MASTER ARBEIT

Searching for the Immersive Experience

A VR Analysis and Design of a VR Piece

Autor: **Carlos Rodríguez Rodríguez,BA**

Matrikelnummer: **1810374039 · s1473090**

Betreuer und Erstprüfer: **Prof. Dr. Josef Gründler**

Zweitprüfer: **Univ. Prof. Marko Ciciliani, PhD**

Master Studium: **Master of Arts in Sound Design**

FH Joanneum University of Applied Sciences · CMS

Kunst Universität Graz · Institut 17 IEM

WS 20/21 Abgabedatum: 25.1.2021

Declaration

I declare that I have authored the present master's thesis by myself and that I performed the associated project myself. I also declare that I have not used any aids other than those specified. All wording and concepts taken from printed, unprinted or the Internet in their wording or in their essential content are quoted in accordance with the rules for good scientific work and identified by footnotes or other precise references.

The present original thesis has not been submitted to any other university in this form in order to achieve an academic degree. This work has been submitted in printed and electronic form. I certify that the content of the digital version is identical to that of the printed version. I am aware that a wrong explanation can have legal consequences.

Carlos Rodríguez Rodríguez

Abstract (English)

The goal of this project is to find the characteristics and mechanics that make VR immersive.
After the fast adoption rate specially seen in 2020, new VR content has spawned, not always
utilizing the medium to the full possibilities. By means of an extensive analysis and synthesis of
this mechanics, the project of the Master Thesis will be a VR Experience designed and created
from scratch utilizing this idea.

Split in 2 parts, an analysis and a practical VR implementation of the conclusions of this analysis
The results should point ultimately at what VR is today, how can be fully taken advantage of and
finally, to learn and experience a full development cycle of software testing and implement all
the knowledge acquired during this Master studies.

This thesis will be a final test for my experience, a proof that I am ready to be a generalist in the
VR industry and will help me understand the technical and creative challenges of VR

Keywords: **VR, 360 video, ambisonics, game mechanics, game design, game audio**

Abstract (Deutsch)

Das Ziel dieses Projekts ist es, die Eigenschaften und Mechaniken zu finden, die VR immersiv
machen.

Nach der schnellen Akzeptanzrate, die speziell im Jahr 2020 zu verzeichnen war, sind neue
VR-Inhalte entstanden, die das Medium nicht immer in vollem Umfang nutzen. Durch eine
umfassende Analyse und Synthese dieser Mechanik wird das Projekt der Masterarbeit eine VR-
Erfahrung sein, die unter Verwendung dieser Ideen von Grund auf neu entworfen und erstellt
wird.

Aufgeteilt in 2 Teile, eine Analyse und eine praktische VR-Implementierung der
Schlussfolgerungen dieser Analyse

Die Ergebnisse sollten letztendlich darauf hinweisen, was VR heute ist, wie es vollständig
genutzt werden kann und schließlich, um einen vollständigen Entwicklungszyklus von
Softwaretests zu lernen und zu erleben und das gesamte während dieses Masterstudiums
erworbene Wissen umzusetzen.

Diese Arbeit wird ein abschließender Test für meine Erfahrung sein, ein Beweis dafür, dass ich
bereit bin, Generalist in der VR-Branche zu sein, und mir helfen, die technischen und kreativen
Herausforderungen von VR zu verstehen

Schlüsselwörter: **VR, 360 Video, Ambisonics, Spielmechanik, Spieldesign, Skript**

- **Thanks to the staff, professors, instructors and colleagues at FH Joanneum for welcoming me and sparking new interests in my professional career. -**

Table of Contents

0.Introduction

0.1 Ambition and reason

My formal education before starting my CMS Master's Degree at FH Joanneum in 2018 was only a bachelor in music performance. The music education I received from the Institutions was completely disconnected both from the job market and the current world. No technology or modern music production is even mentioned in the studies curriculum.

As a curious person, my interests were wide, and always had an affinity for all kinds of technology and videogames
Thanks to the internet, the training and knowledge-sharing possibilities are endless, and allowed me to get proficient quickly and confidently in disciplines that mattered to me.
(The topic of online education will be briefly discussed in the VR Devlog in the last chapter of the Thesis as well)

A professional development in fields outside music performance was achieved thanks to non-regulated education.

Fast forward to 2018, where I finally found not only a degree that combined disciplines that were very interesting for me, but a community of like-minded people that spoke the same language as I, and I could not find in the music world.

Of course, my interests were still beyond sound, that's why taking advantage of the course offer of the FH Joanneum I could attend 3D Modelling or Interaction Design lessons.
My goal for the studies was to broaden my knowledge and spark new curiosity in unknown fields for me. And this was achieved.

Now the ambition of this Thesis and product is to put my formal education, non-regulated training, life experience and professional career to the test: Developing a vertical slice of a VR Interactive Film by myself.

0.2 Quick note about the Philosophy behind

Music was perhaps the one of the first artistic expression forms for humankind, already in the prehistoric era.

As other forms of performing arts appeared and evolved, like theater, they started to combine into mixed expressive forms: Monteverdi Composed the first **Opera** in 1607. It was a popular form of entertainment during the whole classical and romantic era.

In the XIX Century, Wagner coined the word "*Gesamtkunstwerk*" or *Total work of art.* It includes singers, orchestra, atrezzo and set pieces, costume design, libretto, supernumeraries and technical elements. It was at the time, the most multidisciplinary spectacle on a stage. Music at the service of Drama.

Then cinema came and added analog technologies, color science, lenses, special effects, perspectives.

Digital cinema set the bar even higher; CGI, Motion Capture, Procedural Crowds, Green Screen, Precision Robotic Arms, High fps, and lately even full digital sets developed in VR, like the backgrounds for *The Mandalorian Series*(Disney, 2019) or innovations like Jon Favreau's *The Lion King* (Disney, 2019) produced almost entirely in VR Environments

All of this is great. All of this is very **engaging.** Powerful stories told on a stage or through the lens by talented actors, supported by music, visual and sound effects, embellished by wondrous locations and attractive stage design.

But it is still only **engaging**. We are **spectators.** We are being told the story, but not taking part in it. As much, our interaction comes from reacting to it in social media with hashtags, but there it ends.

Here is where videogames come into play.

Now the player is the protagonist and has control (as much control as the game designers allow) to use this character to play a role in the story. **From spectator to actor.**

Sandbox games gave almost endless freedom to players to write their own story in the game universe.
MMORPGs gave players freedom to live a new experience through their avatars and interact with real people.
All of this is even more **engaging.** It can glue players for hours on end to the screen.
But still, everything is seen through a flat screen and interacted through a mouse and keyboard or controller.
Engaged, but not immersed

VR came as the promise of **full Immersion.** Your whole body as a controller. Once you are in, the real world disappears and becomes the virtual one, with lifelike graphics, interactions and 360 degrees of sound.
Extra accessories for HMDs like haptic vests, hand tracking, omnidirectional treadmills and are commercially available now or being developed to immerse players even more.

The evolution of mediums for storytelling has broadened immensely the choice of entertainment for consumers.

At the end of 2020, VR is still an early adopter market and there are many technical and narrative ways to explore the storytelling capabilities of the medium.

Let us try and squeeze all the possibilities.

0.3 Structure and method of the Thesis

The thesis will be divided in 2 main blocks:

1. **Context & Analysis:** A brief story of VR and its current state.
   A short walkthrough of available hardware and its capabilities.
   This part includes a categorization VR applications as
   We will analyze aspects of locomotion, playability, graphics and other topics with examples from Milestone titles

2. **Development Journal:** A detailed documentation of the process of creating the vertical slice of my own VR experience; testing narrative and technical approaches, applying game mechanics analyzed in the previous block and a description of tools, technologies, problems and successes along the way.

1.Engaging vs. Immersive

VR is a fairly new medium with unique and novel characteristics over traditional predecessors. While cinema or streaming in flat screens engages us emotionally, nothing is stopping us as **viewers** from diverting our attention to our phone, talking to other people or any other distraction that can disengage us from the narrative. We can **multitask** while we are watching a series as opposed to VR, that requires our **full attention** once we put on the headset.

In flat screen cinema or series, our focus and vision are **directed and limited** by what the camera has filmed and what the audio team has designed.
In VR, we have **6 Degrees of Freedom**, where events happening in the environment need to ask for our focus and vision.

It is not without its disadvantages, while 2D media can be enjoyed and shared together in the same real space, as a social activity, VR is only social inside the virtual world, and the feeling cannot be shared with those in the same real room as the player.

