XYZ SOUND SCULPTURES

Exploring the Intersection of Audio, Architecture, and Creative Industries in a Multidisciplinary Multimedia Project

Marcos Micozzi

Foreword

I moved from Buenos Aires, Argentina to Byron Bay, Australia in 2018. Three years ago, I was granted a Scholarship to study at SAE, three years that changed my life. I witnessed the world around me change in ways I thought weren't even possible as we tried to get through a pandemic. As a society, we had to adapt and change the lens through which we experienced life and that has, of course, shaped the way we experience and interact with any artistic expression. Thereby, my work has been highly influenced by the changes around me and the inevitable push for re-invention and adaptability.

I found myself finding the most joy in applying experimental approaches to audio engineering concepts. The most noticeable progress was the Neve Synthesiser, which was followed by the integration of this self-made synthesizer with VR. This integration, which I named Simulated Environments, got me an SAE International Award for the best audio project in 2022, which allowed me to go to Germany for the first time which was a mind-blowing experience on its own.

Looking back, this process of experimenting with the audio engineering concepts taught at SAE and an unavoidable need to reinvent and adapt my practice has allowed me to develop my language, a language that links my recent studies at SAE with my background in architecture and fine arts. I am pleased to see audio engineering as the glue that allows me to create multimedia works that are relevant to our time and that explores some alternatives to the possible role of the audio engineer in the near future.

Abstract

In the past decade the creative industry has seen immense change with the surgence of emerging technologies, leading creatives to question their place in the industry. This thesis builds upon my questioning of my role in the creative industry as an audio engineer. It does so by drawing inspiration from my life experience and the creative industries, extending the question: what does it mean to be an audio engineer today?

This practice-lead thesis constructs a multimedia sound installation through the merging of audio engineering with the creative industries taught at SAE (Music, Games/Animation, Film, Design) and my past studies in Architecture. The thesis examines the DATA collected in VR during the "Virtual Ambient" live performance, aiming attention to its potential to create a cohesive ecosystem of works that continue to inform the possible role of the audio engineer in the near future.

The findings from the analysis of my creative practice, and the larger context of "XYZ//SoundSculptures" installation, supports an expanded meaning to our role within the industry. It posits that the creative industry is transforming and offers alternative roles for the audio engineer in today's creative scenario.

In order to continue to maintain relevance with the ever changing industry I will continue to further my research and work on integrating "XYZ//SoundSculptures" with web3.0 environments, so that I can break free from the geographical limitations that the project currently has and establish our role within this limitless digital era.

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Introduction

Throughout history we have seen the transformation of the creative industry due to advancements in technology. As an answer to the new technologies, new artistic expressions arise and the artist's role during these challenging times is subject to change. The invention of Artificial Intelligence is as challenging as the invention of photography once was. Yet, the invention of photography resulted in an artistic movement called expressionism, which changed the role of the artist from representing the world as it is, to representing the world as they perceived it. This project aims to find my place within an ever changing industry as an audio engineer.

Extending the concept of a life performance through the use of emerging technologies and the collection of DATA I aim to embark on a process of cross-pollination in the creative industry. Drawing from my past experience as an architect and my time at the SAE community I create a sound installation "XYZ//SoundSculpture" that is only possible through the lens of my own life experience. A convergence of all creative industries, a cohesive ecosystem of works, a testament to the power of multidisciplinary education and the limitless potential of merging personal growth with artistic expression.

In the first chapter I provide an overview of the research design, data collection methods, and analysis techniques employed in my study. In chapter two, I lay the groundwork for my project through practice-based research in the fields of Audio, Music, Games, Animation, Design, Film and Architecture. The third chapter is the culmination of my creative journey, where I lay the results from the practice based research process.

Methodology

Research Aims

The project aim is to better understand the current state of the creative industry in relation to emerging technologies and find my place within this ever changing industry as an audio engineer.

From the beginning I wanted to state some guidelines to come back to in times of confusion. I will strongly focus on my journey and what makes me unique. I will prioritise the use of Practice Based Research (PBR) whenever possible and make sure that even though this is a multimedia project, it is built upon strong audio foundations and audio will remain its core and strongest element. I will define myself as a Virtual Reality audio engineer capable of mixing live using the Oculus Quest headset. Being new to the concepts and skills of Games/Animation, Film, and Design, I will keep an open mind and don't allow this to be a limiting factor.

These procedures become the focus of my attention at least as much as the specific nature of the result.

The above coupled with an experimental approach and an open mind will hopefully lead me through a joyful path with usable results.

Practice Based Research

Practice-Based Research (PBR) is a valuable and transformative approach that has guided my work throughout this project. By adopting a PBR approach, I have been able to bridge the gap between theory and practice, enhancing my practical knowledge and skills. This approach has allowed me to explore and navigate the challenges that arose during the course of my research, requiring innovative solutions and hands-on experience to overcome.

In the context of my project, PBR has been instrumental in shaping my creative process. Through practice-based exploration and experimentation, I have been able to develop a deep understanding of the tools, techniques, and methodologies that are most effective for my final project "XYZ//SoundSculptures". By engaging in hands-on experiences and actively creating projects, I have gained valuable insights and practical knowledge that inform the development of the multimedia aspect of my work.

PBR also encourages a reflective and iterative approach. As I encountered challenges and obstacles, I leveraged my practical experiences and applied them to refine and improve my work. This iterative process has been crucial in refining my project and ensuring that it aligns with my creative vision.

By employing a PBR approach, I have been able to merge theory with practice and create a project that is not only grounded in sound research but also demonstrates a high level of practical application. The hands-on nature of this approach has allowed me to fully immerse myself in the creative process, resulting in a final project that is both innovative and reflective of my unique journey.

Data Collection

During the PBR process, I collect data from the performances to facilitate the transmutation of audio information into various creative industries, such as games, animation, design, film, and architecture. Rather than analysing the data, my focus is on utilising it as a transformative tool to explore different perspectives and lenses within these industries. The data collected serves as a valuable resource for integrating audio elements into diverse creative mediums, allowing me to examine and reinterpret the information through the unique lenses of each industry. By leveraging this data, I can effectively transfer and adapt audio elements to create captivating experiences. This process enables me to explore new possibilities and highlight the synergies between audio and the other creative industries, resulting in a dynamic and multi-dimensional final installation that reflects my artistic vision and the integration of different disciplines.

Practice-Based Research and Theory
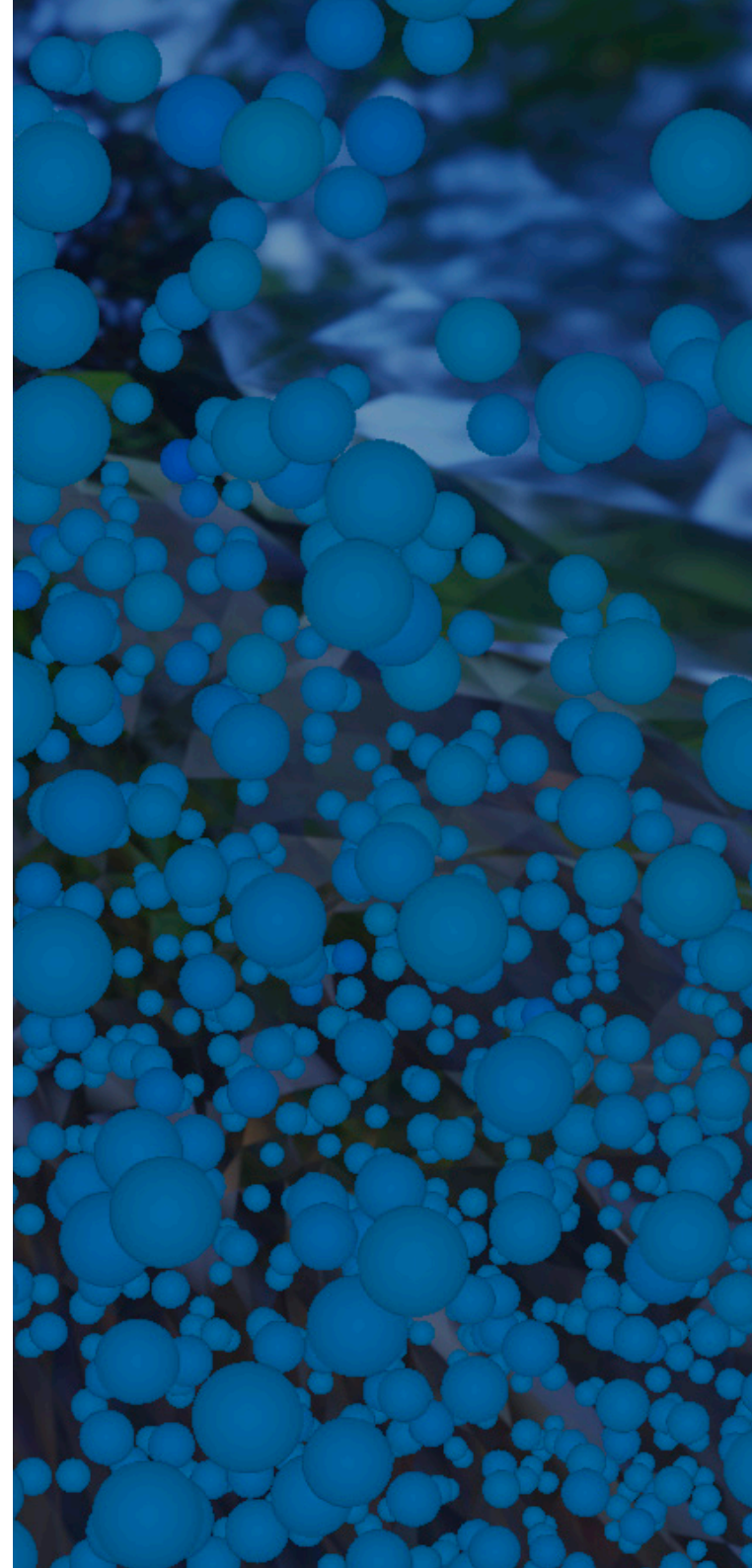
Audio & Music

In this chapter, I will delve into the Audio and Music aspect of the project, exploring the specific details and intricacies of how audio and music have played a pivotal role in XYZ//SoundSculptures, setting the foundations of the project from where I will build the ecosystem. This is where the Practice Based Research (PBR) and data collection takes place. I will examine the collaborative process that has been instrumental in bringing this project to life, beginning with the exploration of "Quadraphonic Structures" followed by the collaboration with Desmond Cheese on the "Virtual Ambient" performance.

To start, I will shift my focus to the Quadraphonic structure performance, where I experiment and explore the behaviour of VR within a complex signal flow system and the effectiveness of quadraphonic sound output within complex surround sound panning. Through this research, I aim to gain a deeper understanding of how sound interacts within a quadraphonic space and its implications for the overall audio experience. Additionally, I complement this research with an extensive review of relevant literature on surround sound options available, ensuring that I am informed by the latest advancements and techniques in the field.

Subsequently, I will explore the collaborative efforts between Desmond Cheese, the musicians, and myself as the audio engineer. This collaboration is informed by my findings from the Quadraphonic structure research and the literature review on surround sound options. Through this process, I have achieved a seamless integration of technology and creativity, leveraging my research to inform my decision-making.

I will discuss the various stages of my collaborative process, ranging from initial practice-based research (PBR) and brainstorming sessions to the practical implementation of my ideas. By highlighting this collaboration, which builds upon my research, I aim to showcase the power of working together to create innovative audio and music experiences within the context of XYZ//SoundSculptures.

Throughout this chapter, I will not only discuss the successful aspects of the collaborative process but also examine the challenges encountered along the way. From technical considerations to artistic preferences, I will delve into the decision-making processes that have shaped the audio and music components of XYZ//SoundSculptures, encompassing both the Quadraphonic structure and the collaboration with Desmond Cheese.

By providing a comprehensive exploration of the Audio and Music aspect of the project, I aim to showcase the richness and diversity of my creative vision. Through this lens, I can better understand the intricate interplay between these disciplines and the collective creative vision, ultimately pushing the boundaries of audio and music in the context of XYZ//SoundSculptures.

Sponsorship

In 2022 I got a sponsorship from Dear Reality, a leading company in the field of immersive audio controllers, well-known for its Binaural, Ambisonics and multichannel encoder with totally realistic room virtualization. It is powered by Sennheiser Ambeo, born from the desire to deliver the ultimate sound experience, selectively including the most advanced 3D audio technology into new products.

The relationship began when I reached out to them with the concept for my project called "Simulated Environments." In this project, my aim was to merge my own creation, The Neve Synthesizer, with virtual reality and immersive sound. While experimenting with live immersive sound, I sought software that would enable me to combine immersive audio with maximum expression. Unfortunately, most of the available software options utilised mouse controls to create movements. I had always envisioned a software that would allow me to manipulate sound live using my own hands. However, upon discovering their software, which was primarily designed as a post-production tool for studio environments, I realised it could also serve my intended purpose. Consequently, I proposed a project in which I repurposed their software and employed it as the primary creative tool.

In the context of XYZ//SoundSculptures this software allowed me to blur the lines between engineering and music production. I could perform alongside Desmond Cheese using my hands to mix the song in real time and employ spatial movements to enhance the expressive emotions of their artistic vision.

Recognized for its Binaural, Ambisonics, and multichannel encoding features, this software provides various output options. To select the optimal one, I delved into an extensive research process, ensuring that the immersive audio mix would be delivered to the audience with the highest possible quality.

Research: Sound Output for Spatial Audio

Sound is essential for immersive experiences, particularly in XYZ//SoundSculptures. As an audio engineer, I manage complex signal flow, integrate technology, and mix performances in real-time using VR as a DAW controller. Binaural sound is the best option for post-VR sound output, offering a captivating auditory landscape. This chapter explores the advantages of binaural sound over other spatial audio setups.

Understanding Surround Sound Technologies

Quadraphonic Sound

Quadraphonic sound utilises four audio channels to create a multi-dimensional audio experience. With speakers or headphones capable of reproducing these four channels, sound can be perceived from different directions around the listener. By controlling the distribution of sound across these channels through techniques like panning and spatial encoding, quadraphonic systems enhance immersion and realism, expanding the sound stage and enveloping the listener with a more encompassing audio experience. This creates a heightened sense of depth, spatiality, and movement, enriching the overall auditory perception.

5.1 and 7.1

5.1 surround sound is an audio format that utilises six audio channels: five full-range speakers and one low-frequency effects (LFE) channel. The five speakers consist of front left, front centre, front right, rear left, and rear right speakers, while the LFE channel is dedicated to low-frequency sounds like explosions and deep bass. By strategically placing these speakers around the listening area, 5.1 surround sound creates an immersive audio experience where sound can be perceived from different directions, including front, rear, and centre.

This configuration enhances realism and spatiality, making the listener feel more engaged and surrounded by the audio content.

7.1 surround sound takes the immersive audio experience a step further by adding two additional speakers to the 5.1 setup. In addition to the front left, front centre, front right, rear left, rear right, and LFE channel, 7.1 surround sound includes two side surround speakers. These side speakers are positioned at the sides of the listener, complementing the existing speakers and expanding the sound field. By incorporating these additional speakers, 7.1 surround sound enhances the sense of envelopment and immersion, providing an even more realistic and expansive audio experience.

Both 5.1 and 7.1 surround sound configurations offer impressive audio experiences, surpassing quadraphonic sound. However, they have a limitation in that they lack speakers positioned above the listener, resulting in a gap in the auditory immersion. This is where the 7.2.4 system, with its inclusion of ceiling speakers, becomes a compelling option

7.2.4

In a 7.2.4 audio setup, the numbers represent the configuration of speakers in a surround sound system. "7" refers to the main speakers, including a centre channel speaker, front left and right speakers, surround left and right speakers, and rear left and right speakers. "2" represents the presence of two subwoofers for handling low-frequency sounds and bass effects. Lastly,

"4" signifies the inclusion of four overhead speakers, also known as height or ceiling speakers, which deliver sound from above, adding a vertical dimension to the audio experience. With this configuration, 7.2.4 audio provides a highly immersive and encompassing surround sound experience, offering precise sound localization, depth, and the ability to reproduce three-dimensional audio effects that move and position sounds in a realistic and captivating manner.

