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Institute of Computer Science
Computer Science Curriculum

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Enhancing the virtual reality experience
Psyrreal
Bachelor's Thesis (9 ECTS)

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Enhancing the virtual reality experience Psyrrreal

Abstract:

This bachelor's thesis focuses on enhancing the user interface of the psychedelic virtual reality application Psyrrreal to improve its usability in therapeutic contexts. A new intuitive menu system and visual effects were integrated based on feedback from Psyrrreal's beta testing. Customizable scenes, developed using Unreal Engine 5.3.2, support the psychedelic experience. Usability testing confirmed that the improved interface is intuitive for novices and aligns with therapeutic goals.

Keywords: virtual reality, Unreal Engine 5, user interface, psychedelic therapy

CERCS: P170, computer science, numerical analysis, systems, control

Virtuaalreaalsuse kogemuse Psyrrreal täiustamine

Lühikokkuvõte:

Käesolev bakalaureusetöö keskendub psühhedeelse virtuaalreaalsuse rakenduse Psyrrreal kasutajaliidese täiustamisele, et parandada selle kasutatavust teraapilistes kontekstides. Uus intuitiivne menüüsüsteem ja visuaalsed efektid integreeriti, lähtudes Psyrrreali beta testimise tagasisidest. Unreal Engine 5.3.2 abil loodi kohandatavad stseenid, mis toetavad psühhedeelset kogemust. Kasutatavustestid kinnitasid, et täiustatud liides on algajatele intuitiivne ja toetab teraapilist eesmärki.

Võtmesõnad: virtuaalreaalsus, Unreal Engine 5, kasutajaliides, psühhedeelne teraapia

CERCS: P170 Arvutiteadus, arvutusmeetodid, süsteemid, juhtimine (automaatjuhtimisteooria)

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1. Introduction

Virtual reality (VR) has evolved rapidly in recent years, moving beyond the boundaries of entertainment into fields such as mental health. One emerging direction involves mimicking the sensory and emotional characteristics of psychedelic experiences, which have been associated with therapeutic potential in recent clinical research [1]. This thesis focuses on the design and development of Psyrrreal, a VR experience that draws on psychedelic aesthetics and principles to offer users a personalized and exploratory digital environment.

The motivation for this project stems from the growing relevance of non-pharmacological interventions in mental health and the opportunity to explore how virtual environments can induce similar psychological responses. Psyrrreal represents a novel application of VR where the user is invited to navigate visually intense scenes while adjusting various parameters to shape the experience. The need for a carefully designed interface arises from the challenge of presenting complex visual effects in a way that remains accessible, especially for users unfamiliar with VR systems.

The aim of the thesis is to enhance Psyrrreal's user interface and interaction model, improve scene-specific visual effects, and ensure a comfortable experience for first-time users. This involves both the visual design of menus and feedback systems as well as the technical implementation of user interactions and material-based visual effects in Unreal Engine 5.3.2.

The core research problem addressed in this thesis is how to design a VR interface that balances accessibility with visual complexity in a context inspired by psychedelic therapy. The central research question investigates how visual effects and interaction mechanisms can be implemented to ensure a compelling yet navigable experience for users unfamiliar with VR. Psyrrreal itself serves as the object of study, offering a contained environment for experimenting with these design challenges.

The structure of the thesis begins with a theoretical overview of relevant research, followed by a chapter focused on visual and interface design decisions for the application. This is followed by an implementation chapter detailing the technical steps taken to realize the project, including interaction logic and the creation of three visual scenes: Tunnel, Grid, and Coloured Edges. A dedicated chapter presents the findings from the usability testing with three participants and reflects on their feedback.

The appendix contains a visual overview of the application's user interface design through annotated screenshots, providing context for visual and structural decisions made during development.

This thesis has been formatted and linguistically refined with the assistance of ChatGPT-4o, to support clarity and readability.

2. Background

With the resurgence of psychedelic research and the rapid advancement of virtual reality (VR) technologies, a new frontier in mental health treatment is emerging [1]. This chapter explores the intersection of these fields, particularly in the context of Psyrrreal, a VR system designed to simulate psychedelic experiences for therapeutic purposes.

The chapter is structured into four sections. Subchapter 2.1 examines the therapeutic potential of psychedelics, emphasizing their role in mental health treatment. Subchapter 2.2 discusses the applications of virtual reality in therapy, particularly its immersive capabilities and potential for simulating altered states. Subchapter 2.3 introduces the Psyrrreal concept, explaining how it integrates psychedelic-like visuals and VR to create a controlled and customizable therapeutic experience. Finally, Subchapter 2.4 discusses user feedback gathered during Psyrrreal beta testing, showing how clear and accessible UI design can improve engagement and usability in VR.

2.1 Therapeutic Benefits of Psychedelics

Drawing on Stringer comprehensive analysis [2], the exploration of psychedelics as therapeutic agents has grown significantly over the past two decades, driven by their potential to address various mental health conditions that often remain resistant to conventional treatments. As discussed in the same analysis, individuals diagnosed with disorders such as post-traumatic stress disorder (PTSD), major depressive disorder (MDD), or substance use disorders continue to struggle despite available pharmacological and psychotherapeutic interventions. In response to these challenges, Stringer [2] highlights that psychedelics such as psilocybin have emerged as promising alternatives, offering unique mechanisms of action and rapid therapeutic effects.

The following discussion on the therapeutic benefits of psychedelics is derived from Tupper et al.'s article [1]. The resurgence of psychedelic research has demonstrated the therapeutic potential of these substances when used in carefully controlled and clinically supervised settings. Unlike conventional treatments, which may require prolonged use, psychedelics often produce lasting effects after just one or two guided sessions. Substances such as psilocybin and MDMA, administered under professional supervision, have shown promise in addressing complex mental health conditions.

As explained by Tupper et al. [1], one of the key mechanisms behind the efficacy of psychedelics lies in their ability to facilitate deep psychological experiences that foster emotional processing, personal insight, and psychological reconnection. These outcomes, they argue, are highly

dependent on the interaction of three factors: the patient's mindset before the session, the therapeutic environment, and the strength of the therapeutic relationship. According to this study, this triad ensures that insights gained during the psychedelic experience are integrated into the patient's broader therapeutic journey, increasing the likelihood of sustained psychological benefits.

Tupper et al. [1] provide clinical evidence indicating the efficacy of psychedelics in the treatment of a variety of mental health issues. The authors report that preliminary studies have shown positive responses to psychedelic treatments in cases of anxiety, depression, post-traumatic stress disorder (PTSD), and addiction. They note, for example, psilocybin-assisted therapy has been linked to substantial reductions in depressive symptoms, particularly for patients with treatment-resistant depression and end-of-life anxiety. Similarly, the authors report that MDMA-assisted therapy has demonstrated efficacy in alleviating PTSD symptoms, with patients reporting improved emotional regulation and reduced trauma-related distress.

The safety profile of psychedelics, as discussed by Tupper et al. [1], is generally favorable when used within structured clinical protocols, with reported side effects such as short-lived anxiety or minor physiological responses like elevated heart rate typically being mild and manageable. The authors note that more serious complications, such as Hallucinogen Persisting Perception Disorder (HPPD), remain rare in clinical contexts, especially compared to the higher risks observed in unsupervised, recreational use.

Finally, Tupper et al. [1] suggest that psychedelics may represent a paradigm shift in mental health treatment. The authors argue that their reintegration into modern clinical practice is supported by emerging ethical frameworks, methodological rigor, and ongoing regulatory evolution. They further anticipate that continued advancements, including optimized treatment protocols and improved accessibility, will strengthen the role of psychedelics in managing complex psychological disorders.

2.2 Virtual Reality in Therapeutic Applications

This subchapter is referenced from the article "The use of virtual reality technology in the treatment of anxiety and other psychiatric disorders" [3].

Virtual Reality (VR) technology has become a transformative tool in therapeutic applications, providing immersive, controlled environments that enhance the delivery of psychiatric treatments. By leveraging head-mounted displays and specialized interface devices, VR enables users to

experience computer-generated three-dimensional settings with a strong sense of presence and interactivity. These systems track head movements, adjusting the virtual environment in real time to create a seamless and natural experience.

One of the primary advantages of VR in therapy is its ability to create highly customizable and replicable scenarios. Unlike traditional exposure methods, VR does not rely on a patient's ability to vividly imagine feared stimuli, making it more accessible for individuals who struggle with visualization. It also reduces logistical challenges, as virtual environments like airplane cabins or combat zones can be simulated without the cost, risk, or impracticality of real-world exposures. Additionally, therapists can precisely control variables such as the intensity, duration, or specific triggers within the virtual environment to match the unique needs of each patient. VR also provides a more private alternative to real-world scenarios, helping to maintain patient confidentiality.

Patient satisfaction with VR-based therapy is consistently high, with many studies indicating that VR is as effective as, and sometimes preferred over, traditional methods. For example, refusal rates for VR exposure therapy are significantly lower than for in vivo exposure, suggesting that VR helps address some common barriers to treatment. However, certain challenges remain. High initial costs, occasional technical issues, and the need for specialized training can limit the accessibility of VR therapy in clinical settings. Nevertheless, advancements in affordable, user-friendly VR systems, including smartphone-based platforms, are making the technology more widely available.