In cinema we are invited into a story, where we are spectators. In VR we are invited into a World where a story happens and we are protagonists.

2D media can be enjoyed nowadays in any screen device, from OLED TVs, to phones, tablets or a cinema screen of any quality and manufacturer in any condition. That means, as a creator we do not have control over the quality that is being delivered to spectators. In VR, the HMD we use to create the content is the one where it is going to be consumed, meaning that we have full deliverable control and assurance of outcome as intended.

And finally, as a filmmaker, we have full narrative control, because our scenes and shots only show what we want to show.

In VR, players have freedom to look around and go wherever they please. Creators in this medium have to work harder to keep the narrative tight and direct the focus where they want to have it.

These differences, while important, are mostly superficial and not fundamental, because the medium's purpose is to serve storytelling better, no matter which one it may be.

2.State of VR

2.1 Hardware

As of January 2021, there are many different headset manufacturers, each of them targeting a different audience and use case, but one is the indisputable king of VR:

Oculus from Facebook.

Oculus started as Oculus VR in 2012 in California from the union of four entrepreneurs, being Palmer Luckey its CEO.

After two very successful *Kickstarter* fundraisers and two prototypes, Oculus DK1 and 2, the company was acquired by *Facebook* in 2014.

A collaboration with *Samsung* led to the first version of mobile VR in the form of Gear VR.

In 2016 Oculus launched the first version of their consumer VR headset, Oculus Rift. Using OLED displays at a resolution of 1800x1200 per eye and an external tracking based on sensors, the only competition was the **HTC Vive.**

With the financial strength from Facebook backing it, Oculus launch Rift S and Quest in 2019. Quest was one of the first standalone 6DOF headsets, and their gateway to mass adoption as per plans of *Facebook* CEO *Mark Zuckerberg.* Both headsets featured inside out tracking with a 5 and 4 camera system respectively, and the Quest, updated months after launch, also featured hand tracking without external sensors.

Priced at around 459$ at launch, it was now accessible to more consumers. The addition of the Link feature, allowing the headset to work standalone or as PCVR over a single USB C cable was welcomed by users.

After some internal disputes, part of the original Oculus VR team left Facebook, that had a new agenda not agreeable for the founders.

In late 2020, Facebook launched Quest 2, discontinuing Rift S, at a 299$ price point, now targeting even more customers. However, this was not without controversy, as Facebook now requires a real Facebook account to use the headset.

The quality of the controllers, the capability of the processor and refresh rate from the Quest 1 to the 2 have been greatly improved and this 2nd generation of Quest is now the benchmark to beat, in performance, content offering and price.
Oculus Quest 2 is as of 2021 the most used headset in Steam VR

HTC collaborated with **Steam** to create the first Steam VR headset in 2015.
The HTC Vive was made available to consumers in 2016. With the content backing of Valve, it had a lot of potential, especially in the early days of consumer VR, to have the upper hand because of the Steam Platform.
The Vive relied in Base Stations as tracking devices, and their controllers, the Vive Wand, were reviewed as less ergonomic that those of the Oculus Rift S.
HTC launched then the Pro and the business versions of the Vive, with upgraded screens and business services. At a far higher cost, with no significant advantage, it didn't have the expected embrace from the audience.
The company then ventured to do a Standalone headset to compete with Oculus Quest with the Vive Focus, with some cold reception and their latest headset is a hybrid of Standalone and PCVR with modular design and faceplate addons for hand tracking and more.
HTC was one of the first companies to create a Streaming module that allowed to use PCVR Wirelessly.

Windows Mixed Reality is the VR program from Microsoft, using manufacturing partners to create hardware for their platform, that is compatible with content in the Microsoft Store and SteamVR.
Lenovo, Hp, Acer and other brands released their hardware as early as 2017.
The WMR platform relied since the beginning on inside out tracking, but only with 2 cameras, where the hardware-software mix was not mature enough. Adding the filminess of their controllers, the quality of the experience was subpar against the construction of HTC and Oculus Controllers and the better tracking provided by base stations or external lighthouses, WMR is considered a 2nd tier platform.

The HP Reverb G2 is considered the best WMR headset for its crisp resolution at 2160x2160 per eye. It is geared towards enterprise and gaming simulation.

Playstation VR launched for PS4 in 2016. A capable headset with subpar tracking, but a big array of titles and PlayStation Exclusive.

Valve Index is a High-End gaming headset created by Valve for the Steam VR platform. Featuring 144Hz refresh rate screens, finger tracking Knuckle controllers and off-ear speakers, it is one of the most impressive hardware packages in the market. Include base stations, the price is steep at 999$. There have been some reported quality issues with the lenses.

Pimax is one of the pioneers of high-resolution VR. While other manufacturers where still at 1800x1200 ppi per eye, Pimax was trying their 4K Prototype.
Nowadays they offer PCVR headset ranging from 5K to 8K resolution compatible with SteamVR platform.

Samsung was the creator of Gear VR, using their Samsung Galaxy S7 and Note, spreading mobile VR in 2017 to the masses with an affordable mounted case to slot in said Galaxy phones. They also had a successful HMD, especially among Simulation Racers, the Samsung Odyssey+, but they have not been very active since.

Other manufacturers, like **Xiaomi** or **Pico** have created 3DOF HMD.
Oculus Go, now discontinued, was Oculus' 3DOF offering from 2017-2019.

2.2 Possibilities

The Standard controller in any VR headset includes a trigger, a grab button and a joystick in each controller.

Most noticeably, the Oculus Quest 1, 2 and the Vive Cosmos include hand tracking with the same tracking cameras.

Playspace

VR can be enjoyed in Roomscale, Seated or Stationary modes.

Roomscale allows the player to move within the boundaries set in the Guardian or Chaperone System of the headset, a security feature mapping obstacle in the room to avoid collisions while playing.

Seating is preferred for Driving, Flying and other Vehicle simulation games.

Stationary mode creates a smaller boundary around the player in content tha needs interaction but not real-world movement, like VR Films and certain games.

3DOF vs 6DOF

Meaning 3 or 6 degrees of freedom, it determines the amount of movement possible inside the VR world we have.

In 3DOF we have access to move in three parameters, yaw, pitch and roll or x y z axis. We can look around in 360º and our controller has 360º of movement as well, but tied to a position. That means we are static.

In 6DOF VR we can usually move around freely up down, forward backwards, up or down, laterally and the 3 aforementioned axes, using 2 methods and the variation of those.

Movement Methods

Teleportation or Smooth Locomotion.

In teleportation, we point to a part of the world with our controller and a ray interactor where we want to move to, release the button, and we have moved to that specific place, skipping the distance in between both locations, usually with a short fade to black.
It is more beginner-friendly as it causes less motion sickness.

Smooth locomotion uses one of the joysticks to choose the direction in which the player wants to move. It is a continuous movement that will continue over all types of terrains.

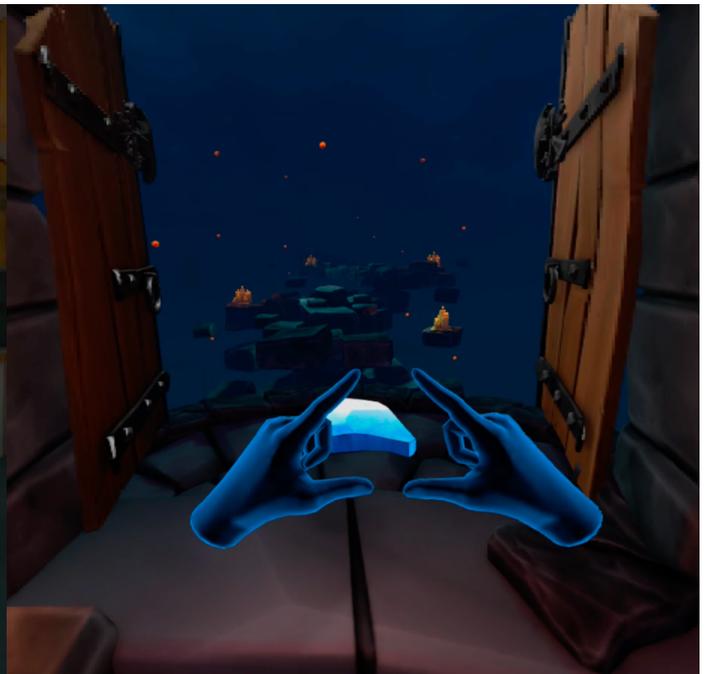*Figure 1 Smooth Locomotion in Contractors VR*

Figure 2 Teleportation with hand tracking in Elixir

Smooth, Snap or Natural turn.