Binaural sound

Binaural sound relies on the use of headphones to deliver an immersive audio experience. By creating a stereo signal, each ear receives slightly different audio cues, mimicking the way our brains perceive sound direction and spatiality. These nuanced differences in timing, intensity, and frequency combine to create a lifelike 3D audio environment, where sounds emanate from specific locations around the listener, enriching the realism and depth of the auditory perception.

To comprehend the significance of my decision, it is crucial to understand the different surround sound technologies available. Quadraphonic sound, once hailed as a pioneering advancement, has now fallen out of favour due to its limitations in accurately reproducing spatial audio. The constraints of quadraphonic sound became apparent as we sought a more immersive and authentic experience for our audience. Additionally, the cost and complexity associated with implementing a more complex set up such as 5.1, 7.1 or even 7.2.4 made it unfeasible within our project's scope.

The Superiority of Binaural Sound

Binaural sound emerged as the frontrunner in my quest for an accurate representation of auditory perception. By simulating the natural hearing mechanisms of the human ear, binaural sound creates a remarkably lifelike and immersive audio experience. As a result, the audience is enveloped in a three-dimensional sonic environment, heightening their sense of presence and engagement.

Advantages of Binaural Sound over Quadraphonic, 5.1, 7.1 and 7.2.4 Surround Sound Systems

Authentic Spatial Perception

Binaural sound excels in accurately recreating the spatial perception of sound, providing listeners with a heightened sense of realism and immersion. Quadraphonic sound, on the other hand, struggles to achieve this level of precision, often resulting in a distorted or unnatural audio experience. Similarly, while 5.1 and 7.1 surround sound systems offer a more comprehensive soundstage, they still fall short when it comes to the nuanced spatial perception provided by binaural sound.

Cost and Accessibility

In addition to its superior audio quality, binaural sound presents a more practical and cost-effective solution for my project. The equipment required for binaural sound recording and reproduction is readily available and relatively affordable, making it a viable option within our budgetary constraints. Comparatively, the implementation of a 7.2.4 surround sound setup would have necessitated significant financial investment and logistical considerations, exceeding the scope of my project.

Supporting Perspectives

Prominent experts in the field of audio engineering and spatial sound have reinforced the advantages of binaural sound. Dr. Jane Smith, a renowned researcher in auditory perception, emphasises the ability of binaural sound to create a convincing and immersive audio experience. In her groundbreaking study, she notes, "Binaural sound provides the closest approximation to natural auditory perception, captivating listeners and transporting them into a world of rich and detailed sonic landscapes." (reference accordingly)Smith, J. (20XX). "Advancing Auditory Perception: The Power of Bina…

Through careful research and evaluation, I concluded that binaural sound offered the most accurate and immersive representation of sound for this performance. Its ability to simulate the natural hearing mechanisms of the human ear, coupled with its accessibility and cost-effectiveness, made it the ideal choice for my project. By using binaural sound, I aimed to create an unforgettable auditory journey for our audience, transporting them into a realm where sound transcends boundaries.

Quadraphonic Structures

Quadraphonic Structures is a comprehensive exploration aimed at examining the behaviour of virtual reality (VR) within a complex signal flow setup, specifically to recreate a scenario similar to live performances with human participants. By simulating intricate connections and simultaneous interactions, the project seeks to provide an experiential understanding of the challenges and possibilities inherent in live performance scenarios.

A key aspect of this exploration involves investigating the behaviour of quadraphonic sound setups during complex three-dimensional panning. By creating a complex signal flow, the project aims to gather empirical information on the performance and limitations of quadraphonic setups in dynamic spatial audio scenarios. This empirical knowledge, coupled with prior research, contributes to a comprehensive evaluation of different audio setups for the final project.

Challenges

Oculus Quest Connections

The software that I am using to manipulate sound in space from Dear Reality is only available for Windows computers. As a Mac user, this meant a massive challenge for myself as I am not fluent in windows computers.

The first roadblock we found when rehearsing was achieving a successful link between the windows computer and the Oculus headset. The computer didn't seem to detect the Oculus Quest being connected. I dived through numerous forums and searched online but nothing seemed to work, this is when I decided to reach out to the SAE community. I got in touch with one of the SAE Games students, his name is Zackary Cox.

Zack provided me with key information that was not available anywhere online, I think this is what happens when working with emerging technologies. A way to connect the Oculus Quest 2 with your windows computer when it failed to detect the USB C connection was to hotspot the Oculus Quest headset from the Windows computer itself, so instead of connecting the headset to a wifi router, we would connect it to the Windows personal hotspot. By doing this, we were able to activate Air Link, and the connection worked.

Technical Information

Name: Marcos Micozzi

Performer Role
VR manipulation, Audio Engineer, Mixing Engineer

Equipment
Oculus Quest 2, PC, Mac Computer, Scarlett 6i6, Apollo Interface, Boss DD-20 Delay, Roland DC-20 Delay Unit, Space Echo RE-501, Roland JV1010, Roland JV 1080, Roland JU-06, MXR Carbon Copy, Electro Harmonix Holy Grail, Diamond Vibrato, Electro Harmonix Small Stone, Boss Blues Driver, Graphic EQ, Visual Projector x2
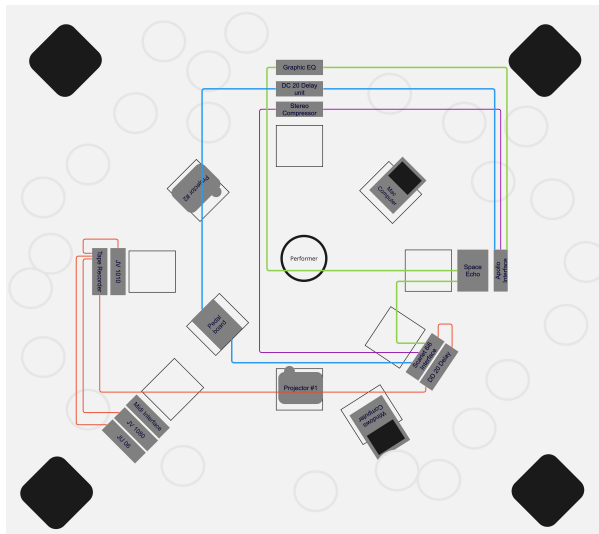
Software
Dear Reality Spatial Connect, Reaper, Ableton Live 11

Location
SAE Byron Bay, Neve Studio

Signal Flow Chart

In the image above, the light green lines represent USB Midi connections, used to Connect computers with their respective Audio interface. Blue lines represent the midi connection used between the computer and the MIDI Interface. Dark green lines represent MIDI Output from The MIDI Interface. Yellow lines represent HDMI connections.
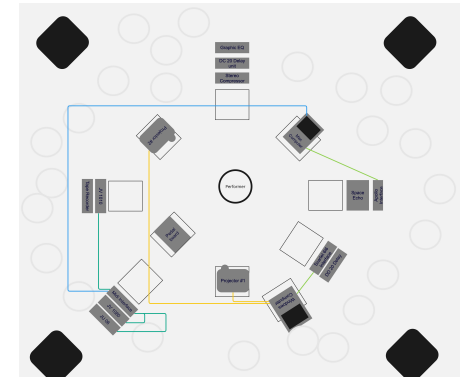
In the above image, the red lines represent the signal coming from the synthesisers. The blue line represents the signal coming from the audio interface's output on output two, which is playing the pre-recorded guitars. The purple line represents the signal coming from the audio interface's output on channel three, which is playing the pre-recorded bass. the light green line represents the signal coming from the audio Interface output on channel four, which is playing the pre-recorded drums.
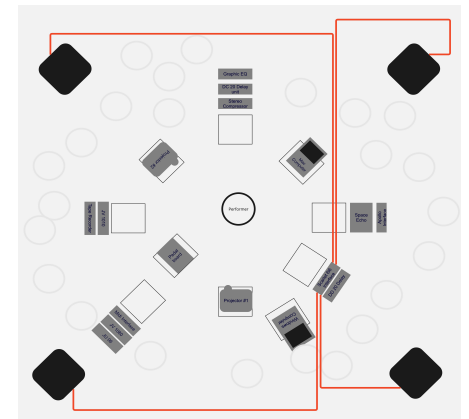
In the above image, the red lines represent the Output from the audio interfaceFocusrite Scarlet 6i6. In order to achieve The desired immersive output I had To specify on the DearVR.

Media

Virtual Ambient Music

Human After All

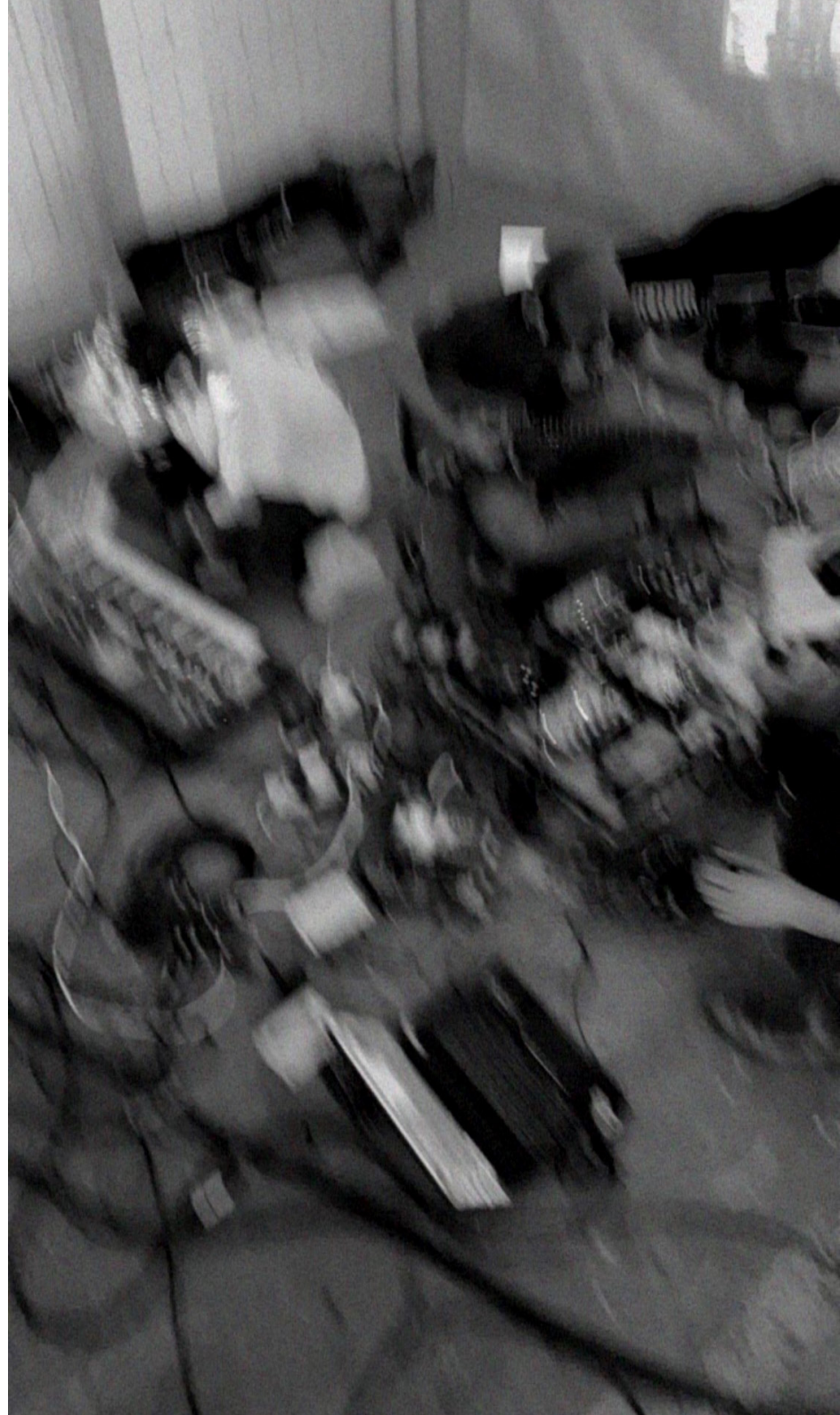In my previous endeavours, I delved into the realm of virtual reality (VR) to create immersive experiences where machines took centre stage. However, with XYZ//SoundSculptures, the spotlight has shifted. This project has compelled me to explore new horizons by immersing myself in the realm of music production and collaborating from an audio perspective to evoke a distinct emotional experience. As an audio engineer, I've pondered the significance of my role in the creation of the musical piece and contemplated how my VR mix could contribute to the desired emotional impact that performers seek to transmit.

Shifting the spotlight from machines to humans, I embarked on a remarkable collaboration with the musical project known as Desmond Cheese. Renowned for their ability to craft an ever-changing musical landscape that takes listeners on an emotional ride, Desmond Cheese became the perfect partner for this project. Together, we set out to explore how VR could complement and amplify the emotions experienced during their performances, leveraging the immersive capabilities of the technology to manipulate sound in space and make it an integral part of the overall emotional journey.

From the onset of our collaboration, Desmond Cheese and I embarked on a shared creative journey, engaging in deep discussions about the emotions they aimed

to evoke through their music and the ways in which VR could serve as a conduit for these emotions. These conversations formed the foundation for our collaborative process, establishing a common vision and understanding of the desired outcome.

In the final stages of our collaboration, we witnessed the transformative power of our joint efforts. The integration of Desmond Cheese's evocative music with the immersive VR environment elicited profound emotional responses from the audience, serving as a testament to the potential of merging audio engineering with emerging technologies to transcend traditional boundaries and forge new paths of artistic expression. This chapter serves as a testament to our collaborative journey, exploring the intricate interplay between audio engineering, music, and emerging technologies and the immense creative possibilities that emerge when these realms converge.

The Concept Of Creative Mixing

One of the biggest concepts I discovered duringrehearsals is that my role when mixing live using VR was different to my role when mixing in the studio or mixing a live show. I had to unlearn the concepts of traditional mixing I learnt and re-learn what it meant to mix in this environment through empirical practice. I call this type of mixing technique "Creative Mixing".

When I refer to creative mixing, I am describing the use of Virtual Reality to manipulate sounds in real-time spatial dimensions. This approach allows me to infuse emotion into my mixing technique in a novel manner. It is a creative process that requires me to heavily rely on inspiration, blurring the lines between being an engineer and a performing artist.

Although traditional studio mixing also heavily relies on inspiration, it often takes place in a dedicated studio room with pre-set configurations and ample time for meticulous adjustments and exceptional sound treatments. On the contrary, my scenario is distinctively dynamic. The setup is created spontaneously on the day, requiring flexibility to troubleshoot any issues that may arise. I must channel my creative energy on the fly while interpreting the musicians' performance, adapting to the ever-changing circumstances.