As VR technology advances, its therapeutic potential continues to expand. Future developments may include integrating biometric feedback, enhancing sensory stimulation, and refining AI-driven interactive environments to personalize treatment.

2.3 The Psyrrreal concept

Building on these insights, Psyrrreal was conceptualized as a virtual reality platform designed to replicate the phenomenological components of psychedelic experiences [4]. Psyrrreal creates an immersive experience by simulating visual, auditory, and spatial phenomena often described by individuals under the influence of psychedelics (Figure 1) [5].

As described by Vasser et al. [5], the Psyrrreal experience was implemented as part of an augmented therapy intervention for people experiencing mild to moderate depressive symptoms. This intervention combined the virtual reality experience with psychological support to facilitate

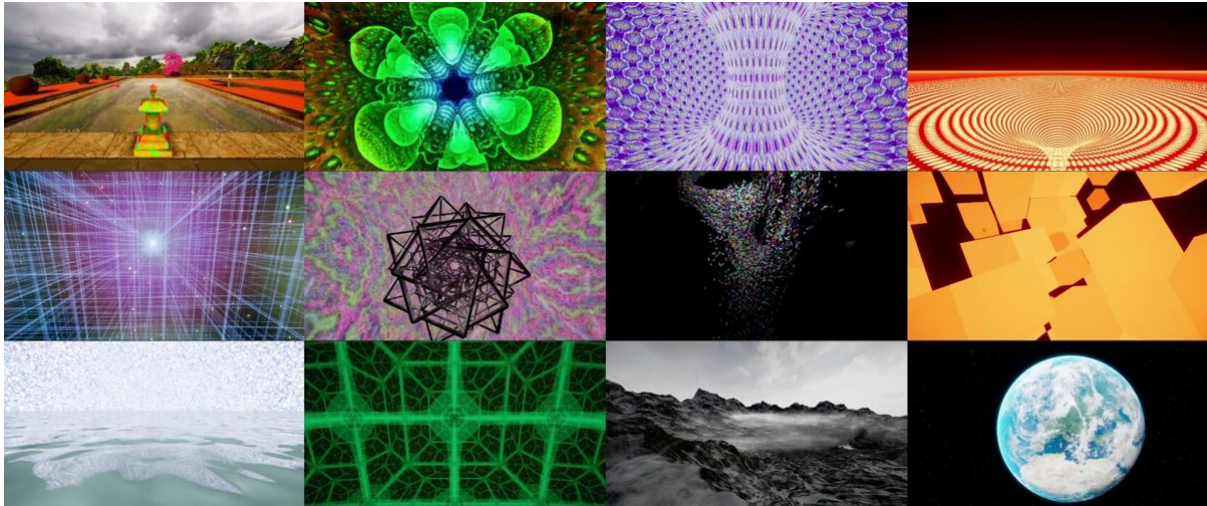


Figure 1. Different visuals of Psyrréal [4].

emotional processing and insight. In an open-label feasibility study conducted by the authors, participants underwent Psyrréal sessions over two days, with follow-up evaluations conducted two weeks later. Preliminary results demonstrated significant reductions in depressive symptoms, suggesting that Psyrréal has the potential to replicate some of the therapeutic benefits traditionally associated with psychedelic substances.

Vasser et al. [5] further explain that Psyrréal seeks to bridge the gap between the recognized benefits of psychedelic therapy and its current limitations, such as legal barriers, accessibility challenges, and safety concerns. As noted in article, by leveraging the capabilities of virtual reality technology, Psyrréal offers a novel and scalable approach to exploring the therapeutic mechanisms of altered states of consciousness. According to the authors, its potential applications extend beyond mental health treatment to areas such as meditation, personal growth, and overall well-being.

2.4 User feedback

Through Psyrréal's beta testing, user feedback was collected to evaluate the VR experience's performance and usability. A thorough analysis of user feedback allows identification of critical features requested by users, as well as bugs and imbalances within the VR experience [6].

Specifically, the feedback highlights several UI and UX shortcomings that impact the overall accessibility and immersion of the experience. A major issue is the lack of clear onboarding and exit cues, leaving users unsure when the experience has officially begun or ended. Implementing a guided introduction, with subtle visual or auditory signals, would help users transition smoothly

into and out of the experience. Another area for improvement is user control and customization. Many users expressed a desire to adjust the length of the experience, revisit specific segments, or choose different audio options.

To address these gaps, the UI should prioritize intuitive navigation, responsive feedback mechanisms, and greater user agency. By refining onboarding, interaction guidance, and personalization features, the experience would become not only more engaging but also more accessible, seamless, and compelling for repeated use.

3. Design

This chapter presents the design approach together with the reasoning behind the developed user interface and interaction system for the Psyrréal. The goal involved designing an easy-to-use interface that provided comfortable access for users through VR controllers while addressing the current version's restrictions.

The chapter is structured into five sections. Subchapter 3.1 examines key considerations for VR user interface design, including the limitations of traditional UI, effective interaction principles, and cognitive aspects of spatial design. Subchapter 3.2 reviews the initial Psyrréal interface, highlighting its reliance on minimal controller inputs and associated usability issues. Subchapter 3.3 draws inspiration from existing VR applications, analyzing their interface designs to inform Psyrréal's development. Subchapter 3.4 details the iterative design process, incorporating supervisor feedback and best practices to create a new menu system. Finally, Subchapter 3.5 describes the UI prototyping phase using Figma, which laid the groundwork for the implemented interface.

3.1 Design Considerations for VR UIs

Advancing VR technologies and growing use cases across entertainment, education, and culture highlight the need for thoughtful user interface design that supports immersion, interaction, and usability across different levels of virtual reality systems [7].

3.1.1 The Incompatibility of Traditional UI with VR Displays

This subchapter is referenced from the book "Unreal Engine VR Cookbook: Developing Virtual Reality with UE4" [8].

Drawing on McCaffrey's analysis of VR user interfaces, the following discussion examines the challenges associated with head-locked UI elements in virtual reality environments. In standard 2D games, it is common to use head-locked UI elements, which are interfaces that move along with the player's in-game camera or head. While this approach functions well on flat screens, it becomes problematic when transferred to VR environments.

McCaffrey highlights the issue of orthographic projection in the context of head-locked UIs for VR. One significant challenge is the reliance of these interfaces on orthographic projection to remain sharp and legible. In traditional games, this method allows the UI to overlay other visual elements without interacting with the 3D world. However, in VR, orthographically projected

elements appear as though they are positioned at an infinite distance. This creates a visual inconsistency, as objects that should appear closer are rendered behind something the brain perceives as far away. The result can be disorienting and uncomfortable for the user.

Additional insights from McCaffrey address the limitations introduced by the display characteristics of VR headsets. The lenses in modern head-mounted displays are optimized for visual clarity at the center of the user's field of view. As interface elements shift toward the periphery of the display, their clarity diminishes. This reduces the legibility and usability of UI components placed near the edges of the user's vision. Moreover, individual differences in eye relief, meaning the distance between a user's eyes and the headset lenses, can exacerbate the problem. Elements that appear clear to one user might be blurry or entirely obscured for another.

3.1.2 Principles for Designing Effective VR Interaction Interfaces

Drawing on Meng-Xi et al.'s article on human-centered VR interface design [7], this discussion explores how cognitive processes, emotional engagement, and multimodal interactions can enhance virtual reality experiences. Effective VR interface design can be advanced through several key approaches. First, cognitive load theory can be applied to minimize unnecessary mental effort while promoting meaningful cognitive engagement, thereby creating interfaces that reduce the cognitive demands of navigating virtual environments. Design principles such as alignment and consistency further support user comprehension and interaction. Second, fostering user engagement and emotional connection is critical, achieved by sparking curiosity and immersion through narrative elements, gamified features, and social interactions, complemented by multisensory inputs like visual, auditory, and haptic feedback. Third, prioritizing intuitive controls, responsive feedback, and adaptive designs tailored to user preferences and behaviors enhances satisfaction and usability within virtual environments. By embedding these principles into VR interface design and iteratively refining based on user feedback, more intuitive and engaging experiences can be created, broadening the applicability of VR in education, entertainment, and professional contexts.

3.1.3 Cognitive Principles in Spatial UI Design

Guided by Jerald insights into cognitive principles for spatial UI design [9], this subchapter explores the roles of proximity and similarity in immersive virtual reality interfaces.

To create effective spatial UI designs, it is essential to incorporate cognitive principles that influence how users process and interpret visual information within immersive environments. According to the principle of proximity, elements that are positioned close to each other are

naturally perceived as part of the same group or shape, even if they differ significantly in form, size, or type (Figure 2). This concept is also highly relevant in the design of graphical user interfaces.