To change direction and turn around quicker, there are different options.

Smooth turn will move the camera around continuously at a speed related to the pressure applied to the joystick controlling the turn.

Snap turn will turn automatically at increment of determined degrees,

Natural turn has this option disable and will move naturally with the position and orientation of the headset.

Most games include all types of locomotion and are user adjustable for comfort levels

Refresh Rate

The Hz count of the display accounts for how fluid the experience can be.

Oculus Quest 1 features a 72Hz Screen, while Oculus Quest 2 90Hz. The winner in this category is Valve Index with variable rate up to 144Hz. The higher the refresh rate, the smoother it will run and less break of the immersion the player will have. This is dependent on the headset.

3.VR Market Analysis

Types of VR Applications
Even with a medium as new as VR, with the first widely available consumer headset and content platform dating back only to 2016, we already have a lot of different categories, genres and subgenres.

We can start this catalog by distinguishing between **Enterprise VR** and **Consumer VR**.

3,1Enterprise VR
It can be classified as software developed for B2B or internal business applications, as follows:

3.1.1 Non-Interactive

360ª Photo
One of the first uses of simple HMD was digital tour for real estate customers in the form of still 360 photography.
It is a non-interactive 3 degrees of freedom experience that gives users a point of view of presence in a space at scale.

360ª Video
Whether it is footage captured with a 360ª camera or GCI, the common aspect with 360 video is that it is a l**inear, non-interactive 3 Degrees of Freedom** Experience.
The most frequent use cases are **virtual tours**, **marketing** pieces for brand promotion and **educational content.**
3 DoF Headsets were cheaper than more advanced 6DoF headsets and it was an easy entryway for traditional business to innovate. As of 2020 most of the 3DoF has been

phased out and Standalone 6DoF headsets like Oculus Quest and Quest 2 can also display 360ª video.

3DoF HMD like Oculus GO or Samsung Gear VR, are still functional and enough for these types of use cases.

Educational content in 360 video can also be included in this category as documentaries and short films.

3.1.2 Interactive

Corporate Training

Large companies like Walmart or KLM have implemented in the past year VR as part as their workforce training program from entry level to executives.

But we are not talking only about procedures, diversity and safety courses and protocols, also soft skills like leadership, public speaking or customer experience.

There are very specialized use cases like Airport Ground Operations simulation, that train workers in pre- and post-flight protocols for Airplane maintenance, again, avoiding the hazardous environment that can be the tarmac of an airport. Training for emergencies or malfunction situations as well as in different aircraft or simulated weather conditions are all benefits

Simulation

Implemented with great success in the military and healthcare fields, the benefits are obvious: saving costs and avoiding unnecessary risks.

Medical simulation for Surgery in VR allows students and resident doctors to train in a controlled risk-free and pressure-free environment, but still having a reactive virtual patient, more interactive than practicing stitching on pig skin. Errors and performance of the trainee can be monitored and mistakes can then be avoided with real patients.

The military has always been an early adopter of new technology, and specially in USA, they have been using VR as a supplement of their traditional training for years.

This program includes Flight Simulation for Cargo and Fighter Pilots, battlefield scenarios for infantry and combat medical personnel training.

VR allows training soldiers in a safe yet immersive environment, with scenarios that they may never encounter in real life, but they must be ready for, while also developing skills like communication, teamwork and reaction times.

Automotive Industry

VARJO, a company specialized in Hi-End Enterprise Headsets, has partnered Volvo Cars to create VR and AR Simulation technologies in the mobility industry.

Use cases include AR HUD (Heads up display) simulation in driving conditions and other data visualization.

In Graz, AVL incorporated VR Simulators in their acoustics department for EV sound development

Visualization & Design

Apps like Gravity Sketch, Medium or Blender XR are VR-enabled 3D Modelling programs that allows the users to use the 3d space and move around the object as they sculpt it. HTC and Logitech are launching specific peripherals for this task beyond the HDM controllers like the *Logitech VR Ink Stylus.*

These tools main advantages are a better visualization and control over the perspective, as well as multiple user collaboration in the design process.

The organization behind the XR plugin for Blender claims that the learning curve is also less steep when starting as 3D modeler in Blender directly in VR. On a personal note, I didn't find this to be any easier that the flat version of the software.

Audio

Spatial Audio is half of the experience when roaming a VR Environment.
Sennheiser's company Dear VR has made some interesting tools for 360 Spatial Audio
Mixing tools. Aimed at 360 video and Unity Game Engine, their Spatial Connect
software allows the user to employ the VR controllers as OSC to MIDI controllers that
write panning and filter information directly on the supported DAW.
This is a massive improvement in ease of use and results over previous workflows with
fb360 plugins, which had not 360 visualization possible and was very cumbersome to
work with.
IEM or Sparta plugins, while really good for 360 audio, do not have any support for
visual content.

Educational

Referring to elementary education levels in this case, there have been different pilot
programs to implement some degree of educational interactive content in classrooms.
ClassVR is at the forefront of these efforts with their hardware and platform offering.
An immersive learning experience, especially in science and history can be more
impactful for students, thus making the information easier to retain, as it has been
coated with an emotional experience on top of it.

VR Workspaces

Like everything related to remote work, the usage of virtual meeting spaces increased
thanks to the pandemic. For work meetings, conferences, symposiums, concerts and
almost everything that required a large gathering of people during this year, if it was not
cancelled, it had a virtual version.
But the idea and technology are not new. Companies like MeetinVR, Spatial, FuturaVR
Space and Immersed have been developing their platforms for several years, but just
leaving their beta phase now.

- Virtual Meeting Rooms

These virtual spaces resemble everything that a real conference room in an office building would have with some additions. Slide presentation is possible, but also is the importing of 3D objects for a better understanding from the attendees.
The benefit over zoom and skype calls is that with the use of avatars, there is a sense of presence as well as tracking of hand gestures, that allows for better communication and reading non-verbal language. The drawbacks are the hardware requirements and setup times.
In a more mature remote work and VR landscape, experts can see this as a form of replacing daily meetings.

- Virtual Conferences

Functioning almost as a MMORPG, each participant has their own customizable character and a world to roam and interact with other people.
Virtual conferences during 2020 were large gatherings of avatars in an environment trying to replicate what there is usually at these industry events: Exhibitor Stands, Panels, Presentations, Product Unveiling, Advertising boards, networking spaces and even food courts with food trucks and bars for casual conversation.
To attract a wider audience that may not have had the technical means to attend in VR, these events were also available in "pancake" or flatscreen mode.
Laval Virtual, the XR Industry French event was celebrated in this way in 2020 with a number of 10000 attendees.

XR Industry prominent figures believe however that once the pandemic is over, in-person conferences cannot be substituted by virtual ones, no matter how immersive and well thought out the environment is.

3.2 Consumer VR

3.2.1 Non-Interactive

360ª Photo

Consumer grade 360º cameras like the GoPro Fusion and Max or the Insta360 ONEx gave users the possibility to capture 360 still scenes. Paired with cheaper mobile powered headsets, this was a new perspective into social content

360ª Video

- User generated content

The same factors that work for 360 photo, work event better for video.
From travel videos to sport or Vloging, 360 cameras paired with cheap or cardboard headsets are a great way to share a new perspective with family and friends.

- Professional content

A lot of content for the original Oculus Go was 360ª video, paired with the support for 360 video and ambisonics on YouTube, and opened a platform for professionally created content aimed at consumers.
From documentaries from National Geographic, Extreme Sport videos from Red Bull, concerts, shorts and feature length films, there is a wide array of content offered in the format of 360ª video.

- A special case is **Oculus Venues**.

This service hosts live streamed entertainment content in the form of 360º video, often with more than one camera perspective to choose from.

Big Organizations like NBA, Esports Leagues or Concert promoters joined and are offering content on this platform, free or as a subscription.

3.2.2 Interactive

Volumetric 360ª Video

Another application of 360ª is volumetric captured video, which is recorded with an array of cameras and gives a sense of depth to the scene and the ability to the viewer to move freely around the scene.

Users can experience different perspectives of the same scene and while it is not fully intractable and the viewer is still a spectator, the immersion is greatly improved.

The downside is the expensive technical requirements, controlled environment and amount of equipment that needs to be shot.

VR Rooms

One of the original use cases for VR was social interaction with an element of telepresence, something that social media or video conferences could not provide.

With this idea, platforms like Oculus Rooms, VR Chat or Recroom appeared.