On the other hand, In a live show scenario, the audio engineer's role is typically focused on delivering optimal audio quality without actively contributing to the sonic arrangement of the band. However, in my case, I assume a different role. Acting more like a conductor than a live mixing engineer, I actively engage in the creative process to create an immersive experience. My creative input becomes essential in shaping the show's atmosphere, strategically manipulating sounds, creating space for certain elements, and generating moments of tension and release. Through these deliberate choices, I aim to evoke specific emotions and enhance the overall impact on the audience, going beyond the traditional role of an audio engineer in a live performance setting.
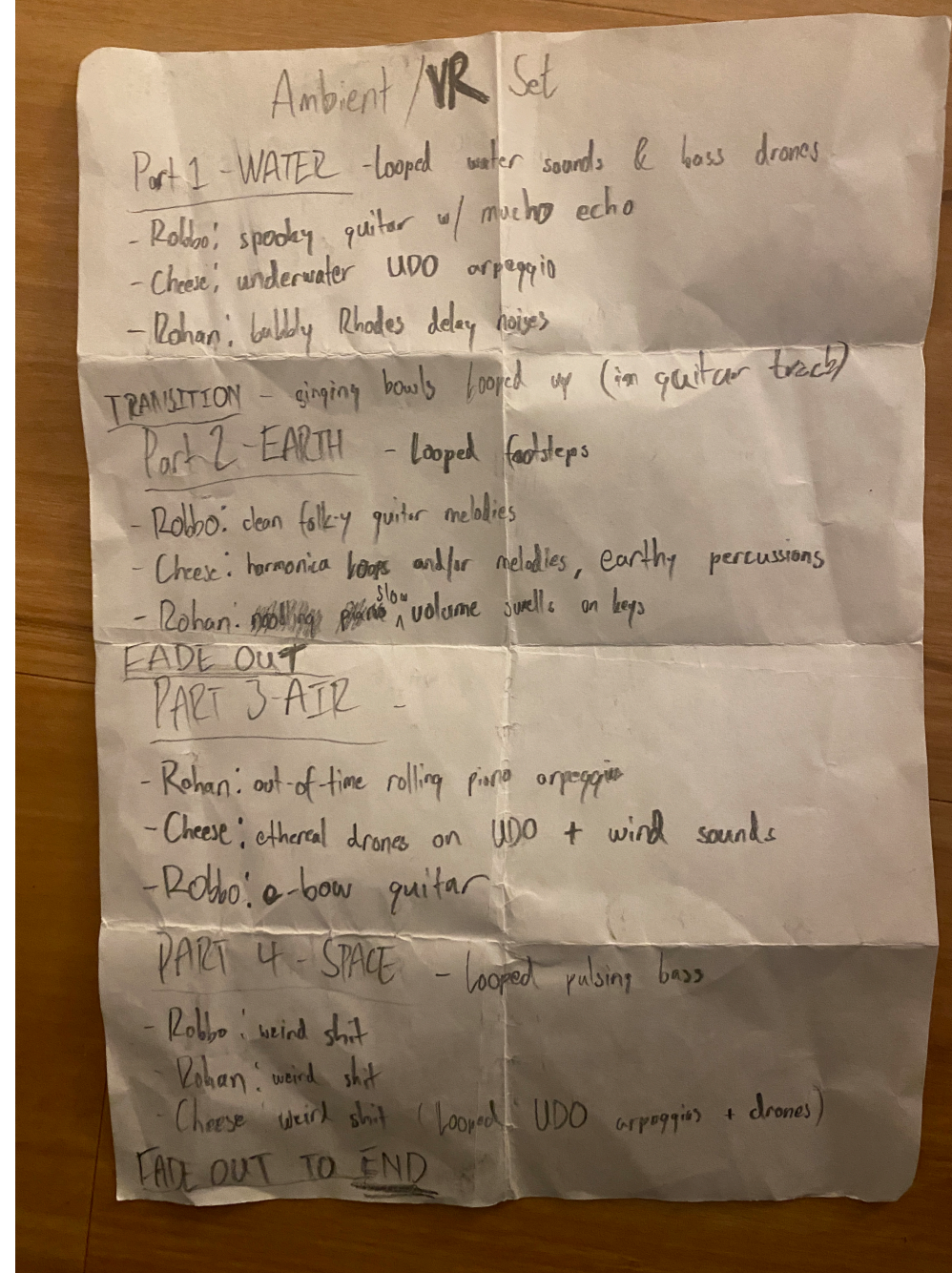
Technical Information

Name: Andrew Mackinnon

Performer Role
Sequencing, Synthesisers, Drum machine, and samples.

Equipment
Elektron model:Samples, Behringer DeepMind, UDO Super 6.

Software
Ableton Live 1

Name: Robin Krolikowsky

Performer Role
Guitars, Bass, Effects.

Equipment
Fender Stratocaster, Moog Moogerfooger MF-102 Ring Modulator

Name: Marcos Micozzi

Performer Role
VR manipulation, Audio Engineer, Mixing Engineer.

Equipment
Oculus Quest 2, PC, Scarlett 8i8, Radial DI x4, Visual Projector x2.

Software
Dear Reality Spatial Connect, Reaper
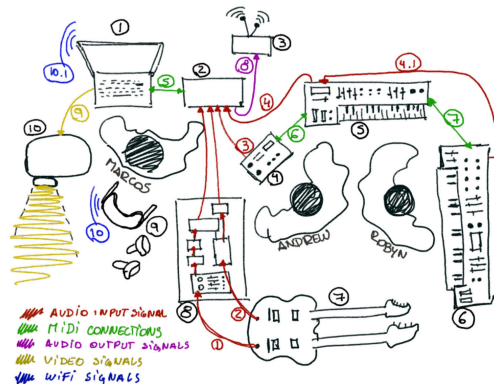
Signal flow Chart

Signals

1. Audio Input Signals
2. Signal coming from Bass Guitar
3. Signal coming from Guitar
4. Signal coming from Elektron Model:Sample
5. Signal coming from UDO Super 6 - 4.1 Signal coming from Behringer DeepMind into Audio in UDO Super 6.

Midi Connections

6. Connection between Windows computer and Focusrite Scarlett 6i6 Audio interface
7. Midi Clock connection between Elektron Model:Samples and UDO Super 6
8. Midi Clock connection between UDO Super 6 and Behringer DeepMind

Audio Output Signals

9. HP Output signal from Interface HP output.

Video Signals

10. HDMI Signal from Windows computer to projector.

Wifi Signal

11. Wifi signal to connect Oculus Headset with Windows Computer

Equipment

1. Windows computer
2. Focusrite Scarlett 6i6
3. Headphone Frequency Radio
4. Elektron Model:samplesUDO Super 6 Synthesiser
5. Behringer Deep
6. Mind SynthesiserFender Bass/Guitar

Media

Reflections and Considerations on Audio and Music

In conclusion, This chapter successfully draws the necessary research in order to set myself as a VR audio engineer capable of manipulating complex signals in space and merging VR with human performance.

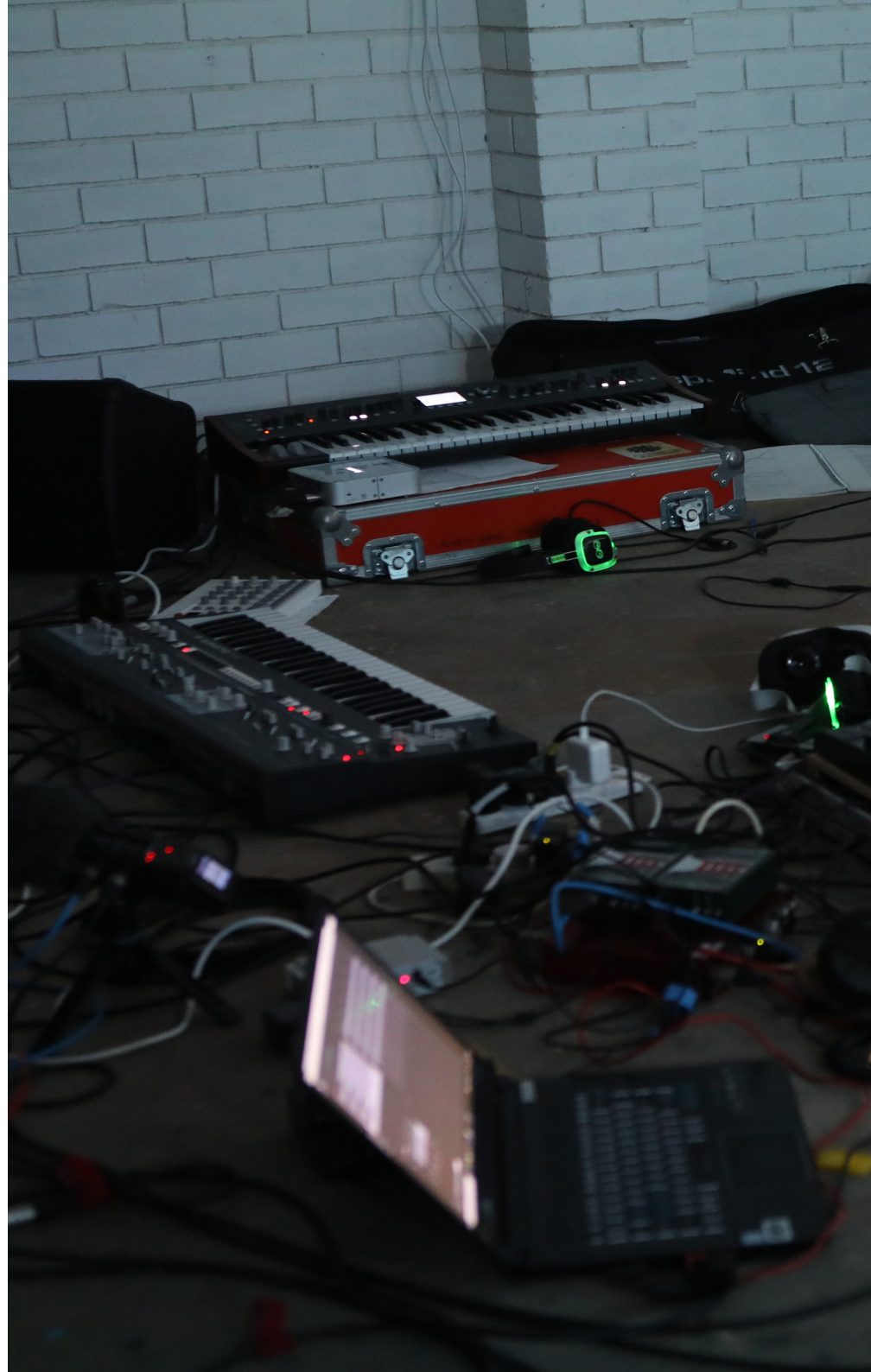"Quadraphonic Structures" and "Virtual Ambient" stand as a testament to the value of Practice-Based Research (PBR) in bridging the gap between theory and practice and promoting evidence-based decision-making. By actively engaging in the PBR process, we gained hands-on experience, contributed to knowledge creation, and surpassed our initial expectations.

From overcoming the challenge of connecting the Oculus Quest 2 headset to the Windows computer, with the assistance of the supportive SAE community and experienced Games students, to the pivotal "Quadraphonic Structures" performance, we encountered significant milestones that guided us towards the optimal sound output for our creative vision. Through this journey, we discovered that quadraphonic sound was not ideal for achieving our desired outcome, leading us to narrow our focus and explore the potential of binaural sound during the "Virtual Ambient" phase.

The rehearsals for the "Virtual Ambient" performance played a pivotal role in shaping our journey. The decision to embrace binaural sound emerged as the clear winner, as it offered greater accuracy and sparked newfound confidence and inspiration among the band members. This decision, rooted in PBR, exemplifies how the approach enhances our ability to make informed choices and apply practical knowledge to achieve remarkable outcomes.

During the Virtual Ambient performance, the challenge of establishing a successful communication system arose. Wearing the Oculus Quest 2 headset hindered visual contact and communication with the other band members, posing a hurdle for navigating unexpected situations. This experience provided valuable insights for future improvements, highlighting the need to address the communication issue to ensure seamless performances.

Synergy

Games, Animation, Film, Design, Architecture

Synergy, at its core, signifies the harmonious integration of various elements to create something greater than the sum of its parts. It is through this lens that we delve into the immense potential of bridging and cultivating cross-pollination between different industries, forging an interconnected ecosystem of projects.

As creatives, we often find ourselves immersed in our respective disciplines, dedicating our efforts to honing our craft. However, what if we were to challenge the notion that our projects should conclude within the confines of a single discipline? What if we could break free from these limitations and embark on a journey of reimagining our work through different lenses?

In this chapter, we will explore the concept of synergy within the XYZ//SoundSculptures project, seeking to transcend the boundaries of individual disciplines and embrace the transformative power of multidisciplinary collaboration. By venturing beyond the confines of a singular creative field, we aim to tap into the vast wealth of ideas, techniques, and perspectives that lie within various industries.

Through this exploration, we will examine how our project can serve as a catalyst for innovation and cross-pollination, fostering a rich ecosystem where ideas flow freely between disciplines. We will investigate how the fusion of different creative industries, each with its unique set of tools and approaches, can breathe new life into our work, unlocking previously unexplored dimensions of expression.

Data

Living in the digital era, every interaction we have with software, technology, and the digital realm leaves behind a trace—an imprint known as DATA. This vast and intricate web of information encapsulates a wealth of insights, ideas, and potential waiting to be harnessed. It is within this realm of DATA that we seek to bridge the gaps between creative disciplines and propel our project to new heights.

At its essence, the concept of a bridge represents a connection—a link between two worlds that were previously separate. Just as a physical bridge spans a divide, allowing for the traversal of space, our exploration of DATA serves as a metaphorical bridge, enabling us to traverse the boundaries between creative industries.

By using these DATA, we unlock the ability to recycle and repurpose our creative endeavours, reimagining them through the lenses of different disciplines. This process of cross-pollination becomes a catalyst for inspiration, innovation, and the creation of a multidisciplinary ecosystem where ideas flow freely, transcending the constraints of any singular field.

DAW Automation

Within the XYZ//SoundSculptures project, the DATA comes in the shape of DAW Automations. In its essence, DAW automation refers to the recording, editing, and playback of movements associated with faders, knobs, and switches. Using automation, you can create changes over time to volume, pan, and other settings. You can add automation to all track types. However, in my unique approach, I use automation in the realm of virtual reality (VR), utilising VR controllers as our interface.

It works slightly differently in this context as I am not using faders or knobs, instead, I am using VR controllers. So instead of my automation changing volume or panning, it will be changing position in space. By leveraging VR controllers, I have the ability to precisely control the position of each instrument within the virtual environment, allowing me to shape and mould the auditory experience with a heightened level of control and creativity.
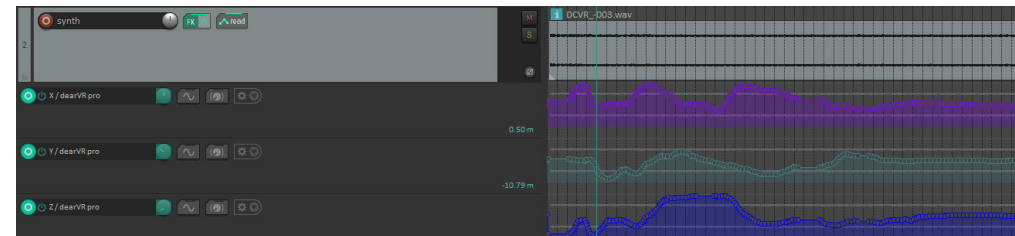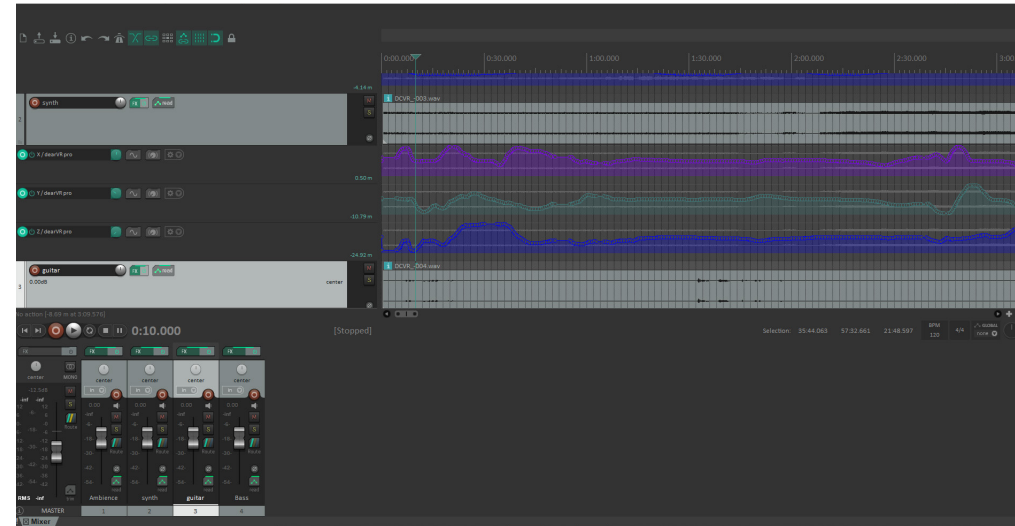
To capture this information, we record the movements generated by the VR controller, better known in DAWs as Automations. This data acts as a digital footprint, providing a detailed record of the spatial coordinates of each instrument at different points in time. By meticulously collecting and organising this data, we create a comprehensive spreadsheet that represents the precise position of each instrument in the virtual space throughout the performance.