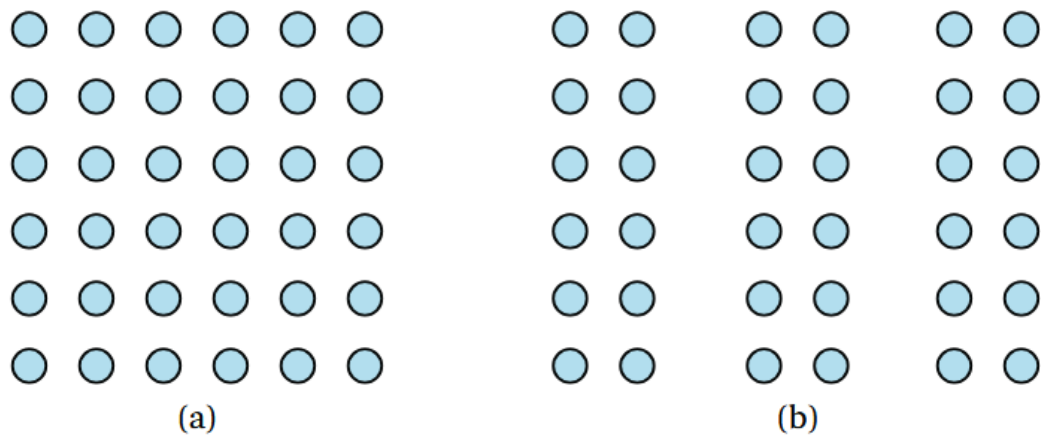


Figure 2. The principle of proximity [9].

In a similar way, the principle of similarity suggests that items sharing visual characteristics such as shape, color, size, or brightness are interpreted as belonging together (Figure 3). This principle supports the organization of visual information both in complex scenes that resemble the real world and in more abstract compositions.

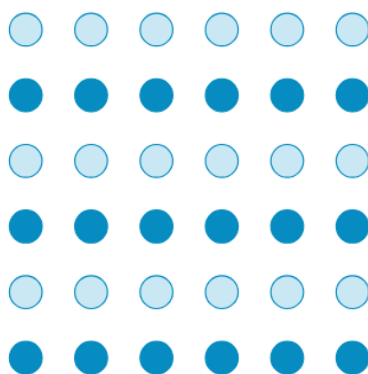


Figure 3. The principle of similarity [9].

3.2 Initial User Interface and Interactions

As outlined in Chapter 2.4, beta testing of the Psyrrreal prototype revealed several usability challenges related to the initial interface design. The previous version of Psyrrreal operated with a basic user interface which depended solely on controller inputs while showing no virtual

environment interface or menu elements. The entire experience functioned through VR controller button inputs without any visual feedback or on-screen guidance. The available controls were as follows:

- Right trigger – Initiates the experience in passthrough mode, accompanied by a gong sound.
- A button (hold) – Activates fast forward.
- B button (toggle) – Pauses and resumes the experience.
- Right joystick click (toggle) – Toggles the volume between normal and muted.

The functional interaction worked but the experience needed both a menu system and an in-experience user interface. Users experienced difficulties navigating the experience because they were unable to recognize the available controls. The absence of structure in the interface demonstrated the requirement for a dedicated VR menu during later development stages.

3.3 Inspiration

While foundational design principles offer valuable guidance, examining how these ideas are applied in real-world VR applications provides further insight. By analyzing the user interfaces of existing VR games and experiences, we can identify best practices and innovative solutions that address the unique challenges of immersive environments.

3.3.1 Beat Saber

The interface of Beat Saber stands out because of its clarity and its background design which is compelling (Figure 4). The cosmic environment with stars and abstract light creates a sense of depth and atmosphere which enhances the overall experience without distracting from the UI elements. This inspired the background direction for the Psyrréal main menu. Instead of a starfield, I aim for a psychedelic visual style—vibrant colors, flowing patterns, and dynamic effects that reflect the mood and interaction within the space. Like Beat Saber, the goal is to maintain immersion while supporting usability, using the background as a thematic and emotional anchor for the interface.

3.3.2 Moss

The main menu of the VR game Moss shows a clean and minimalistic UI approach (Figure 5). The vertical layout with buttons stacked clearly beneath one another makes for an intuitive and easy to navigate experience. What stood out is the lack of overly flashy visuals or complex



Figure 4. Beat Saber options tab [10].



Figure 5. Moss main menu [11].

interactions—just a straightforward design that supports engagement without distraction. This influenced the menu design approach for Psyrréal. Since the functionality of the application is relatively limited, there is no need for a highly dynamic or layered menu. A simple, focused layout helps to maintain clarity and keeps the user experience seamless and accessible.

3.3.3 Gal Gun 2

While structurally similar to Moss, the main menu in Gal Gun 2 stands out for its use of animations and visual effects that make the interface feel more dynamic and engaging (Figure 6). These subtle movements and transitions add a layer of personality to the experience without overwhelming the user. For Psyrréal, this kind of animated menu style is particularly fitting. Given the psychedelic and immersive nature of the experience, incorporating motion and visual effects helps set the tone and draw users into the atmosphere right from the start.

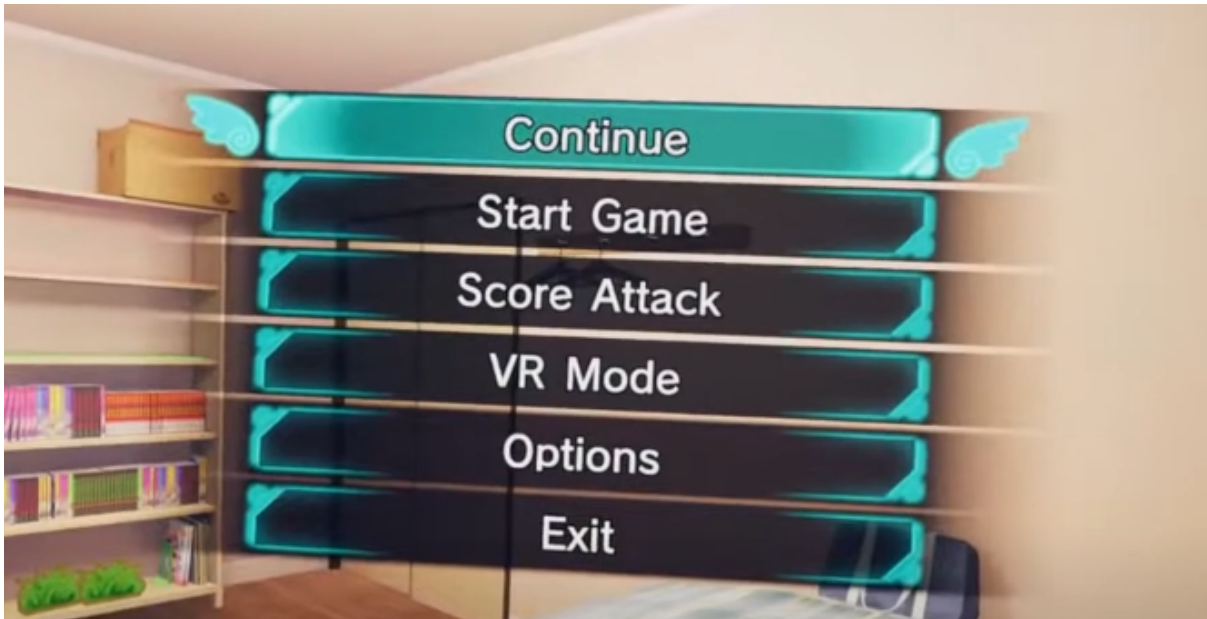


Figure 6. Gal Gun 2 main menu [12].

3.4 Design Process

The development of a new menu system occurred because the initial user interface failed to provide necessary interactivity and clarity which users needed to fully experience the interface. Users faced difficulties navigating the experience because the first interface depended on minimal controller inputs which did not show any feedback or direction about available controls. The design process aimed to build an accessible menu system which provided visual feedback while being aesthetically pleasing to enhance user experience.

My supervisor started the design process by giving specific instructions that included a list of essential features and elements to implement. The main objective was to create a scene selection mechanism which would enable users to select different experiences. The most crucial scenes received immediate attention during the prioritization process. The "Full trip" scene emerged as the main experience among other options. The core experience included several extra features including real-time adjustments for effect intensity settings.

UI required additional content to enable users to experience scenes independently from time limitations while enjoying an extended continuous experience. Scenes Tunnel, Grid and Coloured Edges would benefit from background music that continues to play in loops to create deeper immersion. Users could personalize their experience in visually dynamic sections through options for modifying color palettes and visual effect intensity levels. For example users could modify the "Tunnel" experience by adjusting tunnel dimensions and texture speed.

The visual design plays an essential role in sustaining the psychedelic aesthetic of the experience alongside these functional elements. The user interface needed to match the overall theme so there was need to add visual elements which were easy to navigate while supporting the abstract and immersive nature of the experience. I implemented multiple changes to the design after receiving feedback from my supervisor and my personal observations which resulted in a user-friendly and immersive final product. The system aimed to provide users with interaction capabilities beyond basic usage while simultaneously deepening their experience engagement.

3.5 UI Prototyping in Figma

Before beginning implementation in Unreal Engine, I used Figma to design and prototype the core user interface elements for the virtual reality experience (Figure 7). Figma is a flexible and collaborative UI design tool that allowed me to experiment efficiently with layouts, visual structure, and the overall flow of the menu system. This early design phase helped define the positioning and logical grouping of interface elements in a clear and consistent manner. The goal was to create a visual guide for how the interface might appear and function from a user's perspective within virtual reality.