As said, the main use of these apps was to meet in virtual environments with friends or meet new people to participate in all the different activities and minigames that are available in these spaces. These minigames are a part of spending time together and boost interaction.

Microphones in the HMD, reactive avatars and the ability to move around the space freely allowed a very seamless interaction even in a virtual world.

VR Chat has in the past year incorporated concerts, user generated minigames and seen a growth in popularity to 26000 monthly players in December 2020 in PCVR only according to Steam Charts Data.

Bigscreen tries to emulate the experience of going to the cinema with friends, seating in a theater, picking your seat and even waiting in the lobby chatting before the movie starts.

Facebook Horizons, still in private beta was announced in late 2019, and promises to be the new social network for life-like interactions, including all of the features that other platforms offer and more to be announced.

Interactive Films

Categories for this new medium appeared in Film Festivals including Tribeca, TIFF or Cannes as early as 2013. While they also consider non-interactive 360º video as well, we are talking about interactive film in this case, also in 360 but usually made with a Game Engine like Unity or Unreal or a 3D engine like Blender.

The characterization of this genre is a mix of narrative parts where we are spectators and interactive parts where we interact with the characters and play a role in the movie, as a character.

The case of Madrid Noir: A VR Mystery, is an Interactive detective noir film where we are told a story in the form of flashback scenes, and in the present day we help the detective search for clues and parts of the investigation

Even while we are in exposition scenes in the present day, we are still a character that can move and interact with the environment, and if we go out of script, even get an attention call from the protagonist, that requires our action to continue.

The narrative scenes work as a theater stage, rather than a cinema camera, because we are able to look around and the frame, we can see is not determined by the aspect ratio or position of the camera, but rather our own presence as spectators.

Production companies like Atlas V, Baobab studio or ARVORE are leading the efforts in this category, utilizing talented and renowned actors from the Hollywood world, like Colin Farrell, Kate Winslet or Daisy Ridley to lure in new audiences to this medium.

The runtime of these films is usually under the 50-minute mark, as the headset is not always comfortable for longer periods at a time.

Games

In this category we find every possible genre of game, from First Person Shooters, RTS, RPGs, Puzzle games, Rhythm games, Simulation and everything in between.
In the early days of PCVR and PSVR, some of the first AAA games for VR were ports of successful flat games like **Skyrim** (Bethesda Softworks, 2011, VR version in 2017) or **Fallout 4** (Bethesda Softworks,2015).
A lot of different mechanics have been explored and the creativity of creators has no limit as the technical possibilities grow with hand tracking, Text to speech recognition. Here are some of the most played and celebrated games.

Beat Saber (Beat Games, 2017) is one of the most successful games in all VR Platforms. The studio responsible, Beat Games, was acquired by Facebook in 2020. Beat Saber is heavily promoted in the Oculus platform and targeted at newcomers to VR, as it is simple, has no locomotion that can cause motion sickness and it is highly immersive.
The game is a rhythm game, slicing blocks at the rhythm of the music with 2 lightsabers in the direction that the blocks indicate.
There are obstacles to avoid and there is some movement needed, but otherwise the game is static, with no virtual locomotion.
This title was one of the best-selling VR games and the first one to reach $1M in revenue.

Onward (Downpour Interactive, 2016) is a military simulation First Person Shooter, usually compared to Arma III (Bohemia Interactive, 2013). Featuring different game modes, from Co-op to Deathmatch, it recommends to be played with natural movement and no snap turn, to create a really immersive experience. Realistic recoil, different weapon handling, advanced communication systems gave players what they have been looking for, an immersive version of Call of Duty Modern Warfare (Infinity Ward, 2011)

Pavlov (Vankrupt Games,2017) is an Arcade FPS. It's equivalent would be Counter Strike (Valve, 2000). It is a fast paced, non-realistic VR shooter with the characteristics that CS players enjoy, as well as User modifiable maps and content.
Using realistic reload mechanism, snap turn and voice chat, it featured the game modes seen in Counter Strike, as well as a shooting gallery to learn the unique controls for each weapon.

Moss (Polyarc, 2018) originally released as a PSVR exclusive; this is one of the games that used the new medium in a very original way.
The player, in stationary position, would control 2 characters in this Platformer-Adventure game.
With the left-hand controller, the player controls Quill, the protagonist, moving it around with the joystick and triggering actions like jumping or attacking with Y X buttons.
So far it looks and behaves as a normal isometric perspective platformer played with a D-Pad.
The VR element comes into play, as our isometric perspective is not fixed. We are also playing as a helper spirit for Quill. With the Hand Presence and button triggers, we can grab, slide, move and help the main character solve puzzles that would be impossible for Quill on its own. Combining the movable perspective, as we can look around to see from a better angle and combining 2 sets of abilities gives this game a very original edge and a very enjoyable play experience, topped with great graphics and a compelling story. This similar mechanic has been used in the LEGO Videogame series,

as different characters have different abilities that combined can solve puzzles that otherwise would be impossible to conquer.

Asgard Wrath (Sanzaru Games,2019) is a AAA title in roomscale play mode that offers an idea close to that of Moss, with the main player embodying a God or a Mortal, sky or ground view, to fight enemies and plan attacks differently.

Flight Simulation Titles like VTOL **or Elite Dangerous**, paired with HOTAS controllers in a seated position are true 1:1 simulation environment, where to get the plane in the sky, we have to perform all of the protocols and all buttons, levers and, screens in plane are actionable. Microsoft Flight Simulator (Microsoft Studios, 2020) added the VR feature in Early 2021.

Simracing software like Asseto Corsa or Dirt Rally 2.0 now offer VR compatibility, immersing drivers even more in the game, with a more realistic perspective.

Fitness VR is also increasing in popularity, with physically demanding titles that feature boxing, or pure Fitness apps with varied workouts that immerse the player.

4.Development Journal

I have worked professionally in 3 VR Titles before attempting this Project, although always in the Sound and Music Department, and never involving code.

The first step would be to understand **what I wanted to do,** list the moving parts that it would need and set goals accordingly.

4.1The idea

Already sparked in October 2018, at the beginning of the Studies, I wanted the Thesis to be a sum of everything I could learn during the Master, not only reserved to audio and sound.

At the time I was involved in one VR production as a composer and played with consumer grade 360 cameras and google cardboard.

I wanted to implement some degree of interaction, because video only seemed too limited, but as I would discover later in 2019, it is not.

The form of the Project was chiseled: **An Audio Driven Narrative Interactive VR Experience,** or simplified, a VR short film including an interactive part where sound plays an important role to the story.

A first treatment was written and then evolved to a first script.
It was titled *Bring me back.*
This version was the story about an unconscious son lying in a hospital bed after an unknown accident. As a player/spectator, we are his conscience and help him remember a melody.
The interactive part then comes In a "Simon Says" style game, where a pattern of sound is played within an interactable object made out of spheres, that we must reproduce correctly to advance to the next part of the experience.
Once we have correctly reproduced this melody, we would be transported to 3 different childhood memories of the son, all of them portraying a scene where music is the

carrying narrative and sound is setting the mood and space. Each scene would also portray one of the perspectives explained in the essay:
1st person, 3rd person, 2nd person. Protagonist, Spectator, Support Character.

Scene 1 was a baby memory, where the camera was in first person as a baby lying in a cradle, seeing and hearing a toy mobile playing the melody.

Scene 2 was an early childhood memory, where the camera was in 3rd person.
In a kitchen, the radio would be playing the same melody in a different genre arrangement, and son and mother would be having lunch.

The 3rd memory would be a rest stop during a road trip. We are now in the perspective of the mother looking at the son by the sea, while we hear a new arrangement of the same melody playing on the car radio.

After this last memory we come back to the first stage, where we are prompted to enter the same melody again in the pattern of spheres.
Once replayed correctly, the stage will shake and rumble, fading to white, as a new arrangement from the same melody starts to play louder.
We wake up in a hospital bed, with heavy breathing. We see the mother and the only conversation between them: *"It brought you back"*- as we hear the music play louder and fade to black to the end credits.

The idea was to not only build the interactable scene in unity, but also build the scenes as animated shorts. However, later in the process, I realized I am not a visual artist by any means and I did not want to involve a team of people, since I wanted the whole project to be a test for my own abilities. After reaching this conclusion, I switched to record the scenes in 360º video with 2 actors.
What did not change was the main idea around sound and narrative: The melody, played in different arrangements, is the connection between the mother and the kid over the years that ultimately brings him back from unconsciousness.