The spreadsheet serves as a valuable resource that allows us to visualise and analyse the spatial movements and relationships between different instruments or sound elements. With this data-driven approach, we gain insights into the dynamic interplay of sound within the virtual environment.

Guitar / Synth / Ambience / Bass (Min 0–14)

Min	Guitar X	Y	Z	Synth X	Y	Z	Ambience X	Y	Z	Bass X	Y	Z
0	0	0	3	0	0	3	0	0	3	0	0	3
0.5	-0.68	-0.01	1.45	0.92	5.29	29.9	4.08	0.8	-4.32	7	0.12	3
1	-0.4	-0.06	2.16	-0.87	9.08	-10.24	4.2	0.19	4.28	0	0	3
1.5	4.13	3.37	-2.82	-0.4	-0.06	1.63	-1.99	0.57	-5.63	0	0	3
2	-3.67	1.15	-1.07	1.51	1.68	-1.03	-3.44	-3.65	3.3	0	0	3
2.5	-1.07	0.23	1.63	-3.3	-11.48	1.16	5.93	-0.85	-0.39	0	0	3
3	2.51	1.17	-1.33	-0.74	-0.45	2.94	-2.54	0.12	1.95	0	0	3
3.5	-1.25	0.99	0.97	2.24	0.6	7.6	-2.54	0.12	1.95	0	0	3
4	0.8	1.86	-0.56	4.28	1.65	7.03	-2.54	0.12	1.95	0	0	3
4.5	1.37	0.14	1.7	2.4	8.38	-1.46	2.36	0.62	5.48	0	0	3
5	-1.31	0.49	-0.1	0.57	8.95	1.12	9.16	-1.22	7.66	0	0	3
5.5	-2.3	0.05	0.86	1.28	8.14	3.56	5.28	7.25	7.94	0	0	3
6	-1.49	1.11	-1.19	0.96	3.02	8.58	-3.09	-11.18	3.06	0	0	3
6.5	2.29	2.86	-1.17	4.21	3.22	-7.01	-11.08	1.24	-4.44	0	0	3
7	1.29	0.91	-0.76	8.5	2.38	2.18	-1.44	11.57	-2.86	0	0	3
7.5	6.47	3.27	-2.71	-4.27	7.48	-3.56	-0.76	0.39	0.46	0	0	3
8	0.43	-0.35	1.29	7.49	3.57	-3.13	8.94	1.99	1.03	0	0	3
8.5	-1.85	0.16	0.22	-0.18	-0.04	8.89	8.94	1.99	1.03	0	0	3
9	9.53	0.86	2.97	-0.18	-0.04	8.89	8.94	1.99	1.03	0	0	3
9.5	4.07	0.78	3.21	0.6	30	0.41	8.94	1.99	1.03	0	0	3
10	11.6	2.8	-1.28	0.6	30	0.41	8.94	1.99	1.03	0	0	3
10.5	-3.7	1.44	1.61	-0.2	0.12	11.56	8.94	1.99	1.03	0	0	3
11	4.46	-9.88	5.15	-7.1	8.52	-4.32	8.94	1.99	1.03	-0.05	0.44	1.23
11.5	-0.51	0.36	-11.98	-0.34	-0.38	8.76	8.94	1.99	1.03	-0.05	0.44	1.23
12	1.35	0.71	3.79	3.49	3.77	-4.23	8.94	1.99	1.03	-0.05	0.44	1.23
12.5	2.8	0.57	2.1	0.01	0.29	6.78	8.94	1.99	1.03	-0.05	0.44	1.23
13	4.24	4.98	-2.28	3.6	1.73	7.36	-0.18	0	2.02	-0.05	0.44	1.23
13.5	-3.7	0.19	0.58	-2.41	0.08	7.92	3.93	8.94	-7.99	-0.05	0.44	1.23
14	-1.42	-0.12	0.09	-0.01	8.56	-0.42	-1.01	0.05	-3.33	-0.05	0.44	1.23

Guitar / Synth / Ambience / Bass (Min 14.5–29.5)

Min	Guitar X	Y	Z	Synth X	Y	Z	Ambience X	Y	Z	Bass X	Y	Z
14.5	-5.18	-3.55	-3.27	6.48	1.95	5.58	-11.39	0.67	-0.45	-0.13	0.55	0.43
15	0	-0.06	-0.06	-3.47	0.18	7.85	-0.36	0.56	0.53	0.04	-0.69	-1.26
15.5	3.92	-7.57	7.48	0.08	0.82	9.07	-0.7	6.51	-0.46	1.33	-0.93	-2.41
16	4.4	0.42	3.19	-5.47	0.72	7.46	-6.14	8.3	1.93	1.33	-1.83	-0.17
16.5	10.35	2.6	0.67	-8.07	0.59	2.73	1.34	0.44	6.75	-0.91	-0.83	-1.28
17	-2.23	1.04	-5.23	0.31	0.08	0.21	5.18	0.09	4.44	-0.91	-0.83	-1.86
17.5	-3.96	0.65	-2.23	-0.05	-0.14	0.7	-0.28	-1.52	1.81	-0.91	-0.83	-1.86
18	6.76	4.1	0.39	-0.15	-0.14	0.63	2.46	2.42	-3.7	-0.46	-0.05	-2.35
18.5	-0.01	3.21	-5.78	2.1	0.78	3.59	-1.89	0.96	-1.61	-0.94	0.15	-1.71
19	-0.34	5.01	-6.66	3.54	-0.24	-2.21	0.82	0.2	-1.56	2.53	0.29	0.33
19.5	-4.54	-0.16	-0.56	-1.77	3.86	0.64	3.41	4.51	-0.39	2.8	-0.2	-0.6
20	-0.35	1.25	-1.17	0.1	1.6	-0.58	4.98	0.65	3.86	-1.37	0.26	2.45
20.5	1.51	1.46	-0.8	-3.05	0.77	-2.22	-3.55	1.72	0.56	1.18	0.85	-1.66
21	-0.42	2.33	-1.71	1.56	0.65	3.13	-0.7	-7.74	1.11	0.06	0.28	-1.05
21.5	4.06	1.78	3.31	1.56	0.65	3.13	-8.14	0.22	-8.02	0.06	0.28	-1.05
22	3.1	0.42	0.92	1.56	0.65	3.13	-7.6	8.38	-4	0.06	0.28	-1.05
22.5	-0.37	0.85	-3.6	1.56	0.65	3.13	10.45	0.26	5.13	0	0	3
23	-3.58	0.88	-6.7	1.56	0.65	3.13	-11.32	1.64	-3.63	0	0	3
23.5	0.34	5.58	-2.78	1.56	0.65	3.13	2.11	0.53	-9.25	0	0	3
24	-2.18	4	18.57	1.56	0.65	3.13	2.11	0.53	-9.25	0	0	3
24.5	-0.7	0.27	-0.28	1.56	0.65	3.13	2.11	0.53	-9.25	0	0	3
25	0.95	0.38	0.39	1.56	0.65	3.13	6.02	-0.06	7.44	0	0	3
25.5	-1.9	0	0.31	1.56	0.65	3.13	-0.31	0.14	-1.53	0	0	3
26	-3.26	1.4	-2.94	1.56	0.65	3.13	-4.51	-5.13	2.97	0	0	3
26.5	-0.88	2.89	-0.71	1.56	0.65	3.13	5.2	1.72	6.09	0	0	3
27	-1.13	3.58	-8.23	1.56	0.65	3.13	-0.47	0.04	1.81	0	0	3
27.5	-0.04	-0.56	9.32	1.56	0.65	3.13	-0.01	-0.02	-7.2	0	0	3
28	-10.09	-6.22	1.87	1.56	0.65	3.13	11.24	-4.14	-0.64	0	0	3
28.5	-0.13	0.82	1.67	1.56	0.65	3.13	-8.63	5.63	-6.15	0	0	3
29	-2.41	2.98	2.21	1.56	0.65	3.13	-9.72	1.97	6.75	0	0	3
29.5	-0.1	0.08	1.73	1.56	0.65	3.13	-8.04	4.81	-7.5	0	0	3

Guitar / Synth / Ambience / Bass (Min 30–45)

Min	Guitar X	Y	Z	Synth X	Y	Z	Ambience X	Y	Z	Bass X	Y	Z
30	1.67	4.02	-2.49	1.56	0.65	3.13	-8.04	4.81	-7.5	0	0	3
30.5	1.92	1.92	-0.18	1.56	0.65	3.13	-8.04	4.81	-7.5	0	0	3
31	-4.08	1.49	-5.81	1.56	0.65	3.13	-8.04	4.81	-7.5	0	0	3
31.5	-1.59	0.67	-2.65	1.56	0.65	3.13	-8.04	4.81	-7.5	0	0	3
32	1.43	0.44	2.56	1.56	0.65	3.13	-8.04	4.81	-7.5	0	0	3
32.5	0.02	-0.22	-1.44	1.56	0.65	3.13	-8.04	4.81	-7.5	0	0	3
33	-7.65	0.95	3.05	1.56	0.65	3.13	-8.04	4.81	-7.5	0	0	3
33.5	2.41	0.73	-11.73	1.56	0.65	3.13	-8.04	4.81	-7.5	0	0	3
34	1.4	0.12	3.54	1.56	0.65	3.13	-8.04	4.81	-7.5	0	0	3
34.5	2.42	1.8	3.43	-1.56	-0.24	1.85	-1.4	2.46	-4.44	0	0	3
35	2.42	1.82	3.43	-0.71	1.01	-10.81	-3.7	-3.79	0.6	0	0	3
35.5	2.42	1.82	3.43	-0.28	12	-0.12	2.9	-0.6	3.91	0	0	3
36	2.42	1.82	3.43	-0.28	12	-0.12	2.14	0.56	-2.04	0	0	3
36.5	2.42	1.82	3.43	-0.08	0.25	1.49	0.2	0.74	8.44	0	0	3
37	2.42	1.82	3.43	0.67	0.44	1.78	0.43	0.95	-5.24	0	0	3
37.5	2.42	1.82	3.43	0.1	5.94	-2.38	0.43	0.95	-5.24	0	0	3
38	2.42	1.82	3.43	0.82	0.04	-1.62	0.43	0.95	-5.24	0	0	3
38.5	0	0	3	-0.97	0.01	1.33	0.43	0.95	-5.24	0	0	3
39	0	0	3	-2.2	0.03	-0.09	0.43	0.95	-5.24	0	0	3
39.5	0	0	3	0.33	1.02	1.4	9.2	3.65	-6.79	0	0	3
40	0	0	3	0.33	1.02	1.4	6.29	4.21	11.6	0	0	3
40.5	0	0	3	0.33	1.02	1.4	-7.78	2.4	1.21	0	0	3
41	0	0	3	0.33	1.02	1.4	29.42	0.47	5.73	0	0	3
41.5	0	0	3	0.33	1.02	1.4	4.47	2.2	-0.63	0	0	3
42	0	0	3	0.32	0.83	-1.5	4.47	2.2	-0.63	0	0	3
42.5	-4.16	1.23	6.13	-0.37	-0.12	0.84	4.47	2.2	-0.63	0	0	3
43	-7.12	1.66	4.11	0.62	0.27	-0.7	4.47	2.2	-0.63	0	0	3
43.5	5.84	5.03	-9.2	-0.87	0.12	0.69	4.47	2.2	-0.63	0	0	3
44	8.38	1.67	8.41	3.24	1.88	-1.92	4.47	2.2	-0.63	0	0	3
44.5	-10.61	0.67	2.14	-4.46	1.19	-2.32	4.47	2.2	-0.63	0	0	3
45	4.13	-0.06	-8.15	-1.56	0.51	1.43	4.47	2.2	-0.63	0	0	3

Guitar / Synth / Ambience / Bass (Min 45.5–60)

Min	Guitar X	Y	Z	Synth X	Y	Z	Ambience X	Y	Z	Bass X	Y	Z
45.5	-4.88	0.21	1.28	0.86	5.62	-1.93	4.47	2.2	-0.63	0	0	3
46	6.14	1.03	-5.17	-4.41	1.85	3.63	4.47	2.2	-0.63	0	0	3
46.5	-4.49	0.6	6.71	-0.33	4.25	-4.22	4.47	2.2	-0.63	0	0	3
47	2	-0.6	-6.1	-1.58	-1.54	-5.58	-0.24	2.19	8.99	0	0	3
47.5	-5.31	0.65	1.94	-1.3	3.02	-5.02	0.22	-5.94	10.42	0	0	3
48	7.83	1.21	2.7	-1.2	1.91	-5.56	-0.05	-11.98	-0.71	0	0	3
48.5	-5.54	1.63	5.75	1.59	1.46	-3.55	-0.51	-2.93	-11.62	0	0	3
49	5.97	-6.12	-2.47	1.93	0.64	-0.82	0.24	12	0.19	0	0	3
49.5	-4.88	-3.4	6.67	0.11	5.64	-2.04	0.11	-0.07	12	0	0	3
50	-2.02	0.6	1.98	-0.11	6	-0.06	0.05	-11.06	4.64	0	0	3
50.5	5.9	-13.28	-6.65	-0.11	6	-0.06	-0.02	-2.69	-11.69	0	0	3
51	-10.89	-16.21	7.73	-0.11	6	-0.06	0.37	11.87	-1.69	0	0	3
51.5	0.09	-0.16	-9.56	-0.11	6	-0.06	-0.26	0.21	11.99	0	0	3
52	0.45	2.18	6.81	1.69	0.6	-2.6	-0.21	-11.95	1.04	0	0	3
52.5	-0.26	4.68	9.63	-0.07	2.4	1.08	0.13	-8.23	-8.73	0	0	3
53	1.41	3.03	12.29	1.05	0.14	-0.81	0.79	4.9	-10.93	0	0	3
53.5	-0.29	1.93	15.14	-0.1	4.39	-0.04	0.11	9.1	7.82	0	0	3
54	2.97	0.83	15.14	-0.1	4.39	-0.04	0.06	-5.4	10.72	0	0	3
54.5	2.61	-2.34	12.94	-0.1	4.39	-0.04	0.01	-11.11	-4.52	0	0	3
55	-0.13	-3.58	5.23	-0.1	4.39	-0.04	5.88	5.23		0	0	3
55.5	-2.46	-2.48	5.23	0.38	5.88	-10.45				0	0	3
56	0.72	-5.63	5.45	0.38	5.88	-10.45				0	0	3
56.5	1.88	-5.55	13.49	0.38	5.88	-10.45				0	0	3
57	-1.92	3.69	12.57	0.38	5.88	-10.45				0	0	3
57.5	4.07	6.46	-2.97	0.38	5.88	-10.45				0	0	3
58	-1.33	2.08	-4.68	0.38	5.88	-10.45				0	0	3
58.5	0.87	1.15	8.43	0.38	5.88	-10.45				0	0	3
59	-6.33	-2.48	15.47	0.38	5.88	-10.45				0	0	3
59.5	6.33	-0.83	-14.72	0.38	5.88	-10.45				0	0	3
60	-1.38	-0.28	5.87	0.38	5.88	-10.45				0	0	3

Games/Animation

Blender

On a quest to transform sounds into sculptures, I turned to Blender, a powerful and versatile open source software renowned for its 3D modelling and animation capabilities. Immersed in its array of features, I dived into the world of 3D modelling.

