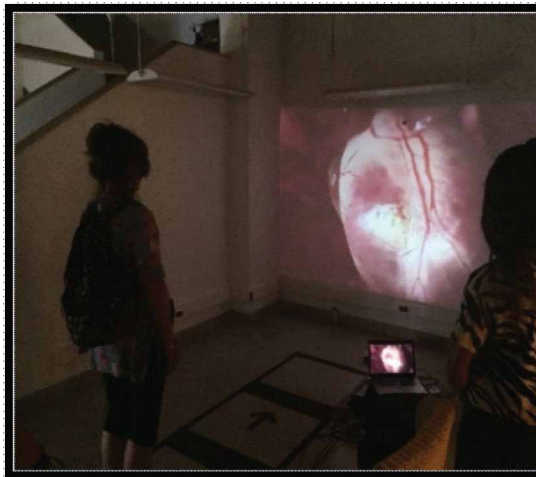
7. EXHIBITIONS HELD AND PARTIAL RESULTS

The Backyard Sounds installation opened in July 2019. In the first assembly, still in testing, we thought of using a kinetic camera instead of proximity sensors.

The first official exhibition took place in July 2019. The first trials, involving different kinds of people, namely visitors, colleagues, teachers and specialists in the field, allowed for reconsideration, new ideas and suggestions; possible failures were noted, ensuring proper attention was being paid to the equipment and materials. On that occasion, for example, a self-insulating adhesive tape was used to assemble the strips; which left immense stains on the floor, which took hours to be removed.

Regarding the location, participation and involvement of people, all the participants finished the installation, even if the space was not as imagined. Some commented that they would have felt more involved without the projection of images; others said that 3 minutes was a short time and others still said that the moment of relaxation could be longer.

Figure 10. Exhibition at Casa José Saramago in Óbidos, at the Doctoral Retreat of the Universidade Aberta, July / 2019



The Second Exhibition took place in Lisbon, from the 17th to the 19th of October 2019, at “Faculdade de Belas Artes da Universidade de Lisboa (FBAUL)”. In this exhibit, starting with the space for assembling the project, there were many problems. Although the projected was approved there were no adequate spaces and they were not yet fully prepared. In any case, the necessity of assembling and disassembling the set on a daily basis, due to the lack of security, and the need for reconfiguring the sensors and programming, lead us to having greater ease in the assembly process and in adapting the artefact for use in a greater variety of locations, where the exact specifications are not met.

Figure 11. Exhibition at - # 18.Art-, Lisbon, October / 2019



The Third Exhibition took place in Braga, from the 23rd to the 25th of October 2019. This exhibition had the best infrastructure. It is important to experiment with different locales to better understand how to adapt the installation to those locales in order to best achieve its maximum effect. There were a few problems regarding assembly and malfunction, as due to the transport from one exhibit to another, there is a slight recalibration of the sensors that required adjustment afterwards.

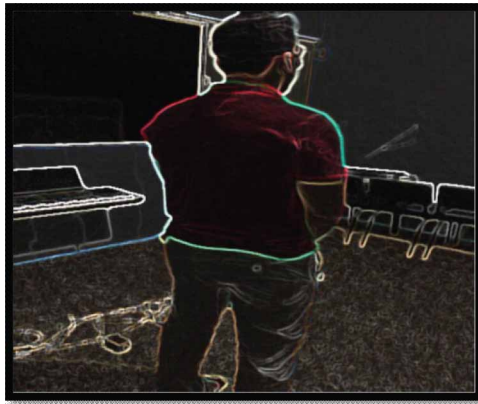
Figure 12. Exhibition at Artech, from the 23rd to the 25th of October, Braga, 2019



The exhibition in Almenara, had no video viewing and the whole installation was centered on sounds. The participants had never had contact with sensors, so they paid more attention to the activation of sounds, than to the narrative presented. Technology was new to everyone.

With regard to people's participation, 100% of the participants were artists, students and professionals in Media Art. A demanding audience. This led to a professional level in the suggestions and comments we received, namely, an appreciation of poetry and narrative, which it claims to be engaging, and a belief that a greater amount of movement and interaction in the exhibition would be beneficial. It was concluded that the video was very immersive and dispersed the users of the

Figure 13. Exhibition at CRIAART, from the 5th of February, Almenara, 2020



centrality of the installation, which is the sound reflection. So that the next version will not have the visual narrative, only an instructional video and in the other parts of the circuit only the sound perception in the dark. 80% of the participants complained of discomfort at the moment of silence or with aggressive sounds (traffic). In the technical aspect, it was found that the infrared sensors had some difficulty in interfering in places that are not very isolated or with a greater flow of people.

8. FINAL CONSIDERATIONS

The Backyard Sounds artifact presented in this article, aims to establish a relationship of empathy between the public and the artifact through audio and kinetic experiences. Thus, an immersive sound atmosphere is created, leading the users to stop, close their eyes and listen, contemplating on the sounds of everyday life in contemporary times. Using the artefact and theoretical concepts, we attempt: to create an interaction between the sound space and the user; to stimulate auditory awareness through soundscapes; and so reinforce the individual's relationship with the environment and its sounds.

Directly involved with the installation were concepts such as: media art; sound art; immersion; interaction; soundscape and sound installation; and were discussed throughout the text. According to Barros (2016, p. 858) “the strong emphasis on the element of sound is what defines sound art or sound art as a conceptual umbrella that includes works from a multitude of artistic languages.”

From a technological point of view, the research gave us experience working with proximity sensors and arduino / processing programming. The development of sounds depends on human presence. And it is linked to the concept of Penna (2014) where without the human being there is no musical creation or reflection.

“Backyard Sounds” has been created, so far, in three exhibitions, throughout 2019. The next steps will be to revisit the artifact replacing the present and merely representative sounds with natural sounds recorded in January and February 2020 in the city of Almenara (BR) and some traditional songs from Jequitinhonha Valley sung by the author herself. The video with the visual poetic narratives is removed so that individuals focus exclusively on the sound narrative, since it was realized that the video was being a factor of dispersion and not of immersion. Participations in exhibitions will also be held; congresses, publications and finalization of the ongoing thesis.

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