As a sound design student, audio was of course going to be a big part of the project. I wanted to showcase in a useful way the power of sound in VR, through a display of technical possibilities, formats and workflows:

- Stereo Head locked Music
- Directional Music
- Mono Interactive Sound Design
- Mono field Recording
- Dialog Recording (ADR)
- FOA Field Recording
- 360 Video Recording
- Space Design
- Unity Audio Systems
- TOA Encoding
- Binaural Decoding
- Mixing in VR

And each of these elements is represented in one of the scenes always with a narrative purpose behind it.

This first idea was overambitious as it required many different locations, and the runtime was about 10 minutes. A revision was necessary to make the project achievable.

The revision

When the restrictions for COVID-19 came, it was no longer possible to record video in the set that the script required.
The story was then simplified to version 4, to a no risk shooting environment, changing characters and the story, but maintaining the same technical display and game mechanic
The script was changed so that it could be done with only 2 actors in outdoor location, and 1 actor in 2 indoor locations. Runtime was also reduced to a minute per video scene. This new script featured a much more traditional story, boy likes girl, as he falls in love by the way she sings a melody, that will be the subject of our game.

This revised version is titled *Stuck in my head.*

Scene 0

We start our narrative in the interactive scene, *the realm of dreams,* as our protagonist is sleeping and dreaming about different things, until the memory of his crush with her singing pops into her head.

Following the philosophy of Tutorial without a tutorial, the player is presented with the game elements (spheres and phone) to interact with them freely, and see if by her/himself can reach the conclusion of how it is played.

The game in this case, rather than a "Simon says" type game, where the spheres propose the pattern that has to be replayed, is a memory game with two elements:

The player has a phone that, when grabbed, will play an audio message containing a melody. This is the hint.

There are also 4 spheres, each of one triggering one of the notes of the melody.

The game mechanic is to hear the melody as many times as we need, identifying the order of notes, and then remembering in which of the spheres each note is, to replay the melody in the correct sequence.

Types of Audio featured in this scene are: Mono SFX, ADR with baked reverb to create the space, stereo head locked ambient music, Mono SFX spatialized with automation, directional SFX. The mix is encoded in First Order Ambisonics and decoded to Binaural in Headset.
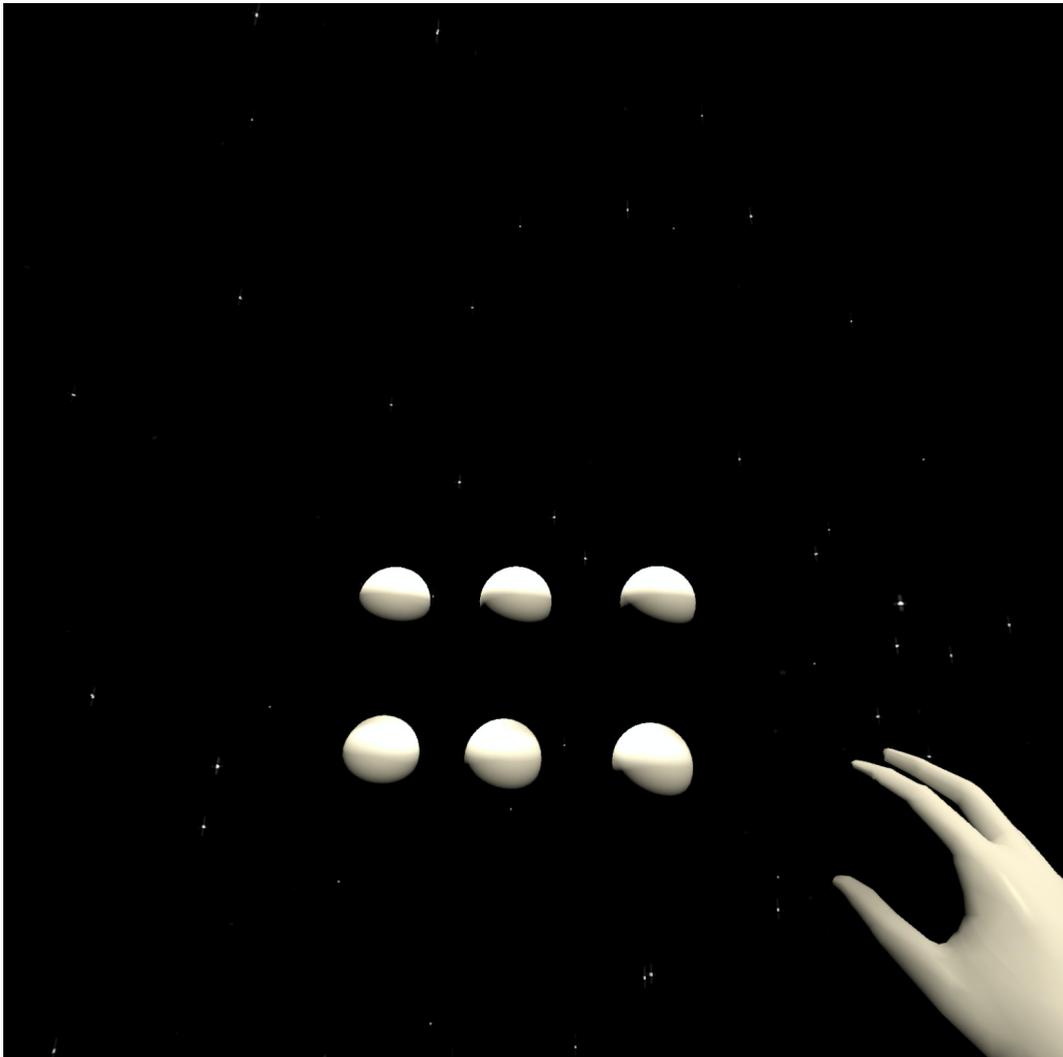
Figure 3. Interactive Scene Capture. 1ST person interactable perspective

Scene 1

Our protagonist is at work, unproduction and not very concentrated. He reaches for the phone to hear the voice message with the melody. This scene is in first person, meaning that the camera has the perspective of the protagonist in the story.

This perspective only knows what the character knows. As a spectator

In this scene we feature FOA field recording via a *Zoom H2N* with 3.0.0 firmware that enables Spatial Audio recording as well as added extra stereo SFX and a non-diegetic music soundtrack.

Figure 4 Scene 1, 1ˢᵗ Person Perspective

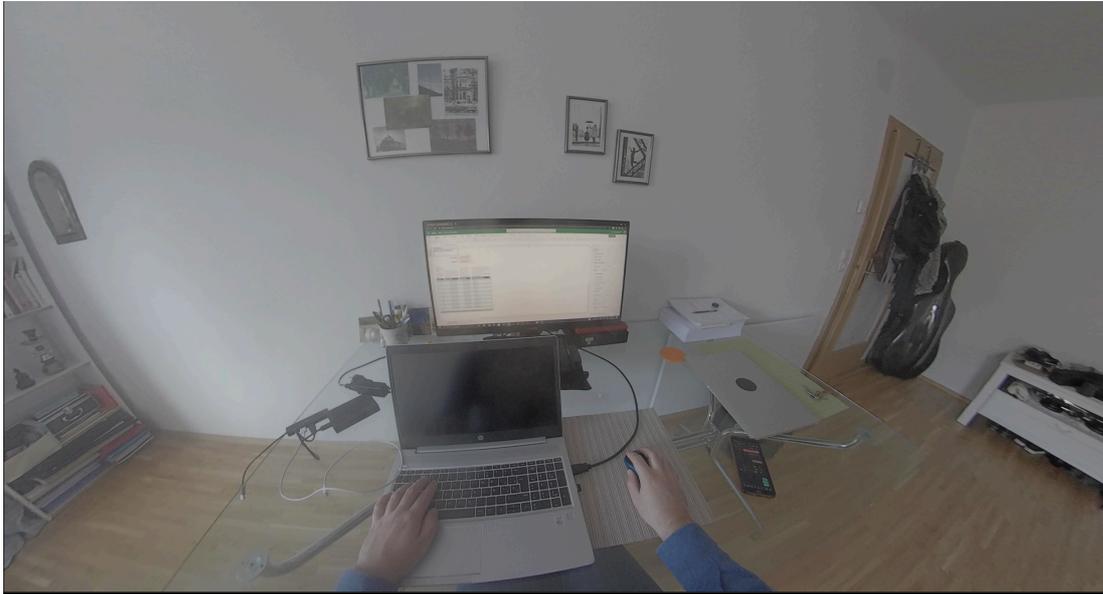## Scene 2

Despaired, our protagonist meets up with a friend in the park to tell her about his lovesickness. This scene is shown in second person perspective, from the view of the friend. She learns what he is going through but only partial information that the protagonist reveals

Figure 5 Scene 2, 2nd Person Perspective

In this scene we have a similar Audio setup, this time edited with IEM plugins in Reaper to reduce ambient noise or compressor to boost one axis signal.