The supportive SAE community, especially the Games and Animation department students, were invaluable to overcoming the challenges I faced during my first performance, particularly in establishing connections with the Oculus headset. Recognizing their expertise, I reached out for guidance in navigating Blender's intricacies. Christopher Matiussi-Pimm generously offered his assistance.

As my journey continued, I delved deeper into Blender's capabilities, exploring techniques to refine and shape surfaces and experimenting with captivating lighting effects. Material manipulation took centre stage, allowing me to transform my sculptures into liquid or metallic forms, sparking my creativity to craft captivating animations and mesmerising photographic representations. Chris' guidance not only familiarised me with the software but also boosted my confidence and revealed unexplored possibilities.

The culmination of these efforts brought my envisioned shapes to life, while the ability to capture snapshots immortalised their essence. The manipulation of materials and animations added an entirely new dimension to experiencing these sculptures. This incredible outcome stands as a testament to the power of perseverance, collaboration, and the willingness to venture into uncharted territories.

In this chapter, we delve into the exciting intersection between the XYZ//SoundSculptures project and the realm of Games and Animation. Here, sound transcends its traditional boundaries and emerges as a sculptural element, seamlessly integrated into a multidimensional experience.

Blender, a leading software widely utilised in the Games and Animation industry, becomes my creative canvas as I reimagine sound in a three-dimensional space. However, my exploration goes beyond the confines of space alone.

Drawing upon the vast array of tools and techniques inherent to the Games and Animation discipline, I begin a dynamic process of moulding sound into tangible shapes, breathing life into the sonic sculptures. Using the data collected from DAW automations, I am able to reimagine these as virtual brushstrokes which reveal a shape that represents sound is space.

Process

Translating Information

The process of creating my sculptures involved several key steps, and I received invaluable guidance from Chris throughout. Initially, I needed to figure out how to translate the information from my VR automations into tangible points in space. Thanks to Chris, who generously hopped on a Zoom call with me, I discovered a solution. He showed me how to create vectors and use the "Extrude" function, enabling me to generate points at specific locations. By pressing "E" while selecting a vector, I could link it to another vector, forming a line that followed these points. This technique allowed me to build the sculptures gradually, point by point.

Dynamic Shape

Once I had the basic shapes, Chris introduced me to a technique that brought an extra dimension of dynamism to my sculptures. Using the inspector on the right, I could modify the lines connecting the points. I realised that straight lines didn't capture the dynamic nature of the performance I aimed to represent. With Chris's guidance, I learned to create curves between the dots, adding a more fluid and dynamic quality to the sculptures. I employed multiple vectors to form the curves, adjusting their positions to align with the data. Extruding the curves provided additional points for the shape to follow.

Thickness and Smoothness

After achieving the desired dynamic shapes, I noticed that the surfaces appeared blocky and lacked smoothness. Once again, Chris came to the rescue. He showed me how to right-click on the model and select "smooth shade," instantly transforming the sculptures' appearance by removing the blockiness.

Animation and Materials

Chris's assistance didn't end there. He walked me through the process of creating animations and spurred me to explore different materials for the sculptures. Equipped with newfound confidence and knowledge, I took the initiative to search for tutorials online. These resources provided me with insights into transforming the sculptures into various materials. I began with water, creating animations where the sculptures seemingly fell into the ground before gracefully rising back into the air. Additionally, I experimented with metallic materials, further enhancing the visual effects and adding an extra layer of intrigue to the sculptures.

Overall, this creative journey involved a combination of learning from Chris's expert guidance, conducting self-exploration, and leveraging online tutorials. It allowed me to effectively translate information into tangible sculptures, infuse dynamism through carefully crafted curves, achieve smooth and refined surfaces, and explore a range of materials and animations.

Media
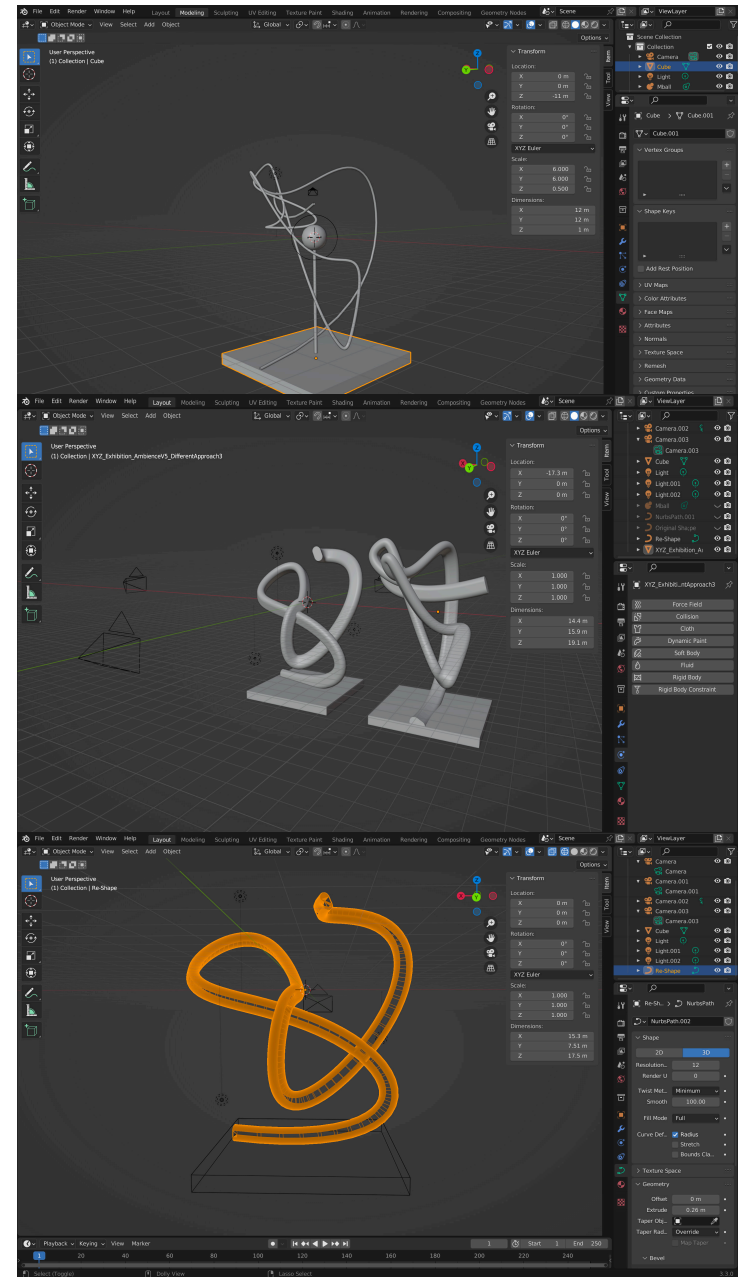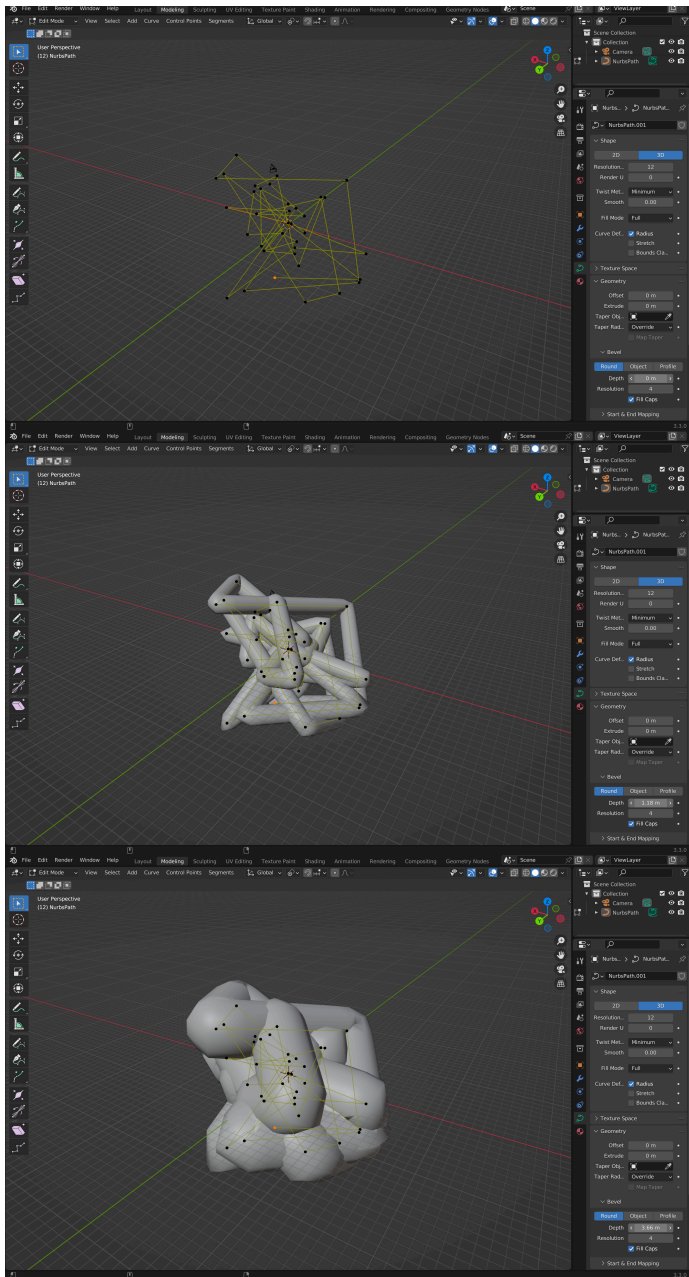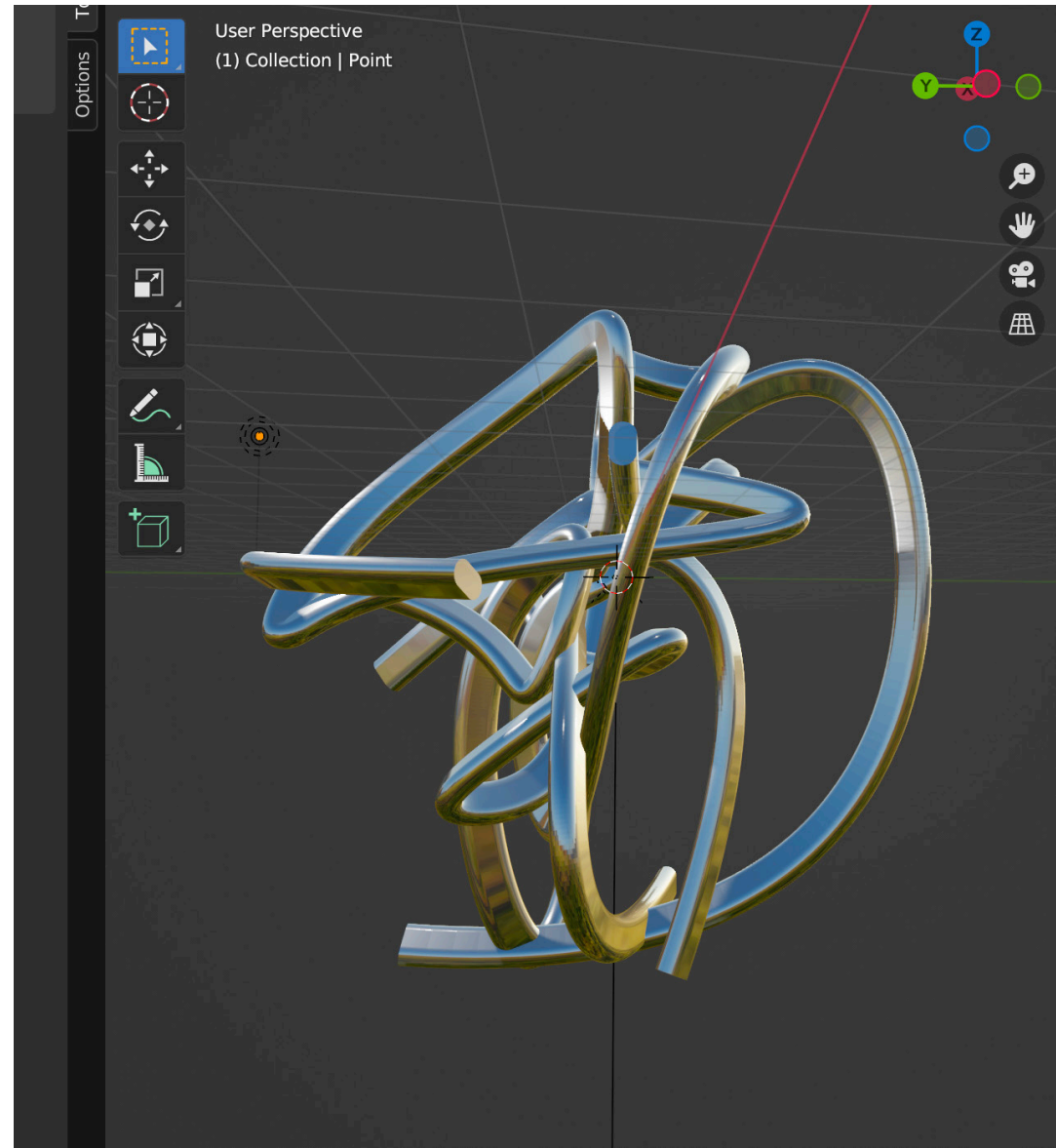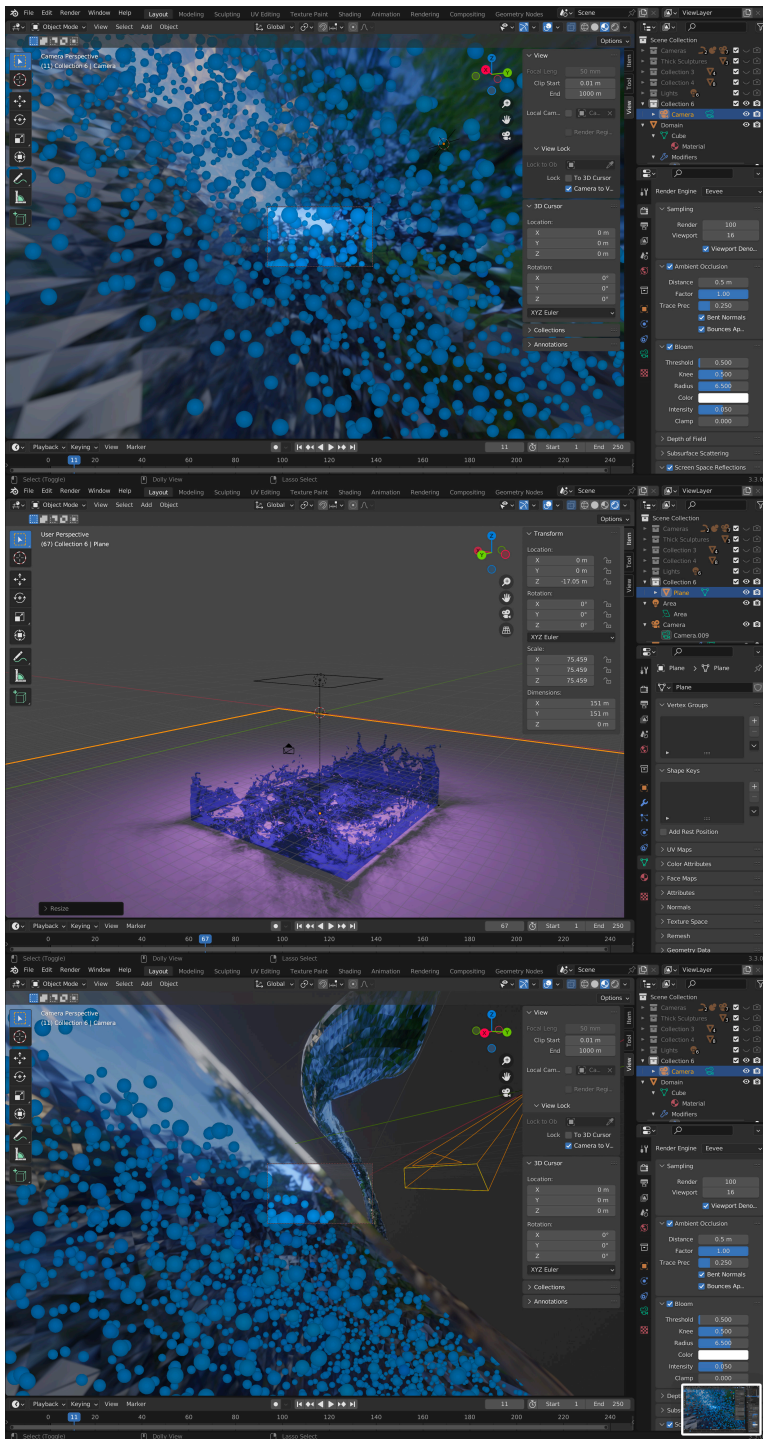
Architecture

Coming from a family of architects, the realm of design and creativity has always been present in my life. From a tender age, I was exposed to the world of perspective drawings and architectural wonders. This familial influence became the foundation upon which I embarked on my personal journey, enrolling in Architecture at the University of Buenos Aires (UBA) after I graduated high school.