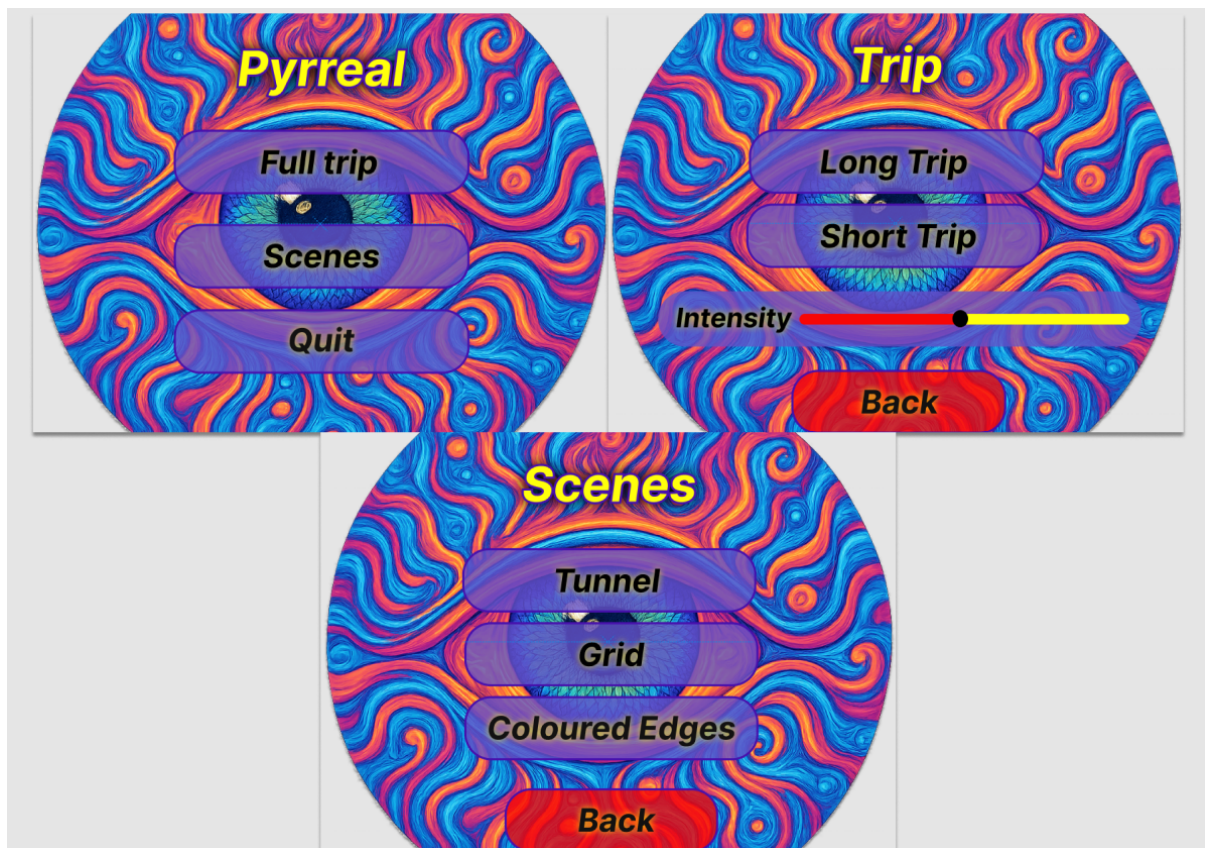


Figure 7. Figma Main Menu Designs.

At this stage of development, the focus was specifically on layout and interface hierarchy. Visual effects, animations, and interactive behaviors were not yet considered. These elements were explored and integrated later within Unreal Engine after the static design was established.

The Figma prototypes served as a useful reference throughout the development process. While certain adjustments were necessary during the transition to virtual reality, beginning with a structured design helped streamline development and maintain visual consistency across the interface.

It is important to note that this design process was limited to the main menu. No Figma-based designs were created for the in-experience menu, as that part of the interface was developed iteratively during implementation. It was shaped by insights gained from the main menu and adjusted to meet the specific requirements of in-world interaction. The main menu served as the primary case study for applying formal user interface design principles.

4. Implementation

This chapter outlines the practical steps taken to develop the virtual reality experience using Unreal Engine, with a focus on creating an interactive and visually engaging user interface for the Meta Quest 3. Building on the design concepts, UI principles, and theoretical groundwork established earlier, this phase focuses on turning those ideas into a working system tailored for immersive VR.

The chapter is structured into five sections. Subchapter 4.1 describes the setup of the development environment for VR deployment using Unreal Engine 5.3.2, addressing configuration challenges. Subchapter 4.2 outlines the creation of a prototype project for menu development, establishing the foundation for UI spatial behavior. Subchapter 4.3 explains the implementation of UI interactions, detailing the use of Unreal Engine's Blueprint system for seamless navigation and input handling. Subchapter 4.4 covers the integration of visual effects, including tunnel animations and interactive button feedback, to enhance immersion. Finally, Subchapter 4.5 discusses the development of customizable VR scenes, designed to replicate psychedelic experiences based on user feedback.

4.1 Project Setup for VR Development on Quest 3

Setting up a development environment for VR on the Meta Quest 3 using Unreal Engine 5.3.2 required coordinating several tools, SDKs, and plugins. The process involved installing Android Studio, Java Development Kit version 17, the Meta Quest Developer Hub, and manually integrating Meta's XR plugins into the Unreal project. To complete the setup and ensure compatibility, it was necessary to follow and complete the tutorial "Unreal Engine 5.3.2 for Meta Quest VR", which provided essential guidance for configuring both the engine and the headset for VR development (Figure 8).

Although setup guides are available, even small configuration errors such as selecting the wrong Android SDK version or placing plugin folders in the wrong location can cause frustrating issues. Several problems arose during setup, including Unreal not recognizing the Android toolchain or failing to build without providing clear error messages. At times, it seemed like everything had been installed correctly, yet something minor such as skipping a system reboot or setting an incorrect environment variable prevented progress.

Despite these challenges, the environment was eventually prepared for building and deploying VR projects to the Quest 3. Careful attention to plugin integration, Android platform settings, and

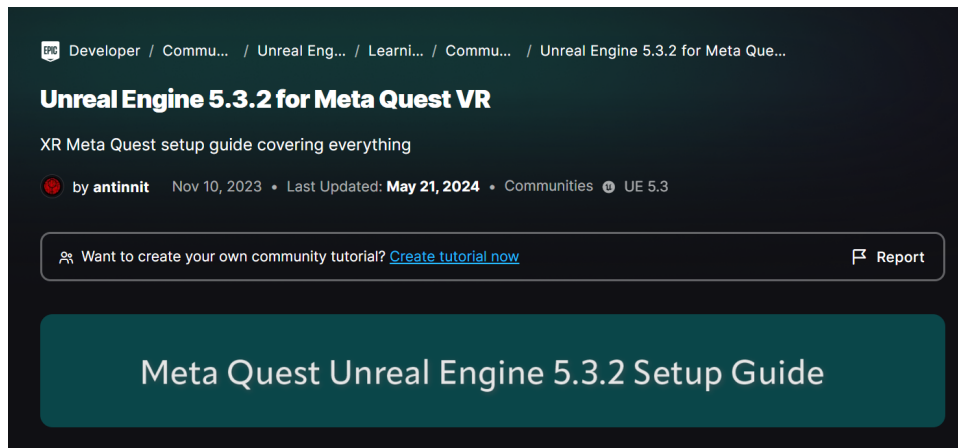


Figure 8. Meta Quest Unreal Engine 5.3.2 Setup Guide.

consistent versions of the required tools proved essential to achieving a working development pipeline.

4.2 Creating a Prototype Project for Menu Development

As someone new to Unreal Engine, the initial phase of development required a considerable amount of exploration and learning. I spent time understanding how to navigate the engine, how user interface elements are created, and how to use Blueprints, which is Unreal's visual scripting language that enables the creation of game logic without traditional coding. This learning process was guided primarily by community-driven content, particularly YouTube tutorials, which helped bridge the gap between theory and practical application.

With a better grasp of the engine, I turned my attention to prototyping the user interface based on my existing Figma designs. I made slight modifications to these designs to better suit the three-dimensional environment and began constructing a basic, non-interactable version of the menu inside a new Unreal project. The goal of this prototype was to visualize how the user interface would appear and behave in virtual reality, focusing first on placement and movement rather than functionality.

To create a menu that stays in front of the user's eyes and moves with their head, I implemented the logic in the VRPawn to spawn an Actor Blueprint that holds the UMG widget. The VRPawn is the default player character in Unreal's VRTemplate, which is a project template provided by Unreal Engine that includes core components necessary for virtual reality development, such as camera tracking, motion controller support, and input handling. I modified the VRPawn to spawn an Actor Blueprint containing the UMG (Unreal Motion Graphics) widget and implemented a

function within the Actor that continuously updates the widget’s position and rotation to match the player’s camera (Figure 9). This ensures the UI remains anchored in front of the user’s view, resulting in a foundational virtual reality experience.