Scene 3

Sleepless, the protagonist scrolls infinitely on the phone, resorting once again to hearing the voice message. Finally, he decides it's time to do something, and calls her.

This scene is seen from the POV of a third person. Omniscient, this perspective knows what has happened to him and sees him react from an emotional distance.

Audio in this scene is similar to the others, but in this case including the mixing in the scene of the voice message as a mono source and spatialized accordingly.
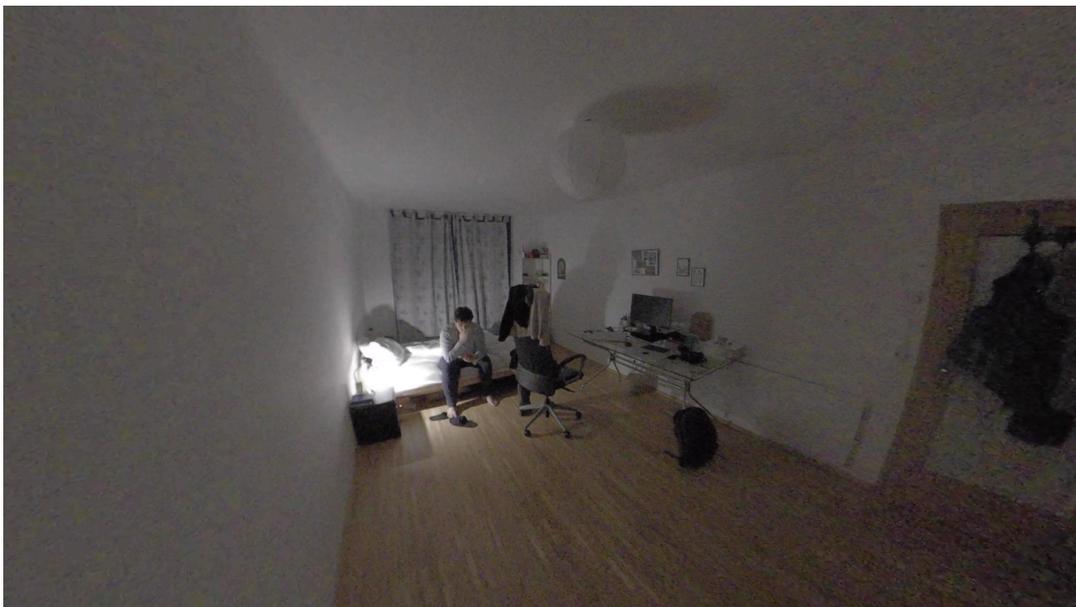

Figure 6 Scene 3, 3rd person perspective

Scene 4

Back in the realm of dreams, we hear once more the voice of the Protagonist as he can finally rest his mind after talking with her.

One last interaction with a pillow finishes the game with a commentary and music as the main act.

This idea is more doable than the first script, simpler, but showcases better the 3 main elements that I wanted to work on:

Perspectives, the power of audio and natural interaction.

With a finalized idea now was time to produce it.

Game Engine

Unity vs Unreal

This is a heated discussion as much as Mac vs Windows or mountain bike vs road bike. After long internet searches, YouTube research and professional advice, I choose Unity for the bigger community online to solve problems, the apparent ease of use, and an easier coding language.

Although I understood how a game engine worked and what I needed to do in order to achieve what I wanted, starting from scratch is an undertaking for an inexperienced solo developer.

Learn

First, I needed some schooling in code. I took 2 C# Courses as well as Unity basics tutorials. Then some VR specific interaction.

The basic tutorials and C# grounds are very useful, but i found myself having problems with the VR interaction part.

Unity has deprecated the Oculus SDK and not yet adopted OpenXR standards (as of 2019.4 version)

Instead, the framework to use is the XR Interaction Toolkit, which had different updates during the time that I was working with it, changing some workflows.

The Unity XR Interaction Toolkit provides pre-built scripts and prefabs for universal VR interaction, based on action or controller input.

Universal actions like grabbing, teleporting and snap turn are mostly covered, others   I had to program myself.

My build is designed for oculus systems, and I have not tested it in any other environment.

After I had learned about this system, I was ready to build my interactive scene:

4.2 Build

The main object to build our scene was to create a XR Rig

A VR Rig in Unity is composed of a VR Camera, a camera offset, hand presence and additionally a player capsule.

The VR camera will take the tracking input directly from the headset with a Pose Tracking Script, while the hand presence script was not a preset, but coded to behave in a special way.

Oculus offers a set of models with animations for hands, including pinch, grab and default hand postures, as well as models for oculus quest and rift s controllers to put in place of the real controllers in game, to have a reference point.

Because I wanted the interaction to be as natural as possible, I chose to display hands but left an option in the script to display the controllers if needed.

The Interactive Scene

As I will explain later, I will be working with 360 video inside Unity for my Narrative Scenes. For the purpose of the originality of the Thesis, of course I wanted all assets used in game to be done by me.

Since I am not a graphical artist by any means and my 3D Modelling skills are very limited, I decided to also use 360 video as my skybox for the interactive scene.

As interpreted from the script, the player finds him/herself in the realm of sleep, which I decided to represent with a space starry sky. It was created in Photoshop only with Gaussian Noise and different filters. Then it was lightly animated in Premiere Pro and exported as a video that then will be looped in Unity.

The other elements in the interactable scene are the spheres for the pattern game and a cellphone model.
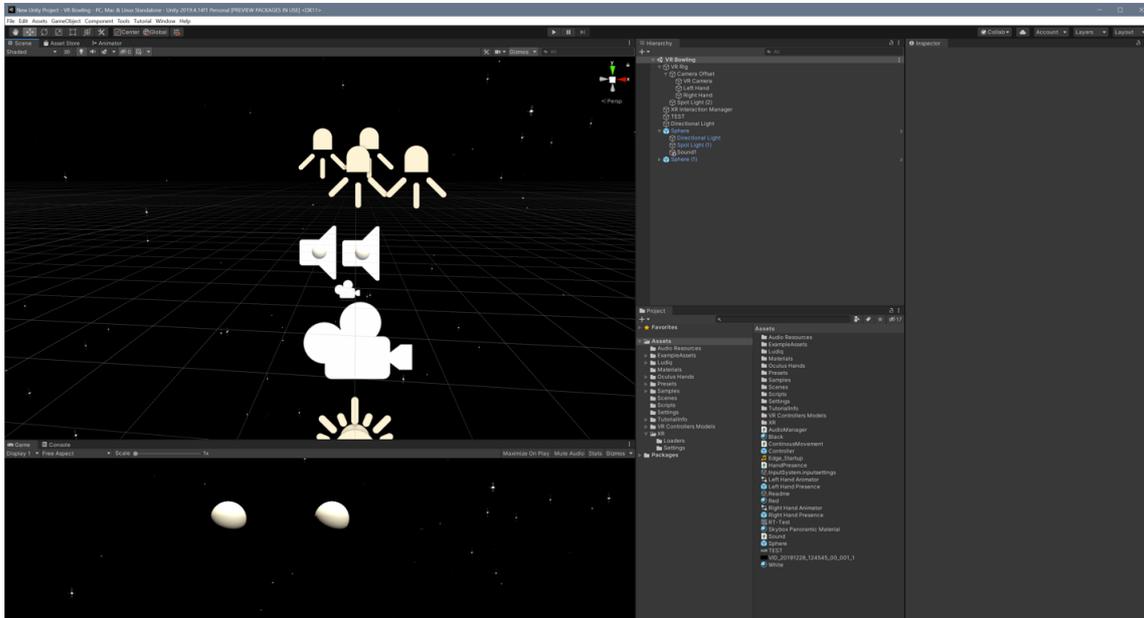
The script for this was a little more involved: Each sphere is a prefab with a grab interactable, that allows the object to be picked and grabbed with the hand of the player, and a rigid body script, that confers the object property like mass and gravity.

In this case, as they are in space, they have no gravity but are locked in place, so that they do not fly away after being collided with.