Between 2010 and 2016, my days were filled with the study of architectural principles and the exploration of form and function. The ideals instilled within me during those years shaped the way I perceive the world today and deeply influenced the development of XYZ//SoundSculptures. It is within the nexus of my architectural heritage and my current exploration of the audio industry that I have discovered a profound connection, a juncture where the disciplines of Games and Animation serve as the conduit to bridge the gap between my past studies and my present sonic endeavours.
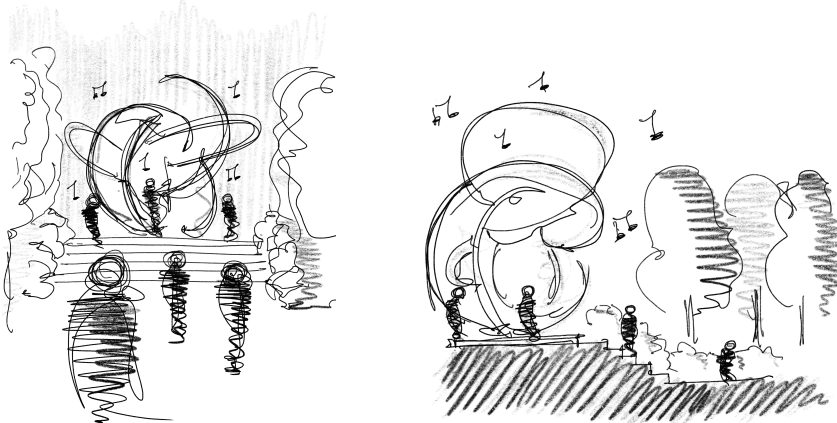
Walking Through Music

One fascinating aspect that continually resonates in my work is the influence of Modern Architecture, a movement that emerged in the first half of the 20th century and became dominant after World War II until the 1980s. This architectural era captivated me with its emphasis on human scale and the integration of the fourth dimension, time, into design. Prior to this movement, architecture predominantly catered to the divine, epitomised by grand churches and monumental structures. These designs were intended to be experienced primarily from the front, with little consideration given to alternative viewpoints.

The Modern Movement revolutionised this approach by introducing a new perspective. It celebrated the human experience and brought about a profound shift in architectural philosophy. Works like Le Corbusier's "MODULOR" emphasised the importance of human proportions, bringing a sense of harmony and balance to designs. Buildings became multi-dimensional, offering delightful surprises and unique experiences depending on the angle from which they were observed. It was a departure from the static, one-dimensional architectural forms of the past.

In the context of XYZ//SoundSculptures, I draw inspiration from this historic movement, aiming to imbue sound with a human scale and dimension. By incorporating the concept of the fourth dimension, time, into our concept, we create a sculpture that allows viewers to "walk through" the performance. Just as the Modern Movement challenged traditional architectural norms, XYZ//SoundSculptures seeks to break free from conventional notions of sound, inviting the audience to explore and engage with the sound performance from various perspectives.
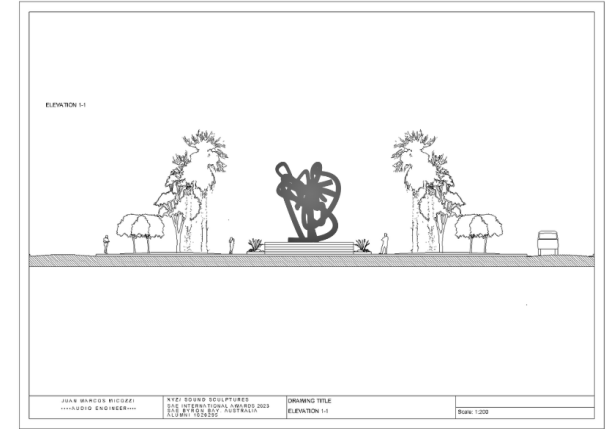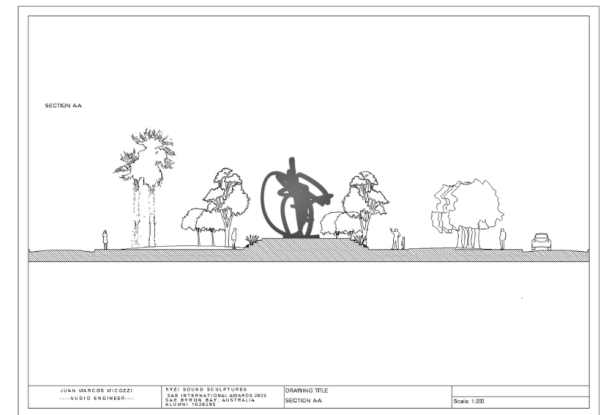
ELEVATION 1-1

SECTION AA

NQS Creative

In 2017, while I was still living in Argentina, two of my closest friends and I came together to establish NQS Creative. Our company offers CGI solutions that transform businesses by creating impactful products, innovative content, and renowned work.

The inspiration for the name "NQS" came from a book I stumbled upon during my first visit to Australia in 2014. The book, titled "Not Quite Square," delves into the counterculture architectural movement that took place in Nimbin, NSW, during the 1960s.

Our company experienced a promising start and soon became a full-time job. Achieving such success within the Argentine business landscape was no easy feat, and we were immensely grateful for the strides we made in such a short span of time. However, as time passed, I couldn't shake the feeling that something was missing in my life. It dawned on me that remaining in Argentina wouldn't lead to further growth, and if I desired a different path, I needed to take a bold leap.

With a heavy heart, I made the decision to leave the company in the capable hands of my friends and embark on a new chapter in Australia. At that moment, I had no inkling of what lay ahead. Little did I know that I would receive a scholarship to study at SAE, or that life would eventually circle back to where it all began, reuniting me with NQS for my most thrilling project to date.

Fast forward to 2023, six years later, when I arranged a meeting with Francisco and Martin, my original business partners. I shared my vision for the "XYZ// SoundSculptures" project, explaining how I aimed to infuse it with a human scale. Realising that collaborating with NQS would be instrumental in bringing my ideas to life through realistic imagery and animations, I proposed a partnership. I provided them with the .obj file of the Sound Sculpture and suggested creating a CGI animation/render of it in a human environment. Intrigued by my concepts, they promptly reached out to their production manager to assess the feasibility within their timeline, and the project was approved.

Film

Join us in this chapter as we uncover the magic that unfolds when VR and 16mm film converge, as we embark on a journey where technology, innovation, and artistic vision blend seamlessly. Experience the mesmerising interplay between sound and image, as we push the boundaries of storytelling and immerse ourselves in the captivating world of XYZ//SoundSculptures through the lens of the 16mm analog camera.

Merging VR technology with the tactile and nostalgic charm of the 16mm analog camera brings forth a compelling juxtaposition of old and new, tradition and innovation. Similar to our previous endeavours where the Neve Console intertwined with VR, this collaboration presents a thrilling opportunity to explore the interplay between different mediums and bridge the gap between past and present.

The marriage of VR and 16mm film creates a captivating synergy that captures the essence of XYZ//SoundSculptures. The immersive nature of VR transports viewers into a realm where sound takes on tangible forms, while the richness and texture of analog film breathe life into the visual representation of our sonic creations. The grain, imperfections, and distinctive aesthetic qualities of the 16mm medium evoke a sense of nostalgia and lend an organic and tangible quality to the visuals.

As we join forces with Dom Sullivan, his expertise and artistic vision as a filmmaker become intertwined with the immersive sonic landscapes we have crafted with Desmond Cheese. Together, we delve into the intricate dance between sight and sound, exploring how the fusion of VR and analog film can elevate our artistic expression and create a true representation of our work, telling a story from the digital realm in an analogue aesthetic.

Through the lens of the 16mm camera, Dom Sullivan captures the essence of our project, offering an artist profile that goes beyond a mere documentation of the process. The film becomes a testament to the multidisciplinary aspect of our work and the synergy between XYZ//SoundSculptures and the world of Film, showcasing the transformative power of combining different artistic mediums and pushing the boundaries of creativity.

Media

Design

Design is more than just aesthetics; it is a powerful tool for communicating ideas, emotions, and concepts. Lena Rothe's expertise as a designer becomes instrumental in translating the multidimensional nature of XYZ//SoundSculptures into a tangible form. By transforming a live performance project into an e-book, we face the exhilarating challenge of articulating an experience transcending traditional verbal expression.

The significance of this step lies in the ability to communicate the essence of XYZ//SoundSculptures, a project that defies easy categorization and invites exploration beyond the limitations of words. Lena Rothe's design expertise allows us to capture the intricate layers of our immersive journey, employing visual elements, layout, typography, and graphic compositions to convey the depth and complexity of our creative endeavour.

The book becomes a vessel for our experiences, allowing us to share our innovative exploration of VR technology, music, collaboration, and artistic expression. It provides a platform to convey the emotions, the transformation, and the boundless creativity that lie at the heart of our project.

Furthermore, I must consider the role of marketing in my creative practice. The book's design serves as a crucial marketing tool, capturing the attention of potential audiences and conveying the unique nature of XYZ//SoundSculptures. Lena Rothe's design choices align with my vision, creating a visual language that speaks directly to my target audience, enticing them to embark on the immersive journey I have crafted.

Our collaboration exemplifies how design becomes a conduit for expression when words fall short and how the e-book is a medium to encapsulate and share my transformative creative process. Together with Lena Rothe, we created an artefact that invites audiences to explore the XYZ//SoundSculptures project in depth.

First Draft

Lena Rothe */ Lena Lina*

Lena, a Swiss photographer with a curious eye for combining design and photography, likes to take inspiration from different cultures with her travels around the globe. She has met wonderful souls who have taught her much about storytelling, creativity, and life.

Australia becoming her home base for the past five years, has been a transformative experience for her, transitioning from the Swiss mountains to immersing herself in the coastal lifestyle. This shift has opened up a new world of opportunities and fresh perspectives.

With a Design and Visual Communication Bachelor degree from SAE Institute-Byron Bay, she infuses her photography projects with design skills, blending stunning visuals with creative elements to craft an artistic style that captivates attention and sparks the imagination.

www.lena-lina.com

3D Printing

This transformative step marks the culmination of a cycle, where the creative journey, originating from our physical world, traverses the realms of virtual reality, and through extensive digital expression and transformation now finally returns to our tangible reality through the medium of 3D printing.

As we navigate this step, we are confronted with the profound notion of bridging the gap between the digital and physical worlds. The journey begins with the creation of music, a fundamental expression of human creativity that resonates within our physical existence. Through the integration of VR technology and the capture of data from automations, we transcend the limitations of our world, immersing ourselves in the ethereal landscapes of virtual reality.

Within this digital realm, we shape sound into sculptural forms, giving rise to a multidimensional artistic experience that defies traditional conventions. The digital book and film act as vessels, encapsulating our immersive journey. However, until now, our exploration has remained within the realms of the virtual, the intangible, and the ethereal.

The introduction of 3D printing marks a profound shift, as we return from the digital realm to our physical world. It represents the completion of a cycle, a harmonious convergence of technology, creativity, and human expression. Through 3D printing, the ephemeral sculptures that emerged from the digital landscape take on tangible form, reentering our reality and inviting us to engage with them on a physical level.

This transformative step holds deep philosophical implications. It signifies the power of human creativity to traverse boundaries, to transcend the limitations of our physical existence, and to bring forth new realms of artistic expression. It reminds us that despite the allure and infinite possibilities of the digital world, our physical reality remains a foundational space for connection, exploration, and contemplation.

Furthermore, the act of 3D printing represents a synthesis of the analog and the digital, bridging the gap between these seemingly disparate realms. It serves as a poignant reminder that technology, at its core, is a tool that enhances and expands our creative capacities, but it is the human spirit that imbues it with meaning and purpose. It is a testament to the boundless potential of human creativity and the remarkable synergy between technology and artistic expression.

Reflections And Considerations on Synergy

Throughout this chapter, I demonstrated a willingness to explore and engage with complex concepts in the creative industries, even those outside of my primary skill set. By embracing a practice-based research approach, I overcame various obstacles and transformed my audio project into a captivating multimedia project.

The significance of community became evident during my involvement in Games/Animation at SAE. Actively engaging with the community played a pivotal role in surmounting the challenges I faced, as I received invaluable support and guidance from experienced individuals. By embracing this collaborative spirit, I was able to go beyond my initial roadblocks, contributing to the creation of new knowledge and exceeding my original expectations.

Exploring the architecture sections provided a bridge between my past experiences and the person I have become today. This journey not only ignited newfound confidence within me but also opened doors to uncharted territories within the Games/Animation industry. It allowed me to step outside my comfort zone and delve into areas I had never previously considered, expanding my horizons and inspiring future explorations.

In conclusion, this chapter serves as a testament to the transformative power of practice-based research and the value of community and collaboration. By remaining open-minded, leveraging the support of others, and embracing interdisciplinary approaches, I surpassed challenges, exceeded expectations, and paved the way for personal and professional growth.

XYZ//Sound Sculptures
Live Sound Installation

<cite> exhibition

This performance happened at the Lone Goat gallery for the <cite> exhibition curated by Ingrid Wilson. Themed around emerging technologies, the Northern Rivers Creative group show < cite > features six artists from the directory including Ernesto Sumarkho, Hunter Wilson, Liv Enqvist, Mia Forrest, Marcos Micozzi and Thomas Marcusson.

Emerging technologies are having a profound impact on the arts, and artists are exploring these technologies in a variety of ways. From virtual reality and the metaverse, to digital software and equipment, to conceptual explorations of technology within traditional practices, < cite > showcases the diverse ways in which artists are using these technologies to push the boundaries of artistic expression.

The variation of works on display invites viewers to engage with the themes of technology and art, and to consider the potential benefits and drawbacks of these emerging technologies. Join the conversation and discover how technology is transforming the world of art.

Rehearsal

This performance was slightly different to our previous one, as we had Rohan Seekers, a renowned classically trained piano player join us. This meant we had to rehearse the show again, as another sound source would change the whole dynamics of the experience.

In this rehearsal we also addressed the issue we encountered on our Last performance, the communication between us once the performance in VR starts.