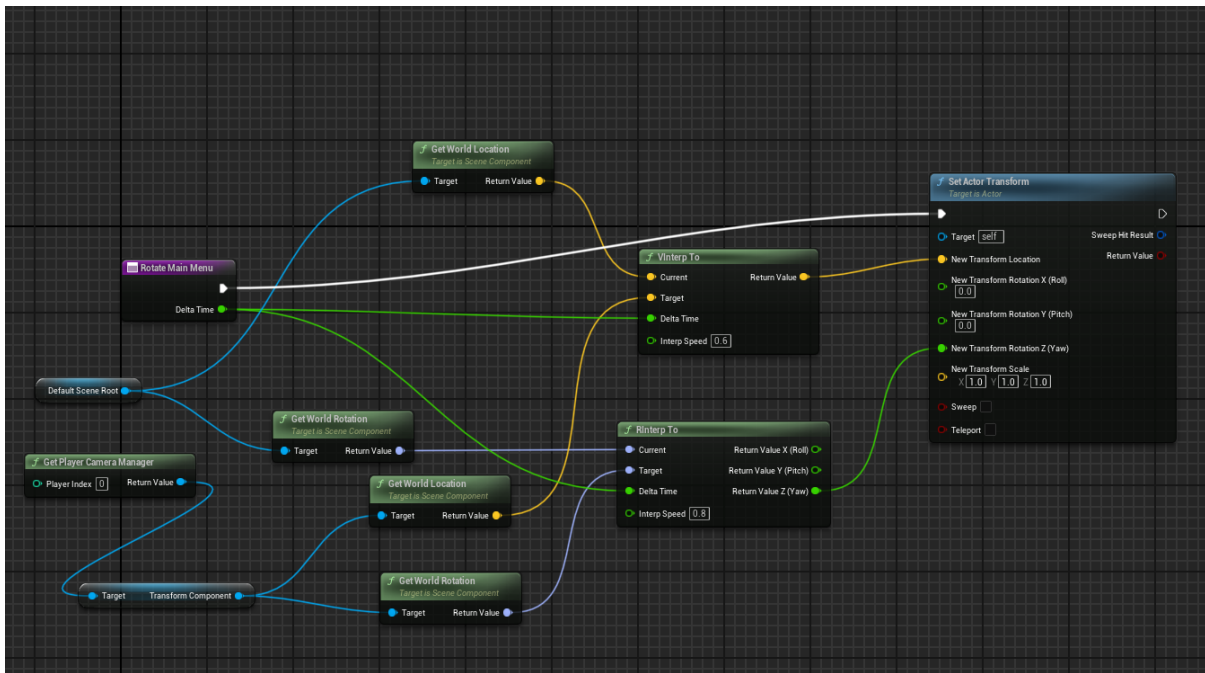


Figure 9. Rotate function inside VRPawn.

The outcome of this phase was a foundational virtual reality experience. When the user launched the level, the menu interface would automatically appear directly in front of their eyes and track their gaze as they moved their head. While this prototype did not include interaction, it successfully established the spatial behavior of the menu, which was an essential step toward building a functional and comfortable virtual reality interface.

4.3 Implementing UI Interactions

Implementing user interface interactions in Psyrréal involved designing a structured system that would allow seamless navigation, level transitions, and input responsiveness within a virtual reality environment. The system was built using Unreal Engine’s Blueprint visual scripting tools along with the UMG to create interactive menus suited for VR use.

At the foundation of the main menu structure was a Blueprint called MasterWidget class, which was responsible for managing the transition between different UI screens. Each screen, such as scene selection or trip selection, was created as an independent Widget Blueprint. The MasterWidget contained logic that determined which widget should be active based on user input (Figure 10). When a user pressed a button, the system would hide the current widget

and display the next one. This modular architecture helped keep the UI logic organized while supporting extensibility as the interface developed further.

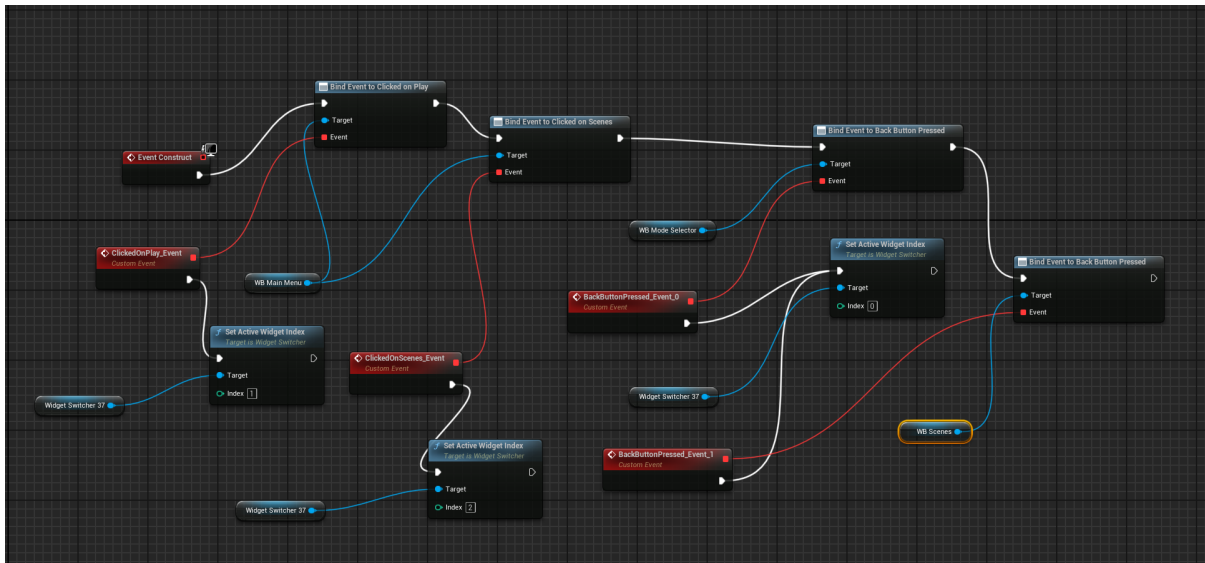


Figure 10. Master Widget event graph.

To allow users to move from the menu to a specific scene, each scene button included logic to load the corresponding level. For example, pressing the "Grid" button in the scene selection menu would trigger a Blueprint function that called the appropriate level by name. This ensured that the UI could directly serve as the launch point for the different virtual scenes.

Displaying the menu inside the VR headset required consideration for spatial positioning and user visibility. As mentioned before menu widgets were rendered using UMG and displayed through an Actor Blueprint that contained a Widget Component. All UI related logic and components, including the UMG based menu widgets rendered through a Widget Component inside an Actor Blueprint, were associated with the VRPawn in the main menu level and with the MyPlayerPawn in the experiential levels (Figure 11). When a level started, the correct pawn spawned and displayed the corresponding UI component directly in front of the user's view. This placement allowed the interface to remain comfortably accessible while preserving freedom of movement.

Input interaction was handled through Unreal Engine's Enhanced Input System, which provided a way to bind VR controller buttons to interface-related actions. For instance, one key function allowed the user to bring up or dismiss the in-experience menu. When the relevant button on the controller was pressed, Blueprint logic executed a check to either create the UI widget in the user's field of view or remove it. Additional safeguards were implemented to ensure that only one instance of the menu could be active at a time, avoiding unexpected behavior.



Figure 11. Player Pawn and UI system flow.

4.4 Integrating Visual and Audio Effects

The integration of visual and audio effects in virtual reality environments is pivotal in enhancing user engagement and immersion. In the Psyrrreal project, both visual and auditory elements were strategically implemented to create an engaging environment and enrich user interface (UI) interactions. This section explores the implementation of various visual effects and audio components in the main menu and in-experience UI, focusing on materials, animations, particle systems, and custom soundscapes, as well as their integration into the overall user experience.

4.4.1 Tunnel Effect in Main Menu

In the main menu level, the surrounding environment was designed to be visually striking and immersive. To achieve a psychedelic atmosphere, a tunnel-like effect was created using a Static Mesh Actor with a custom material applied to it. The material was designed to mimic the dynamic, rotating visual effect of a tunnel, similar to the tunnel scene but implemented differently to suit the menu's needs. By manipulating the material properties, including texture scrolling and transparency, the result was a convincing tunnel effect that enveloped the player as they began the level, providing a sense of being inside a psychedelic space (Figure 12). This effect was crucial in setting the tone for the user experience right from the moment they interacted with the menu, enhancing the overall atmosphere and supporting the immersive nature of the application.