Finally, **light**. Unity sample scenes come with directional light that works as the Sun. I decided not to use this light and instead use spot lights with a very focused beam directed to the spheres. They are attached to the objects, and will move with them if they move around, ensuring that they are always lit.
The player capsule also has one light beam attached to light the hands of the player at all times.
With all elements in the scene now we need to move around it.

Movement

I chose smooth locomotion with snap turns to navigate the scene.

Since there are no terrain elements and we appear to be floating in space, I did not add walking motion or footsteps sounds.

We only need to approach the spheres and the phone to interact with them, and they are not far away from the initial spawning point.

Still is it interesting, especially for new players to feel the movement in VR.

Interaction

As explained above, the spheres and the phone with a rigid body and a grab interactable can be grabbed by pressing the grab trigger in our controller.

When grabbed, the script triggers sound as a one shot.

In the case of the phone, it triggers a whole melody, in the case of the spheres, each one triggers one note of said melody. With these 2 elements we now have our main game mechanic, the memory game explained above.

Tutorial without a tutorial

The gameplay in this Concept piece is short, so i wanted the player to take the time and explore the limited scene, interact with the elements, a try to figure out what the game is about, without any explanation.

The immediacy of VR, as it is much more natural than a D-pad controller of keyboard and mouse because we can perform real life actions that have a direct meaning in the virtual world is what gives this possibility.

360º Video

Unity supports 360º video via the skybox method: A render texture with the dimensions of the resolution of the video is created and then applied as material to the skybox of the Unity scene.

This method is straightforward and allows adjustments to render the video in different planes within the scene. That way it is possible to add other interactable in a closer

render plane while still having the video playing in the farthest plane a background, as it is done in the main intractable scene.

The video Scenes are recorded in 5.7K resolution with a *Insta 360 ONE X* camera. It is edited in Premiere Pro with GoPro Reframe plugin and other native Premiere Pro Plugins, as well as LUT applied to the whole footage, because it was recorded in LOG format to ease the color correction process. 360 Cameras, especially consumer ones, tend to have color aberration due to the 180º field of view and the curvature of the lens.

Audio

No Audio middleware

Because of the constraints of unity with 360 video, I could not rely on FMOD or Wwise to implement my audio. I had to use the Unity built in Audio Engine. Luckily it supports native decoding of FOA, and that is what I will be using.

<u>Sound</u>

The whole soundscape for the experience comes from different sources, such as FOA field recording, designed sound in DAW, or Dialog, but it all is edited in Reaper and Mixed in FOA directly in VR with DearVR spatial connect, a software that I was already familiar with since my previous Project Work 3.

It is then Muxed with the video in the FB360 Encoder, ready to implement to my scene.

Interactive sound elements in Scene 0 and 4 are implemented directly in the **Audio Source** Script on each game object in Unity. It's volume, attenuation and other performance parameters are controlled directly in the same script, and real time editing is also possible while testing.

Music

Music, apart front he main melody, plays a background role through the experience, as a soundtrack.

It is all original music produced in Logic Pro X, with certain STEMS being spatialized in Spatial Connect for narrative support and directing the focus of the player.

Otherwise, the music soundtrack in this case is stereo head locked, meaning that it will stay in the spatial position and move with the head no matter where we look at.

Exporting

Exported a .exe for Oculus Rift S or Oculus Quest + Link or Android in Standalone mode for Quest, performance is better in PCVR, due to the heavy load of the 5.7K videos.

Since

A capture can be found in the following directory for access:

https://drive.google.com/drive/folders/1qPGeO9twt7DTDsyzqZpdFqvw-ocO44mH?usp=sharing

The build itself will be also available, although only compatible with Oculus Headsets.

5.Experience and conclusions

Narrative, Design, Code, Interaction, Movement, Graphics, Audio.
This are the game elements that I have discussed over the length of this Thesis and applied into my VR Experience

Learning C# has been the better outcome of this project, and the one that for sure will be more useful in my professional career from now on.
The workflow with unity, while fairly new to me, was not strange and I could keep up and find workarounds to get the program to do what I needed to achieve.
Gaining knowledge, and useful at that, in any non-regulated field, especially arts, is now easier than ever, and in the span of 5 months, I was able to learn key skills to achieve the goal of this project.
Interaction in game was something that partly came from experience as a player and partly as an interest, but it definitely required some research during the production of this work.
The graphical part was completely out of my skillset and tried to solve this lack of interesting environment with narrative reasons.
Audio is the field where I felt the most comfortable, as I had experience working with all the tools that I used here.

The main conclusion from this period of work is that now I can understand how the pipeline of a VR production works, what are the time, resource and effort requirement of each part of the development and can assess this confidently from now on.
While the final product, for different circumstances is not as expansive as the first idea was, it has maintained the core elements that I wanted to try and it has been successfully produced and documented.

With this Thesis I can see how much I have learned on different topics during my time at FH Joanneum, I can close a stage and open the next one, applying this acquired knowledge and everything that there is to come.

6.Bibliography

- **Norman, Donald A.**: Stages and levels in human-machine interaction, in: International Journal of Man-Machine Studies,Volume 21, Issue 4,1984. ISSN 00207373, in: https://doi.org/10.1016/S0020-7373(84)80054-1. (last visited 15.12.2020)

- **Boy, Guy A.**: The Handbook of Human-Machine Interaction: A Human-Centered Design Approach, in Taylor and Fracis Group, CRC Press, 6000 Broken Sound Parkway, NW, suite 300, Boca Raton , FL 33487 – 27 42. ISSN 978 – 0 – 7546 – 7580 – 8, in: http://crcpress. Com (last visited 16.12.2020)

- **Hoc, Jean-Michel**: From Human-Machine Interaction to Human Machine Cooperation. Ergonomics, in: PubMed, August 2000, ergonomics 43. 833-43. DOI: 10.1080/001401300409044, in: https://www.researchgate.net/publication/12390438_From_Human-Machine_Interaction_to_Human-Machine_Cooperation (last visited 10.12.2020)

- **Beaudouin-Lafon, M**.: An overview of human-computer interaction, Biochimie,Volume 75, Issue 5, 1993, ISSN 0300-9084, in: Elsevier Masson SAS, in: https://doi.org/10.1016/0300-9084(93)90165-O. (Last visited 20.12.2020)

- **Lowood, Henty E.**: Virtual reality. Computer science, in: Encyclopædia Britannica, November 19, 2020, in: https://www.britannica.com/technology/virtual-reality (last visited 3.1.2021)

- **Schulkin, Jay and Raglan, Greta B.**: The evolution of music and human social capability, in: Front Neurosci. 2014; 8: 292, 2014 Sep 17, DOI 10.3389/fnins.2014.00292, in: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4166316/ (last visited 7.1.2021)

- **Summers, T.**:Opera Scenes in Video Games: Hitmen, Divas and Wagner's Werewolves, in: *Cambridge Opera Journal, 29*(3), 253-286, doi:10.1017/S0954586718000046, in: https://doi.org/10.1017/S0954586718000046 (last visited 2.1.2021)

- **Whitlock, K.:** Theatre and the video game: beauty and the beast. (Electronic Thesis or Dissertation), in: https://etd.ohiolink.edu/ (last visited 10.1.2021)

- **Sherril M. Stone:** Observational learning, in: Encyclopædia Britannica, July 07, 2017, in: https://www.britannica.com/science/observational-learning (last visited 5.1.2021)

- **Schönauer Monika, Brodt Svenja, Pöhlchen Dorothee, Breßmer Anja, Danek Amory H., Gais Steffen**: Sleep Does Not Promote Solving Classical Insight Problems and Magic Tricks, in: Frontiers in Human Neuroscience, Volume12, 2018, ISSN - 1662-5161, DOI - 10.3389/fnhum.2018.00072, in: https://www.frontiersin.org/article/10.3389/fnhum.2018.00072

- **Miller, G. A.**: The magical number seven, plus or minus two: some limits on our capacity for processing information, in: Psychological review, 63(2), 81. Vol. 101, No. 2, 343-352 (1956), in: http://www2.psych.utoronto.ca/users/peterson/psy430s2001/Miller%20GA%20Magical%20Seven%20Psych%20Review%201955.pdf (last visited 26.12.2020)

- **Laurel, Brenda**: Computers as Theatre, in: Addison-Wesley Professional, 1993, 0201550601 (ISBN13: 9780201550603), in: http://ptgmedia.pearsoncmg.com/images/9780321918628/samplepages/0321918622.pdf (last visited 18.12.2020)

Other sources

- **Robinson, Nick:** así es como se vería un videojuego en segunda persona, in: https://youtu.be/mC8QoRa8y_Q (last visited 5.12.2020)