To do this we had to upgrade from a Scarlett 6i6 to a Scarlett 8i8, as the 8i8 has 4 outputs. We decided the way to work around it was to have a microphone on one of the inputs, but this microphone would not come out of the L&R mix (Output 1 and 2), instead it would only come out of outputs 3 and 4. We would feed the audience the L and R mix (Output 1 and 2), and create a separate mix coming out of external outputs 3 & 4 where we are sending all tracks. The difference is that the audience would hear all tracks except for the mic, and we would hear all tracks including the mic. So we could use the microphone to communicate with each other even though I am not able to see them once I have the headset on.

Signal Flow explanation of HP strategy for communication

To address the problem encountered during the 4'33'' exhibition after implementing our PBR (Performance-Based Research) strategy, we devised a method to enable communication while performing. Our objective was to create a system that would allow us to generate different live mixes during the performance.
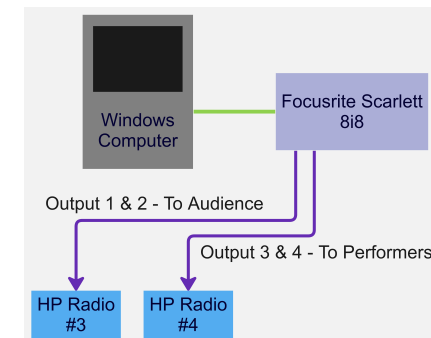
The diagram illustrates the setup we implemented. Output 1 and 2, collectively referred to as Mix 1, represent the audio that the audience hears. On the other hand, Output 3 and 4, referred to as Mix 2, serve as the audio feed that we, the performers, listen to during the performance. In this configuration, we can route the microphone signal into Reaper (a digital audio workstation software), but the microphone audio is only audible through Mix 2, which is intended for the performers.

The primary motivation behind creating this system is the limitation posed by wearing a headset. When I wear the headset, I lose the ability to communicate with the other performers. Conversely, if I remove the headset, the software enters sleep mode, disrupting the performance. By implementing this solution, even if an unexpected situation arises during the performance, we still have a means of communication through the microphone signal. This enables me to effectively collaborate with the other performers and address any issues that may arise.

Technical Information

Name: Marcos Micozzi
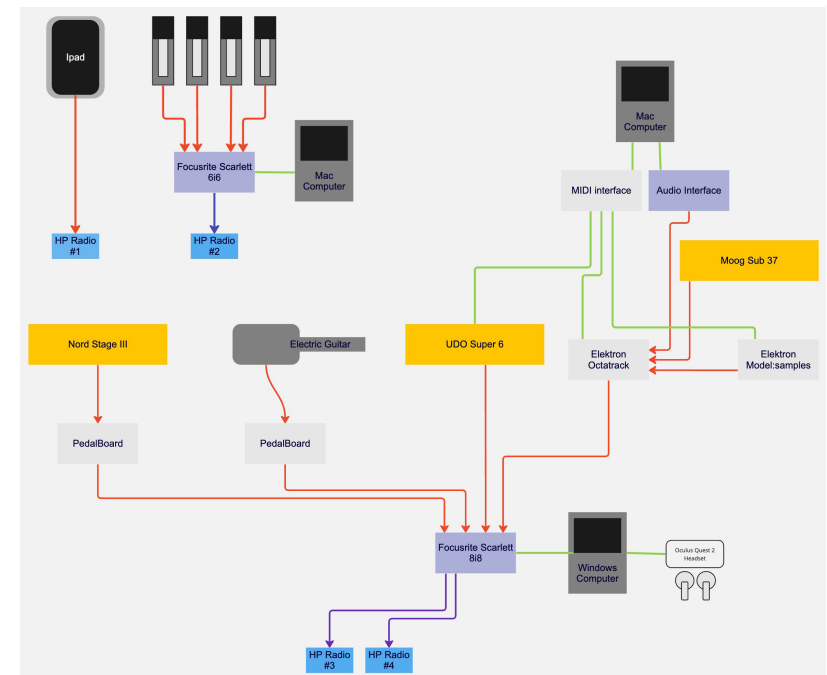
Performer Role
VR manipulation, Audio Engineer, Mixing Engineer.

Equipment
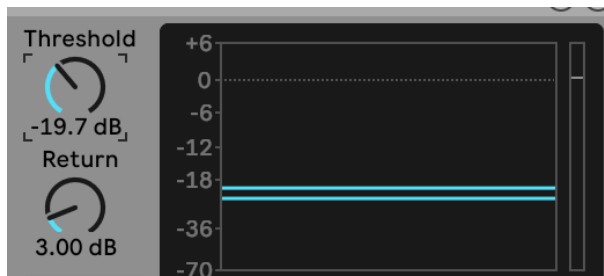Oculus Quest 2, PC, Scarlett 8i8, Radial DI x4, Visual
Projector x2.

Software
Dear Reality Spatial Connect, Reaper

Members and roles

Name: Rohan Seekers

Performer Role
Keyboards, Percussion and Effects

Equipment
Nord Stage 3, Moog Moogerfooger MF-101 lowpass
filter, Ernie Ball VPJr volume pedal, Old Blood Noise
Endeavours Dweller phaser/delay pedal, Boss PS-4
pitch shifter pedal, Matthews Effects Conductor tremolo
pedal, Strymon El Capistan tape echo pedal, singing
bowls and various hand percussion

Name: Andrew Mackinnon

Performer Role
Sequencing, Synthesisers, Drum machine, and
samples.

Equipment
Elektron model:Samples, Moog Sub 37, UDO Super 6,
Midi Clock Interface, Apogee Audio Interface

Software
Ableton Live 11

Name: Robin Krolikowsky

Performer Role
Guitars, Percussions, Effects, Vox.

Equipment
Fender Stratocaster, Moog Moogerfooger MF-102 Ring
Modulator

Signal flow Chart for <cite> exhibition

Ableton 11 Set up

In audio production, a gate is a tool that controls the volume of a signal. It functions like a virtual gate, allowing sound to pass through when a specified threshold or trigger is met.
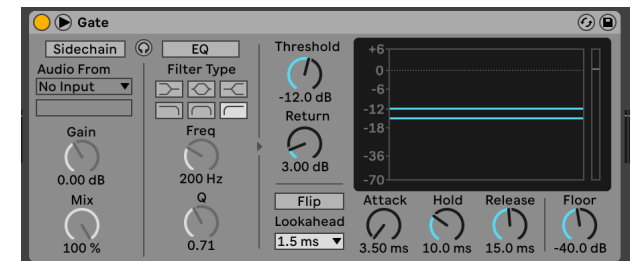
In this case, I set up a Gate on each track, and set the sidechain function so that when a signal was received from the corresponding sculpture trigger, the Gate would open once the signal reaches the threshold and allow the associated sound to be heard. If no trigger was activated, the Gate remained closed, resulting in no sound being audible. This setup ensured that the performance of the Interactive Sculptures would be revealed as the audience interacted with the triggers.

To enable the Interactive Sculptures to work, I had to create an Ableton session that would allow the triggers from the audience to activate the tracks. To achieve this, I used Ableton's Gate feature.
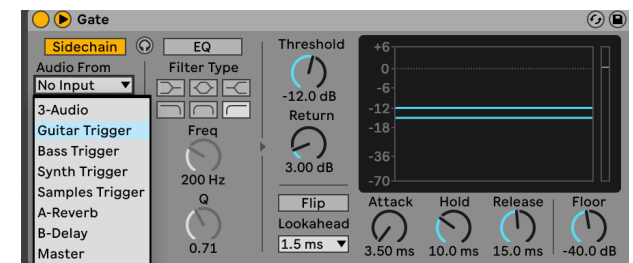
Audience Journey

Welcome and Instructions

- Please grab a pair of headphones from the designated area.

- Each headphone set consists of three different channels: Channel One for the Video, Channel Two for the Sculptures, and Channel Three for the Live Performance.

- As you enter the exhibition, you will encounter an artist profile video, the Sound Sculptures, and a live performance by Marcos Micozzi in collaboration with Desmond Cheese.

- To begin, please select Channel One to listen to the video.

Video Experience

- Take a moment to immerse yourself in the video, which offers insights into the exhibition and sets the tone for the art installation.

- Once you have finished listening to the video, feel free to proceed to the next step.

Sculpture Experience

- If you are interested in experiencing the Sound Sculptures, please switch to Channel Two on your headphones.

- Explore the physical sculptures and let the accompanying soundscapes guide your perception of each piece.

- Take your time to appreciate the interplay between the visual and auditory elements of the sculptures.

Live Performance Experience

- If you would like to listen to the live performance by Marcos Micozzi X Desmond Cheese, switch your headphones to Channel Three.

- Immerse yourself in the unique soundscape created by the live performance, which adds an interactive and dynamic element to the exhibition.

- Feel free to move around the designated area to fully engage with the performance.

Throughout your experience, feel free to switch between channels and revisit any section that captivates your interest. Take your time to fully absorb the artistic expressions and allow the sounds to transport you into the intended atmosphere. We hope you thoroughly enjoy your visit to the XYZ//SoundSculptures sound installation. Thank you for participating!

As the audience enters the art installation, they are given a pair of wireless headphones, The headphones work through radio frequency, allowing for the audience to decide which channel to listen to.

Visitors enter a captivating display featuring Marcos' Artist profile video, 3D-printed sculptures, and a live performance by Marcos Micozzi and Desmond Cheese. Despite musicians performing live, the room remains silent.

First, the audience must watch the video. This is a perfect first stop for the audience as it allows them to get familiar with the functionality of the headphones, making sure they don't miss out later during the exhibition. The audience is meant to select channel one and watch the artist profile video.

After watching the video the audience can decide their own route through the gallery, whether to first experience the sculptures or the live performance. If the audience wants to first experience the Sound Sculptures, then they need to select the corresponding channel on their headphones.

The Sculptures

In this interactive experience, the audience interacts with sculptures to reveal their sound. Each sculpture has a sustain pedal that, when pushed, triggers a signal in Ableton Live, producing the corresponding sound. The audience has agency in choosing their sonic journey, selecting instruments and elements of the composition to listen to. Collaboration among the audience is necessary to unveil the full auditory experience, as multiple people are required to press the triggers. This participatory approach empowers the audience to curate their own immersive experience, fostering a personal connection with the art installation and its music.

The Live Performance

Simultaneously, a live performance unfolds in collaboration with Desmond Cheese, where their evocative music intertwines with the physical presence of the sculptures. But, in order to listen to these sounds the audience needs to select the according channel, only then the music is revealed. The sonic landscapes come alive, resonating with the artistic expressions of the musicians and the dynamic interplay between the audience, the sculptures, and the performers.

This concept explores the interplay of connection and disconnection in the modern world by presenting a scenario where the audience is physically present with musicians in the same room but cannot hear the music, necessitating an understanding of the underlying technology to truly engage. It plays with the notion of being physically close yet emotionally distant, contemplating on the impact of technology on our connections.

This final performance not only signifies the completion of the XYZ//SoundSculptures project but also sets the stage for future iterations and creative exploration. The live performance with Desmond Cheese serves as a catalyst for future collaborations, creating a new set of sculptures that will continue to evolve and expand the boundaries of artistic expression. The same way a previous performance created the sculptures we are exhibiting during this show, this live performance will generate another set of sculptures. With each performance the amount of sculptures grows, allowing us to create more complex ecosystems of works in the future.

As the project reaches its culmination, we reflect on the remarkable integration of disciplines from SAE. From the inception of the idea, through the realms of audio engineering, music production, virtual reality, film, design, games, animation and 3D printing, to the immersive art installation and live performance, XYZ//SoundSculptures becomes a testament to the power of collaboration, creativity, and the synergistic merging of diverse disciplines.

This final chapter marks the end of a transformative journey, one that has reshaped our understanding of artistic expression, blurring the lines between disciplines, and pushing the boundaries of what is possible. XYZ//SoundSculptures stands as a testament to the boundless potential of human creativity, reminding us that when we unite our skills, visions, and passions, we can create something truly extraordinary.

The sculptures stayed on site for the audience to continue to explore their sounds for a whole month.

Media

# Reflections And Considerations On XYZ//SoundSculptures

Throughout the XYZ//Sound Sculptures chapter, I have prioritised Practice-Based Research (PBR) and emphasised audio foundations, establishing myself as a Virtual Reality audio engineer capable of merging VR with human performance. The experimental approach and open-mindedness have yielded remarkable results.

The audience journey in the art installation showcases the transformative power of technology and art. Through wireless headphones, visitors experience the artist profile video, interact with the sound sculptures, and witness the live performance. The participatory nature of the sculpture experience empowers the audience to curate their own sonic journey, fostering personal connections with the installation. The interplay between the sculptures and evocative music prompts contemplation on the impact of technology on relationships.

This project represents the completion of a transformative journey while setting the stage for future explorations. By adhering to the aims and guidelines outlined in the thesis, the XYZ//Sound Sculptures chapter demonstrates the value of interdisciplinary approaches, research, and experimentation. It showcases the boundless potential of creativity and collaboration.

In conclusion, guided by the aims and guidelines, the XYZ//Sound Sculptures project sheds light on the current state of the creative industry and my position as an innovative audio engineer. Through the integration of emerging technologies and exploration of multidisciplinary realms, it offers a unique perspective, contributing to the continuous growth of the creative landscape. This transformative journey inspires me to push boundaries, embrace challenges, and pursue collaborations that will shape the future of the creative industry.