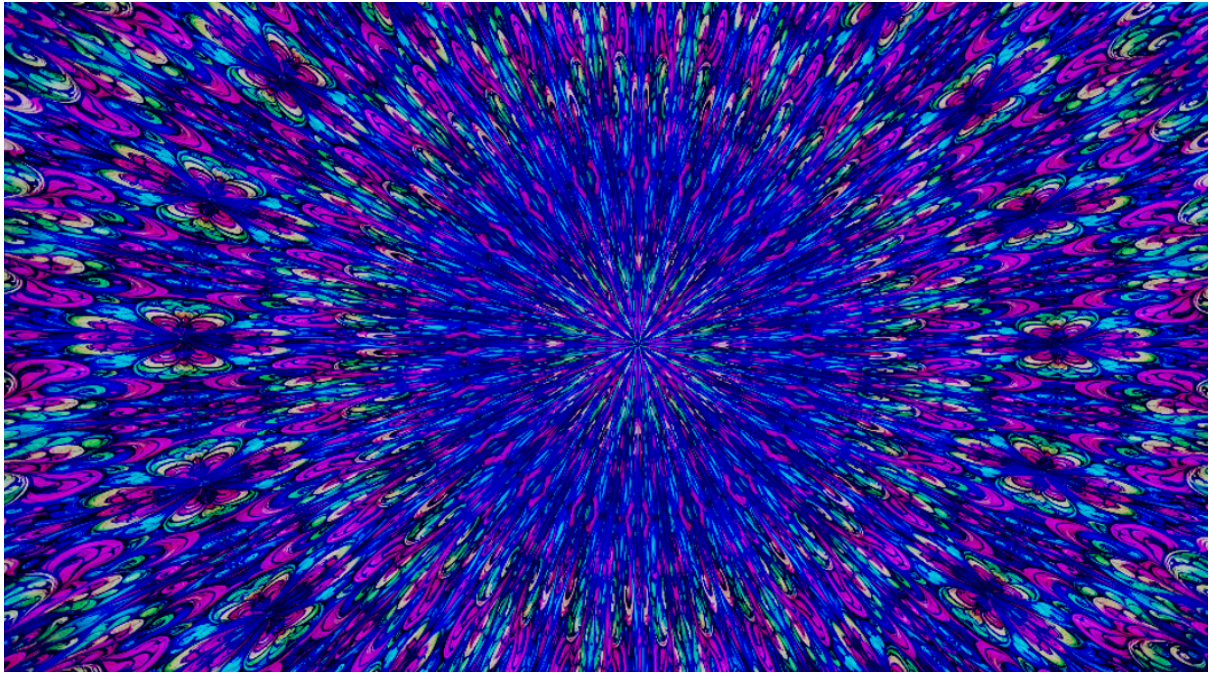


Figure 12. Tunnel effect in main menu.

4.4.2 Psychedelic Eye Animation for the Menu

The menu itself featured a psychedelic eye as its central visual element. To create this effect, images were imported into the Psyrrreal project and used to generate a 2D texture array, which was then utilized to construct a material. The material blueprint contained logic that allowed the eye to animate, functioning similarly to an animated GIF. This animation was applied to a UI image element, resulting in the eye blinking periodically, adding a dynamic visual effect that reinforced the psychedelic theme of the project. The eye's blinking motion not only contributed to the overall aesthetic but also provided a visual focal point for users navigating the menu.

4.4.3 Interactive Button Effects

To enhance the interactivity of the buttons within the menu, Epic Games' UI Material Lab was leveraged to create animated button materials. The button material from the asset pack was customized to meet the specific needs of the project, adding animated effects that responded to user interactions. Additionally, the Free UI Soundpack was utilized to incorporate button-click sound effects, which provided auditory feedback, further enhancing the tactile experience for the user.

The text on the buttons was made visually appealing through a glowing effect, achieved by designing a custom material for the text. This material incorporated a glowing shader, which was

applied through Blueprints to dynamically adjust the text's glow intensity, making the buttons more engaging and visually striking.

Furthermore, when a user clicked a button and transitioned to a new menu page, a Niagara particle system was triggered to provide visual feedback. To achieve this, the Niagara UI Renderer asset from the Epic Games Marketplace was installed. This allowed for the direct rendering of Niagara particle systems within the UI. A custom Niagara system was created for the button press effect, which included a burst of particles that emitted when the user interacted with the button. This effect was designed to be subtle yet visually pleasing, enhancing the overall sense of interactivity.

4.4.4 In-Experience Menu

The in-experience menu was designed with similar visual effects to maintain consistency with the main menu while introducing subtle differences to create variety. Instead of the blinking psychedelic eye, a custom material with a waving psychedelic texture was used as the background for the in-experience menu. This texture animated with a waving motion, creating a fluid, dynamic environment that matched the immersive nature of the VR experience. The waving texture provided a sense of continuity, tying the visual aesthetic to the overall psychedelic theme while introducing a new visual movement.

Additionally, the color of the Niagara particle system effect was adjusted to better match the in-experience environment, offering a visual distinction between the menu and the active experience. These changes helped to maintain the cohesiveness of the experience, ensuring that the UI remained consistent in both design and functionality while still offering visually distinct moments for the user.

4.4.5 Audio Integration

To complement the visual effects and deepen the immersive experience, custom audio files were created for the main menu and each VR scene using Audacity. These tracks were edited from the original Psyrrreal audio file to align with the psychedelic theme, tailored to each scene's mood, and designed to loop seamlessly, supporting prolonged user engagement.

4.5 Creating VR Scenes Based on Psyrrreal Effects

Based on feedback gathered during the Psyrrreal beta testing phase, certain psychedelic effects stood out as favorites among users. This insight highlighted the need to create dedicated scenes that allow users to fully immerse themselves in these preferred visual experiences. The goal was

to design looping environments where users could remain for as long as they wished, with the ability to adjust the intensity of the effects in real time.

As a result, three unique VR scenes were developed: Tunnel, Grid, and Coloured Edges. Each scene draws inspiration from the most positively received effects and is designed to provide a customizable and repeatable experience. This approach enhances user engagement and offers more control over how the visual journey unfolds.

4.5.1 Tunnel

The Tunnel scene in Psyrréal is designed to provide users with a dynamic and customizable visual experience that reflects psychedelic aesthetics (Figure 13). This effect is presented as a tunnel-like visual overlay, positioned in front of the user's view, with several adjustable parameters that influence its appearance and intensity.

Users can modify the tunnel effect in real time through a set of in-game sliders that control the following attributes:

- **Transparency:** Adjusts how much of the physical world is visible behind the tunnel, allowing users to control the degree of visual blending between virtual and real environments.
- **Color Spectrum Overlay:** Activates a vivid, multicolored effect along the tunnel surface, contributing to the psychedelic character of the experience.
- **Texture Speed:** Controls the rotational velocity of the tunnel texture, affecting the perceived motion and energy of the scene.
- **Texture Selection:** Allows users to choose between different surface textures, each offering a distinct visual style and mood.

These parameters are implemented using a Material Parameter Collection (MPC) that communicates with the material applied to a static mesh component positioned under the camera component of the MyPlayerPawn. As users interact with the sliders, the associated MPC values are updated continuously, enabling smooth and immediate visual adjustments without requiring scene reloads or interruptions.

This scene exemplifies Psyrréal's approach to responsive visual design, where user control over aesthetic parameters plays a central role in shaping the virtual experience.