- **Robinson, Nick:** el mejor juego que Ubisoft no te dejará jugar, in: https://www.youtube.com/watch?v=RTkxzQDo0ng (last visited 5.12.2020)

- **Rieger, Martin:** Expert for immersive media, specialized in VR with 3D audio, in: https://www.vrtonung.de/en/

- **Valem**: What I learned making a VR game in 7 days; in: https://www.youtube.com/channel/UCPJlesN59MzHPPCp0Lg8sLw

- **Steamcharts**: An ongoing analysis of Steam's concurrent players, in: https://steamcharts.com/

- **Unity learn**, in: https://learn.unity.com/

- **Tristem Ben, Davidson Rick:** Design & Develop Video Games. Learn C# in Unity Engine. Code Your first 3D Unity games for web, Mac & PC, in: https://www.udemy.com/course/unitycourse2/learn/lecture/8400846#overview

- **Stereopsia europe**: World Immersion Forum, in: https://europe.stereopsia.com/en

- **Atlas V**: From immersive experiences in AR and VR to interactive installations that use Machine Learning, our team seeks to engage audiences by leveraging new technologies, unique visual aesthetics, and immersive design, in: https://atlasv.io/

- **Oculus**: Oculus Connect 5 | Spatial Audio for Oculus Quest and Beyond, in: https://www.youtube.com/watch?v=sKDXksI7S6o

- **Oculus for developers**: Oculus Developer Center/ Audio Development, in: https://developer.oculus.com/audio/

7.Annex:

BRING ME BACK(WORKING TITLE)

Written by

Carlos Rodríguez Rodríguez

Draft 02

contact@carlosrrmusic.com

BRING ME BACK(WORKING TITLE)

VR EXPERIENCE FOR OCULUS QUEST

SC1

INT. DARK

UNITY, DEAR VR, TITLE LOGOS

                                        FADE IN

We are in big dark space with strings of chinese spheres
dimly lit, like chinese paper lanterns at a festival.

MUSIC: Soft warm analog synth pads

We hear voices coming from outside the space. They are
muffled and with a lot of reverb. We can only understand
certain words

                                        WE CAN LOOK
                                        AROUND FREELY

                        OUTSIDE WORLD VOICES

                          (MEN&WOMEN MIXED)
                Hurry!   Oh my god what happened??!
                we need to hurry!

We continue to hear outside world noises and suddenly they
start to LOWPASS untill we don't here them anymore, only
Music and tHE KID appears

We hear him move around us. He has no body, just hands and a
floating head. He talks visibly nervous

                             KID
                Hey! Who are you? Where are we?

if 1)Player doesn't talk

                             KID (cont'd)
                Don't you know how to talk? Can you
                hear me? Do you know where we are?

If 2)Player talks

                         KID (cont'd)
              I don't knw either. But I need to get
              back!

Watching at the kid, some of the chinese lanters descent and
light up in a sequence. As he touches them, they emmit a
sound, conforming a melody.

After he is finished, a set of spheres appears before you,

playing and lighting up in a sequence, and the player
repeating it afterwards.

IF 1)correct

Confirmation sound and next puzzle

If 2)Incorrect

Error sound and repeat

When 1) two more puzzles will happen, with increased
dificulty

When the last one is played correctly, a big glass sphere
appear before us and we are transported into it

                                        FADE TO WHITE

SC2

INT. AFTERNOON LIGHT BABY NURSERY

CAMERA: POV

MUSIC: music box melody

We are laying doing in a cradle looking up. We see a cradle
hanging toy playing the melody we just played in the puzzle

After 20 seconds of looking around we are transported into
the next bubble

                                        FADE TO WHITE

SC3

INT. DAY KITCHEN

CAMERA:POV

MUSIC: 50's arrangement on the radio

We appear sitting at a table, a plate of spaguetti before us
and MOM is by the counter humming that melody

                                        FADE TO WHITE

SC4

EXT. DAY ROAD CLOUDY

CAMERA: MIDDLE OF THE ROAD

MUSIC: Rock coming from car radio

We see MOM and KID by looking at the sea from the back. We
can't hear if they are talking as the waves sound is too
loud.

On the other side of the scene there is a car, with the door
openend, and the radio is playing a rock arrangement of the
same melody.

After some secconds

                                        FADE TO BLACK

SC5

INT. DARK

CAMERA: POV

THE CHINESE LANTERN ROOM

MUSIC: Analog pads

We are back at the beginning stage. Now we hear earthquakes around us, the lamps are dimmer than before and some of them are shaking and turning off.

The KID is more nervous.

>   KID
>   I don't know what's happening, I need
>   to get back.

We hear again voices coming from outside the space. They are muffled and with a lot of reverb. We can only understand certain words.

>   VOICES
>   Come on! Give me 350!

A lighting goes across the space

>   VOICES (cont'd)
>   Not enough, try again!

>   VOICE 2
>   100 ml going in

The kid is getting more nervous

>   KID
>   Please, you need to help me!

A new puzzle appears before us. We play the same melody with the SPHERES

We hear all kind of medical noises coming from outside

When correct: one final lighting strikes across the room and everything lights up, to a very bright white. We hear the melody in a orchestral arrangement louder and closer.

                                        FADE TO WHITE

INT. NO WINDOW, FLUORESCENT LIGHT, HOSPITAL BED

CAMERA: POV

MUSIC: Orchestral coming from a TV in the hall

                                        FADE FROM WHITE
                                          TO A HOSPITAL
                                                    BED

We appear at a hospital bed, heavy breathing and MOM is right there we hear very clearly the music coming from the TV.

She approches the KID and hugs him.

Music Stops

                                        FADE TO BLACK

                        MOM
              You are back!

MUSIC IS STEREO NON DIEGETIC

A mix of all styles we heard throout the experience

                        END CREDITS

STUCK IN MY HEAD
VR EXPERIENCE
Written by

Carlos Rodríguez Rodríguez

STUCK IN MY HEAD

VR EXPERIENCE FOR OCULUS QUEST

SC1

INT. DARK

UNITY, TITLE LOGOS

                                                FADE IN

We are in a big dark space with floating spheres dimly lit,
like PIXAR'S Inside Out Memories.

MUSIC: Soft warm analog synth pads

We hear snoring sounds from outside

                                        WE CAN LOOK
                                        AROUND FREELY

                        VOICE OF CONSCIENCE
                              (MAN)
                        I'm sleeping so well tonight.
                        What will my imagination dream
                        tonight?

We hear different spatialized sounds and a simple
illustration accompanies each of them

1 A motorbike.

                              (MAN) (cont'd)
                        I could be a motorbike world champion

2 howling snowy wind

                              (MAN) (cont'd)
                        or an adventurer conquering a summit

3. Calm beach sounds

                         (MAN) (cont'd)
               or just relax by the water in a
               tropical paradise...

We hear a dreamy WOMAN Voice singing

                         (MAN) (cont'd)
               I am dreaming about her again. That
               melody is completely stuck in my
               head. I can't stop thinking about
               her. She even sent me a voice audio
               with that melody the other day...

You have a cellphone, that if you grab reproduces audio
message

Spheres descend to eye level. You can approach them, and and
if you touch them each will play a note.

Audio MEMORY GAME

Each of the spheres plays a note when grabbed, corresponding
to one of the notes in the melody.

The player has a cellphone that when grabbed plays the full
melody, as a hint to play the memory game

PLAY THE MELODY CORRECTLY and the narrative scenes will
trigger.

We enter a 360 video scene

1.Person

INT. DAY

The protagonist is working at a desk and grabs the phone to
play the message.

                    PROTAGONIST
          She sings so beatifully...(sigh)

2. Person

EXT. DAY

At the park, the protagonist meets with a friend. They sit
in a bench by the park.

                    PROTAGONIST
          I can't stop thinking about her.
          All day, everyday... And her voice.

                    FRIEND
          You need to tell her something.
          Tell her how you feel. You can't keep
          going like this...

                    PROTAGONIST
          You are right, you are right, I just
          don't have the courage...

3. Person

INT. NIGHT

The protagonist is in bed, checking the phone. He listens
again to the song audio.

He turns on the light, stands up and calls her.

                    PROTAGONIST
          Hey how are you! Yes, I know it is
          late but I can't sleep, and I need to
          tell you something. Look...

FADE OUT

Back in the dream realm

                         PROTAGONIST (cont'd)
                Well, looks like today I'll be able
                to sleep.

You can grab an object, to trigger sleeping.

Music plays with her voice.

                        END CREDITS