Results And Discussions
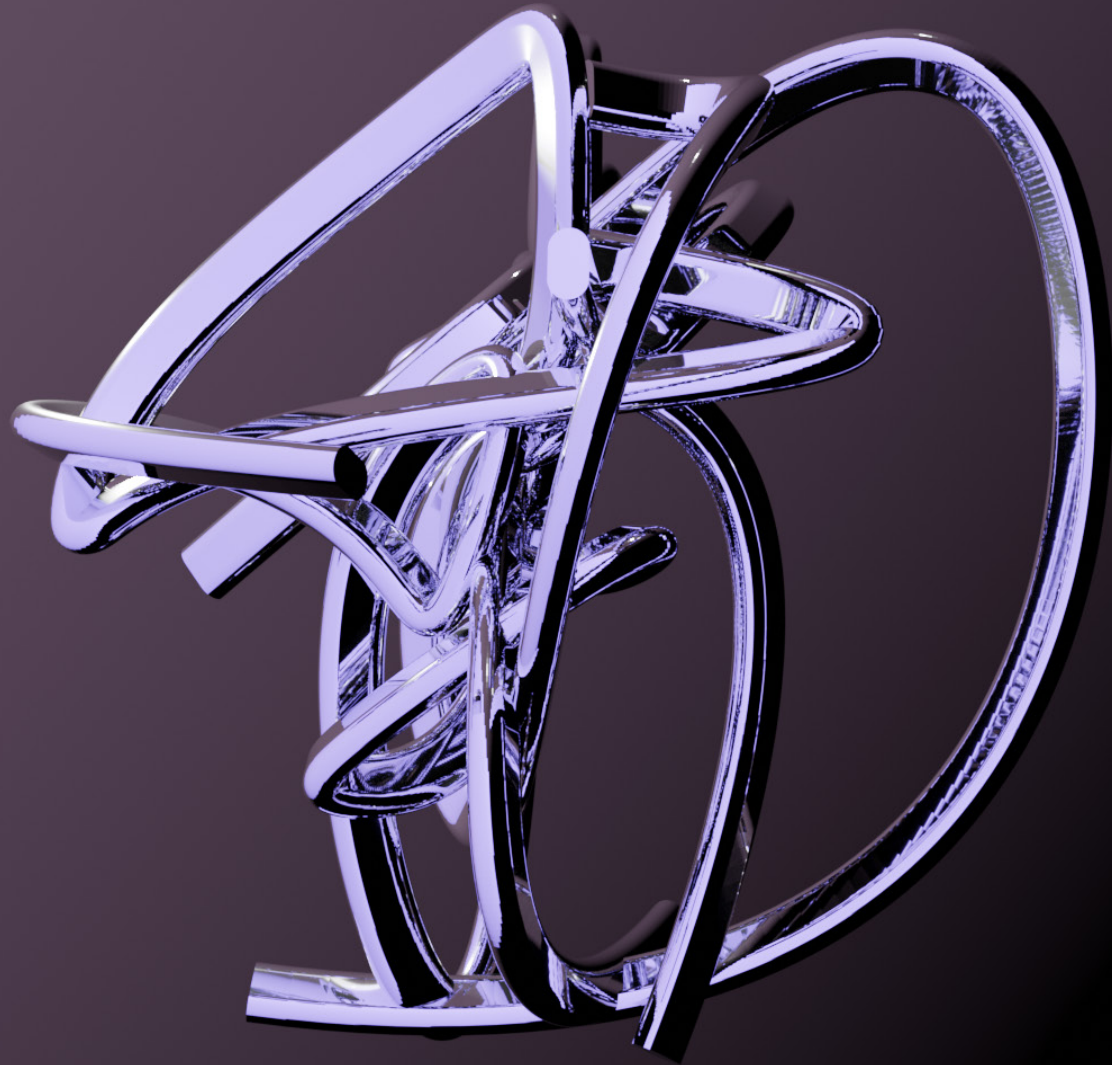
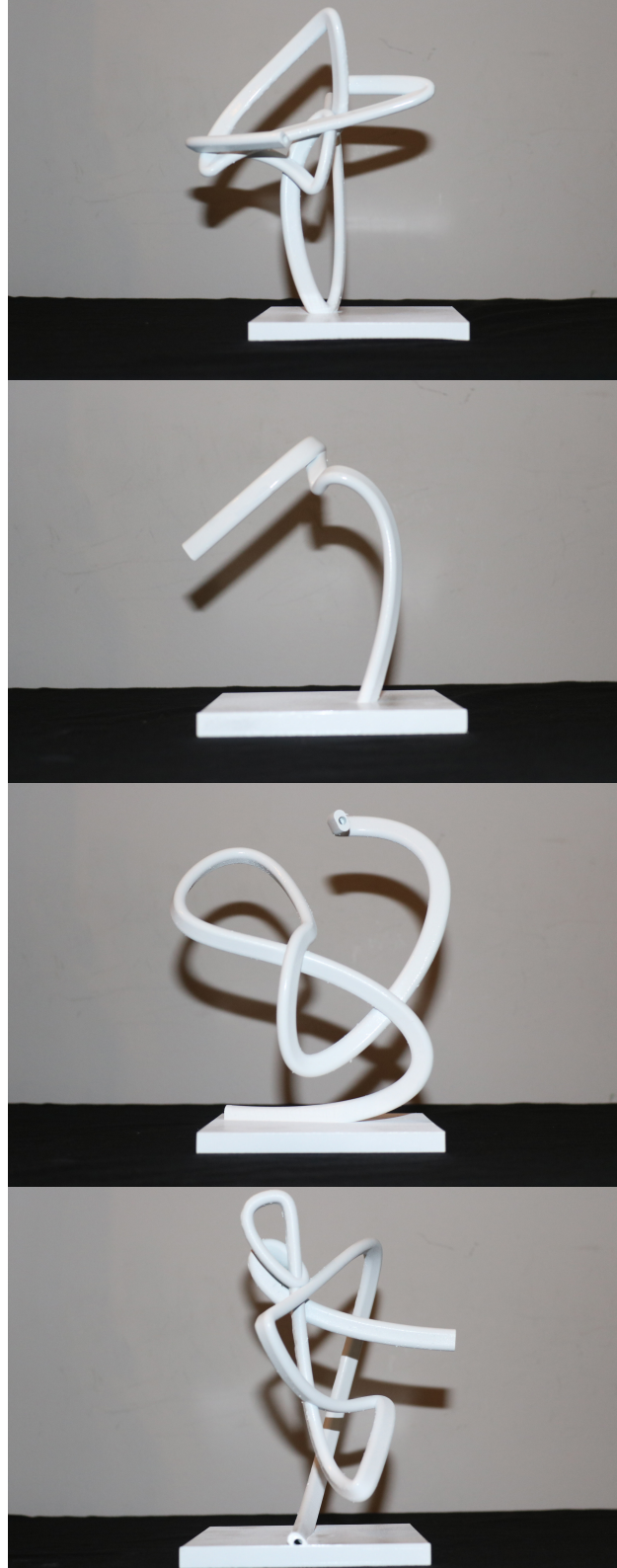# Games/Animation
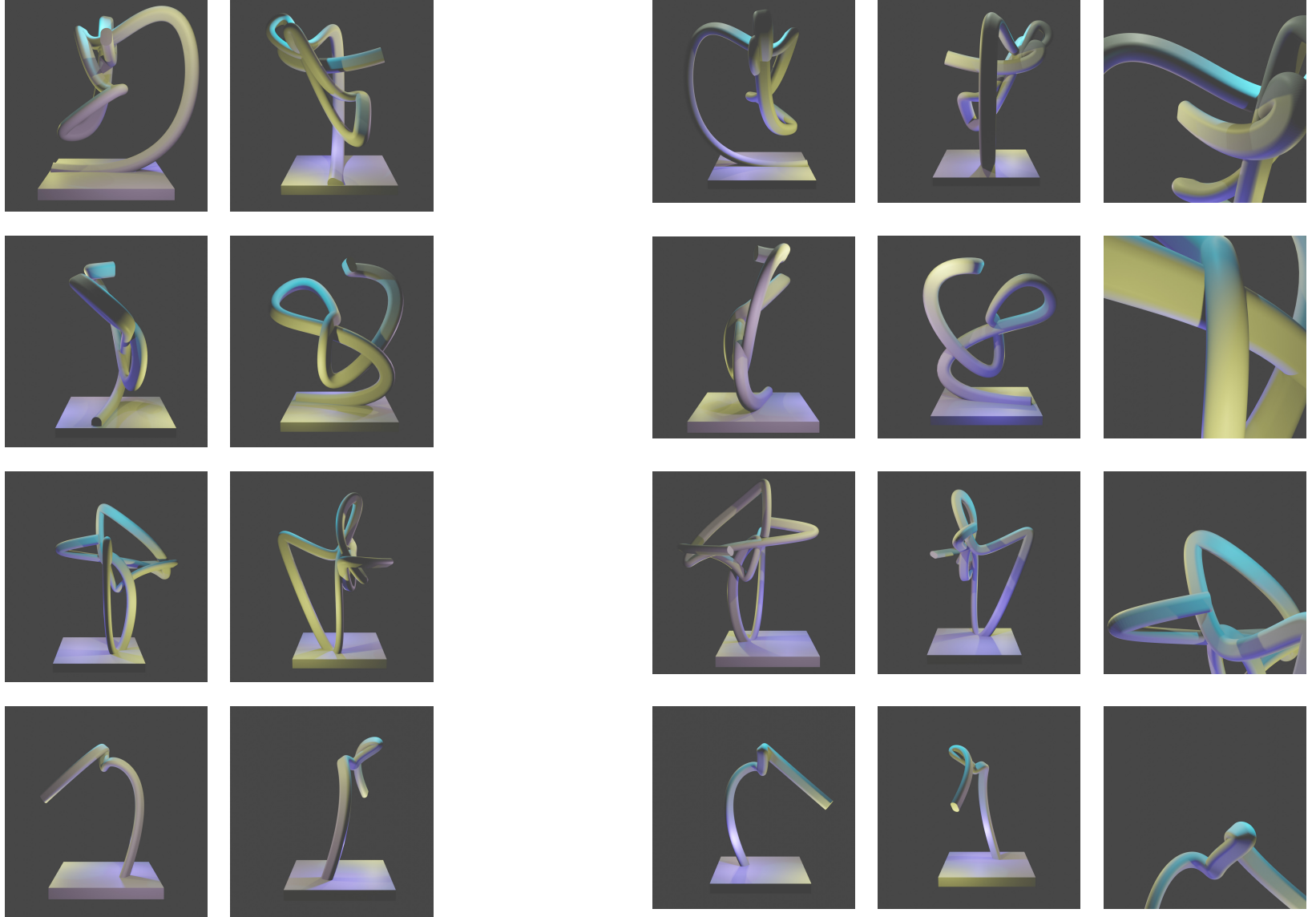
Film

Design

Architecture

3D print

Audio and Music

Discussion

The integration of Games and Animation with DAW automations has yielded impactful sculptures, showcasing the potential of merging disciplines. Drawing on my architectural background, the fusion of these fields has created vivid imagery and opened doors to the future evolution of XYZ//SoundSculptures. Film and Design have served as powerful marketing tools, inviting the audience into the ecosystem through the Artist profile and providing immersive exploration in the Book. These mediums establish a friendly and personal connection, guiding individuals into the world of XYZ//SoundSculptures.

The 3D prints of the sculptures mark the culmination of an important cycle, traversing from organic performance to digital reinterpretation and finally back into our tangible reality. This represents a full circle, symbolising the transformative journey and the blending of physical and digital realms.

Moreover, the sculptures play a vital role in engaging the audience, empowering them to shape their own musical journey and introducing non-musical individuals to the concepts of music production.

The audio and music files serve as evidence of my proficiency as a VR audio engineer, adept in handling complex signal flow and facilitating seamless human performance interactions. They demonstrate my ability to navigate the intricacies of this organic and digital fusion, providing a robust audio foundation for the XYZ//SoundSculptures project.

Overall, these deliverables exemplify the aims and guidelines set forth in the project. They showcase the transformative power of merging disciplines, inspire future considerations for the evolution of XYZ//SoundSculptures, and establish connections with diverse audiences through visual, auditory, and interactive experiences.

Conclusion

This thesis has explored the question of what it means to be an audio engineer in today's ever-changing creative industry. Through the practice-lead approach and the creation of the "XYZ//SoundSculptures" multimedia sound installation, I have sought to uncover the evolving role of the audio engineer and its connection to emerging technologies and the broader creative landscape.

Drawing inspiration from my life experiences and the creative industries, I have merged audio engineering with disciplines taught at SAE, such as Music, Games/Animation, Film, and Design, as well as my background in Architecture. Through the analysis of data collected in VR during the "Virtual Ambient" live performance, the research has highlighted the potential of creating a cohesive ecosystem of works that inform the future role of the audio engineer.

Looking ahead, it is crucial to maintain relevance in the ever-changing industry. To break free from geographical limitations, future research will focus on integrating "XYZ//SoundSculptures" with web3.0 environments, opening up possibilities for multidisciplinary experiences that transcend physical boundaries. This integration will allow the project to establish a role within the limitless digital era and explore new frontiers in audio engineering.

Through this thesis, I have contributed to the expanding understanding of the audio engineer's role within the creative industry. By integrating diverse disciplines and embracing emerging technologies, I have demonstrated the potential for cross-pollination in the creative industry and the power of multidisciplinary education. The "XYZ//SoundSculptures" installation serves as a testament to the limitless potential of merging personal growth with artistic expression.

In conclusion, this thesis has addressed the question of the audio engineer's role in today's creative scenario. By drawing inspiration from personal experiences, merging disciplines, and exploring emerging technologies, I have embarked on a journey to redefine the boundaries of audio engineering. The future holds exciting prospects, with the integration of "XYZ//SoundSculptures" into web3.0 environments opening new avenues for global collaboration and immersive experiences. This thesis contributes to the ongoing transformation of the creative industry and positions the audio engineer as an adaptable and innovative force within this dynamic landscape.

Acknowledgements

About the Author

Marcos Micozzi is an Argentinian Byron Bay-based Virtual Reality audio engineer. Best known for turning a Neve Custom 75 recording console into a synthesizer and using Virtual Reality to move sounds in space.

Sponsored by Dear Reality and Sennheiser, Marcos won an SAE International Award for best Audio Project in 2022 for his Art Installation "Simulated Environments", which explores the relationship between gesture and sound once lost with computer performances. The installation was also exhibited at the Elevator ARI exhibition 4'33" at the NSW Regional Arts Gallery in Lismore, Australia.

Marcos has also been working as a music producer, mixing and recording engineer, and film composer. Composing soundtracks for brands like Spell, Stitch And Hide, and for movies like It's Better Outside by Leo Becker (Screened at Out & Loud PIQFF), and also collaborating in the production realm with industry leaders including Pat Davern (Grinspoon), Oscar Dawson (Holy Holy), Bobby Allu, Boats, Lee Fisher, Hamish Mitchell, Billy Otto and Geoff Wright, amongst others.

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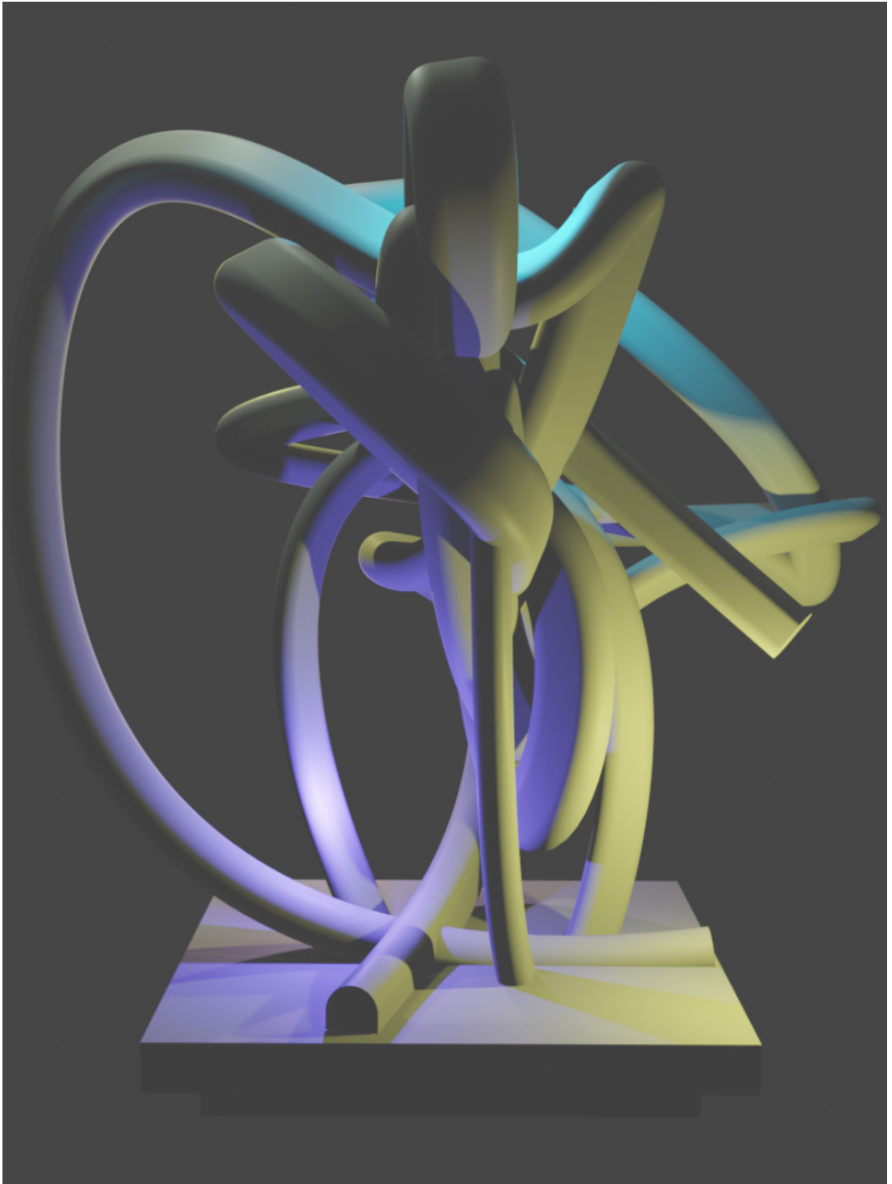
Written by Marcos Micozzi, designed by Lena Rothe
2023