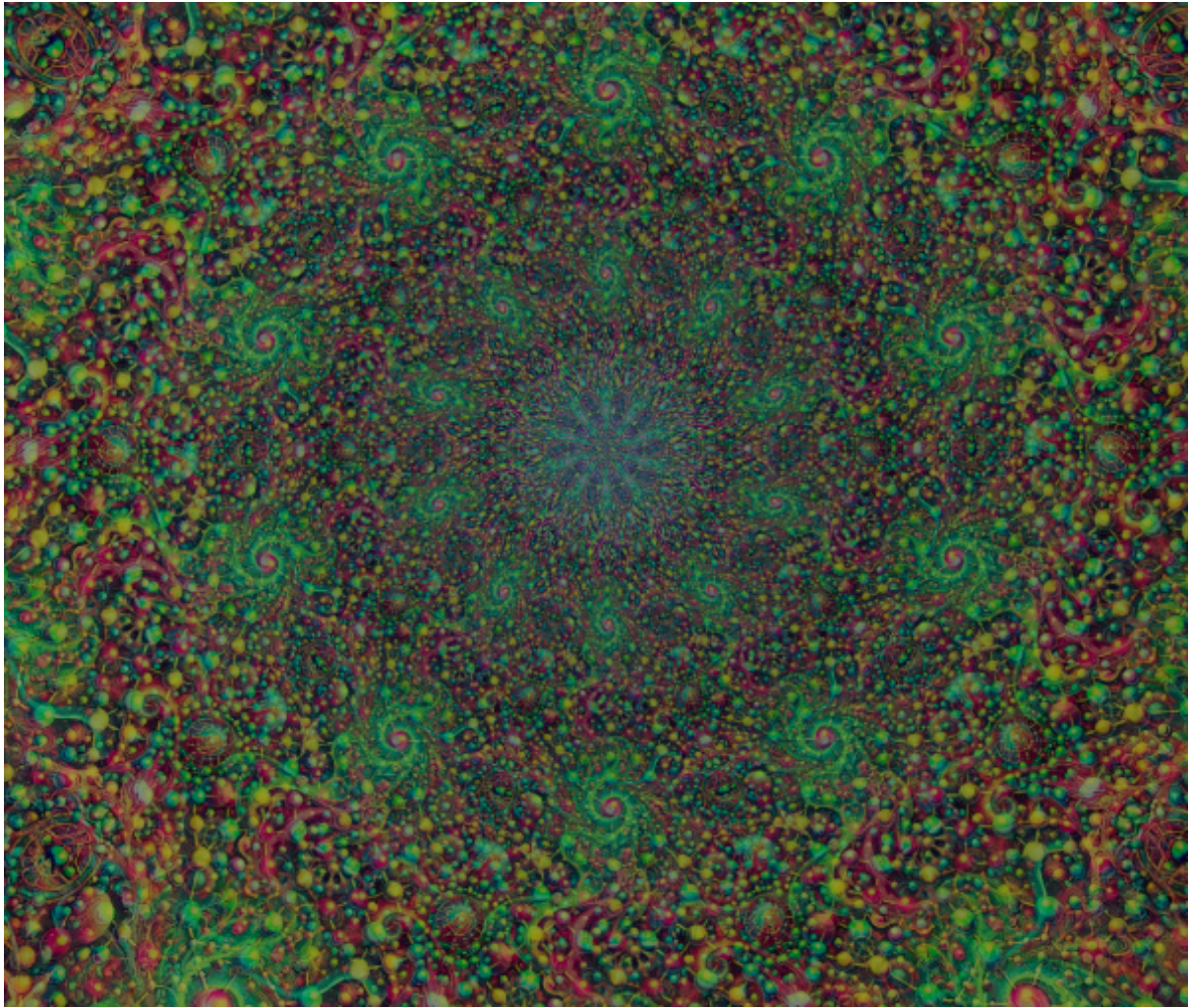


Figure 13. Tunnel effect.

4.5.2 Grid

The Grid scene in *Psyrréal* presents a visually striking environment centered around a colorful, animated grid pattern, designed to evoke psychedelic associations through geometric repetition and reflective spatial effects (Figure 14). The grid is enclosed by mirrored surfaces, which amplify the scene's complexity by producing recursive reflections. This mirroring creates the illusion of an infinitely extending space, enhancing the user's perceptual disorientation and contributing to the altered-reality atmosphere central to the project.

Within the in-game interface, users are given control over the brightness and intensity of the grid, enabling them to adjust the visual output according to their preferences. These adjustments are made through sliders that directly modify corresponding values in a Material Parameter Collection (MPC).

The Grid scene exemplifies the use of minimal geometric design, repetition, and controlled reflectivity to create perceptual effects that align with the project’s overarching psychedelic aesthetic, while also offering user-driven customization that reinforces experiential variability.

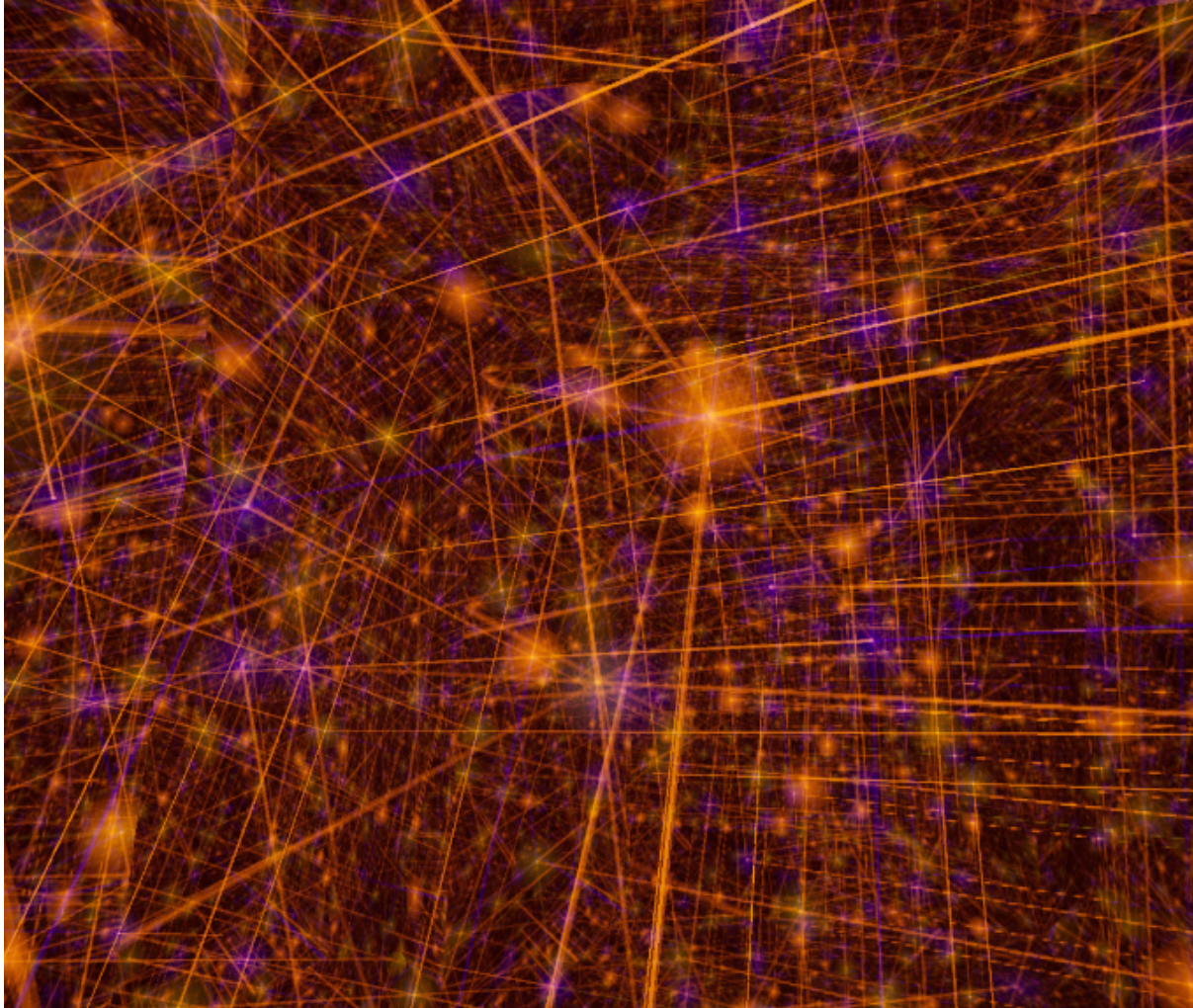


Figure 14. Grid effect.

4.5.3 Coloured Edges

The Coloured Edges scene was designed to explore the perceptual boundaries between virtual and physical environments by enhancing edge detection within the user’s real-world surroundings (Figure 15). Utilizing Oculus passthrough functionality, this scene presents the user with an augmented view in which the edges of objects in the physical space are rendered in vibrant colors.

When the scene is initialized, the edge colors cycle automatically in two-second intervals. This temporal color variation is intended to evoke a dynamic and slightly disorienting visual effect that reinforces the psychedelic aesthetic central to the Psyrréal experience. The implementation

of this color-changing logic is managed within the MyPlayerPawn blueprint, which handles the timing and switching between the RGB color states.

To provide users with additional control, an in-experience menu allows the selection of a fixed edge color. Through this menu, users can override the automatic cycling and choose to display edges exclusively in red, green, or blue.

The Coloured Edges scene serves as a minimal yet effective example of how abstract visual manipulation in VR can enhance the subjective perception of reality, offering users a novel aesthetic layer to their immediate environment.

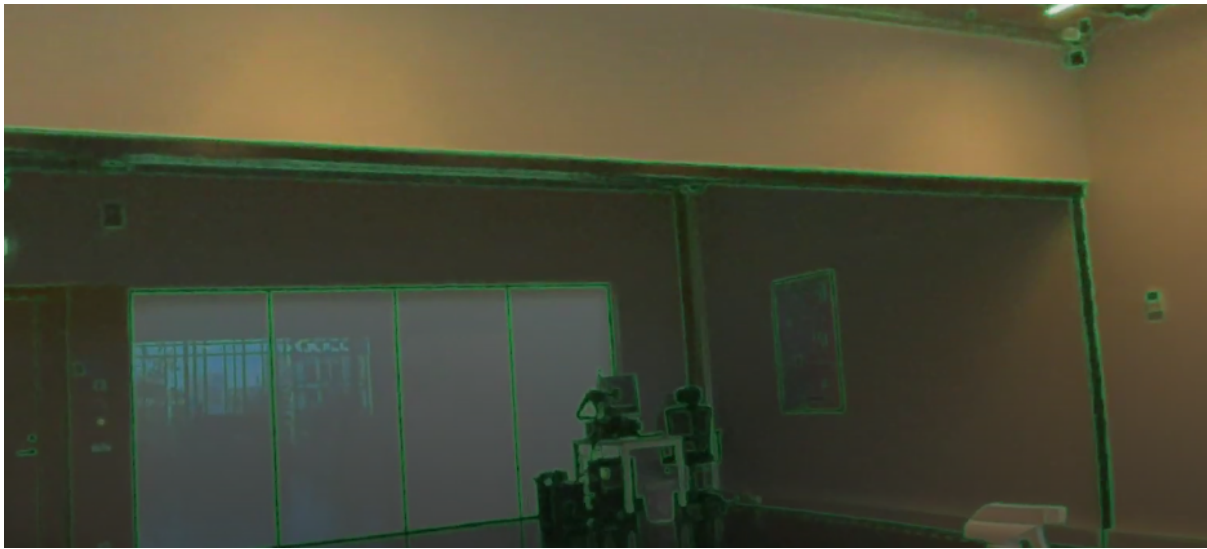


Figure 15. Coloured Edges Effect.

5. Usability Testing

This chapter evaluates the effectiveness and accessibility of the Psyrrreal virtual reality (VR) application's user interface through usability testing, focusing on its suitability for novice users in therapeutic contexts. It presents the methodology and outcomes of testing to inform further refinements.

The chapter is structured into two sections. Subchapter 5.1 outlines the testing methodology, detailing the participant selection, testing environment, and data collection process using the Meta Quest 3 headset. Subchapter 5.2 discusses the results, analyzing user feedback on menu navigation and visual effects to assess the interface's intuitiveness and immersion.

5.1 Testing Methodology

The usability testing took place in room 2007 of the University of Tartu's Delta building, a space equipped for VR experiments. Three participants, none of whom had prior VR experience, were recruited to provide feedback from the perspective of first-time users. This selection ensured the evaluation focused on the interface's intuitiveness for those new to VR technology.

The Meta Quest 3 headset, the primary platform for Psyrrreal, was used for the testing. Before starting, participants received a brief introduction to navigating the VR environment and using the controllers. They were then free to explore the Psyrrreal experience at their own pace, with the requirement to interact with all available scenes.

At the session's conclusion, participants completed a questionnaire to share their feedback. The questionnaire included two main Likert-scale questions, rated on a 1–5 scale, where 1 represented Strongly Disagree and 5 represented Strongly Agree. The first question asked whether the menu navigation was easy to understand and use. The second question assessed whether the visual effects and interactions felt immersive and engaging. Open-ended questions were also included to gather qualitative feedback, providing a comprehensive evaluation of usability and engagement.

5.2 Results

In response to the first question regarding menu navigation ("The menu navigation was easy to understand and use"), participants gave an average rating of 4 out of 5 (Figure 16). One user rated the experience a 3, another gave it a 4, and one more rated it a 5, reflecting a generally positive response to navigating the application. Feedback suggested that the structure of the menus was

intuitive and that users were able to locate and activate scenes without difficulty. However, minor confusion was noted during scene transitions, particularly in recognizing when a new experience had been successfully activated, which may be improved with clearer in-experience indicators.

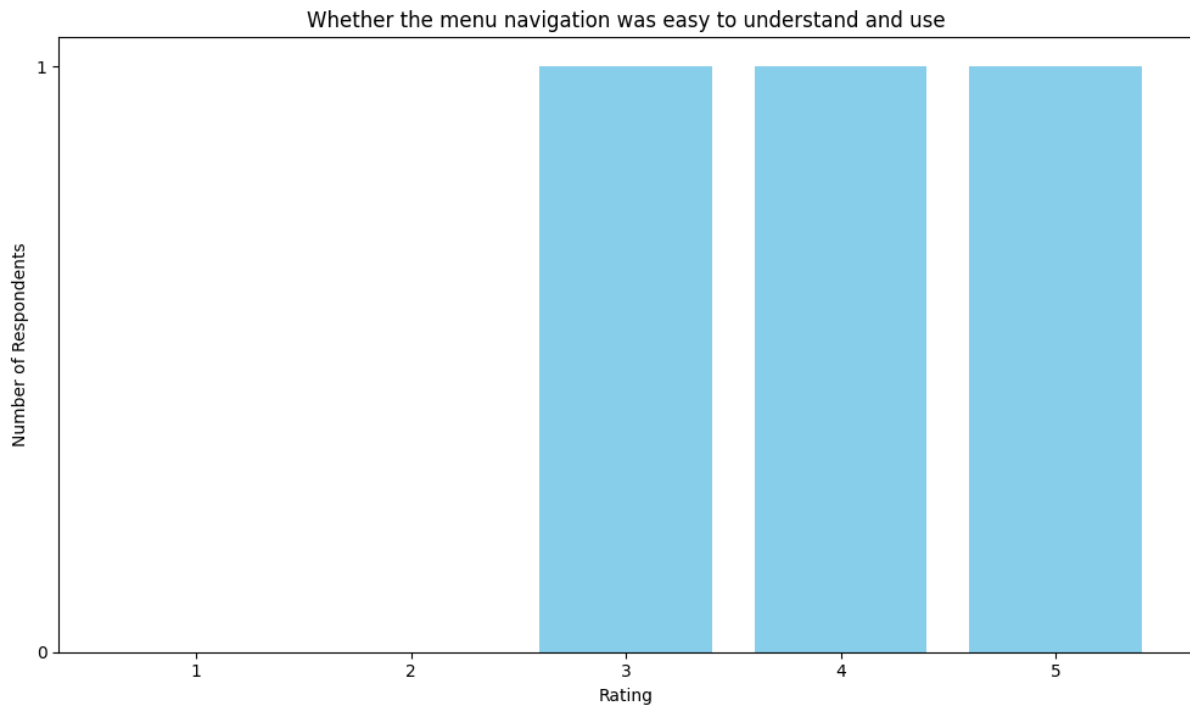


Figure 16. Question 1 results.

The second question focused on visual effects of the experience, receiving an average score of 4.7 out of 5 (Figure 17). Two participants rated this aspect a 5, and one rated it a 4. Test users described the visuals as "unique" and "aesthetically pleasing" and noted that the colorful overlays and dynamic visual changes enhanced the sense of being in an altered state. The Coloured Edges scene was mentioned positively by all participants for its integration of the real environment with digital augmentation, which was described as "unexpectedly vivid."

Overall, the findings suggest that even for first-time VR users, Psyrreal provides an intuitive and engaging experience. While minor usability refinements could improve clarity during scene transitions, the application's core design appears accessible and immersive. The combination of simple interaction mechanics and impactful visuals was effective in achieving the intended user experience, supporting Psyrreal's potential for further development and use in guided digital experiences.

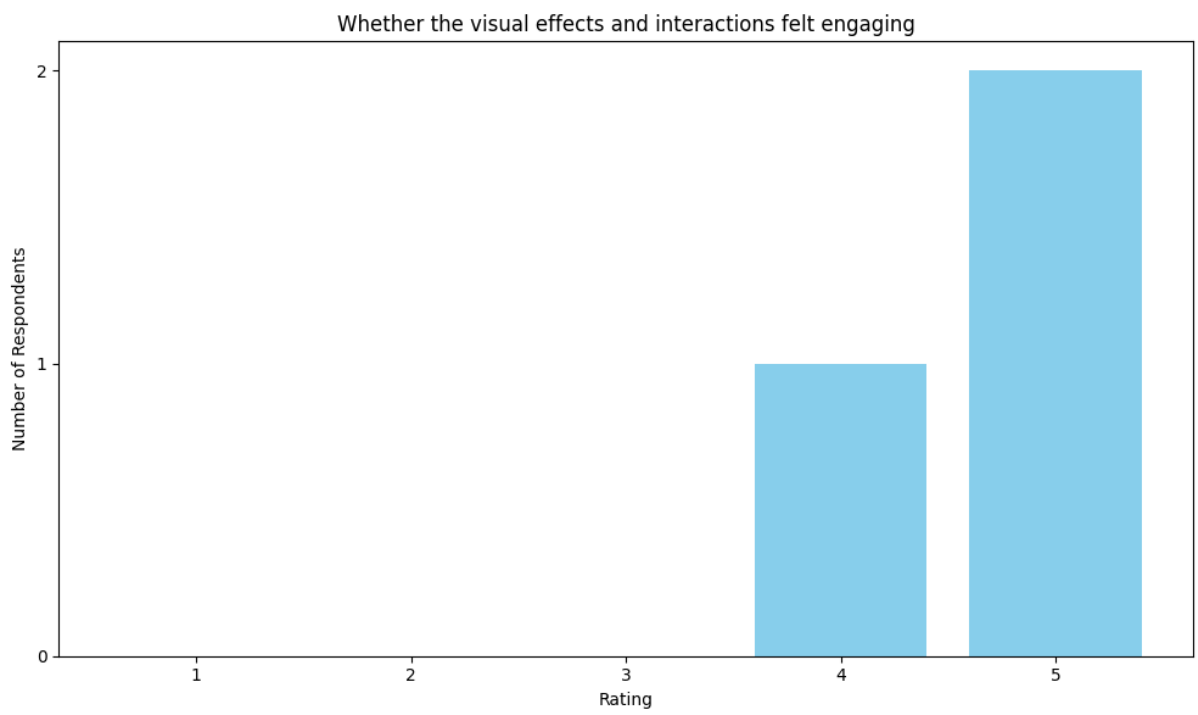


Figure 17. Question 2 results.

6. Conclusion

This thesis focused on the design and implementation of the Psyrrreal virtual reality application's user interface and visual effects, with an emphasis on improving the experience for first-time VR users. The primary objective was to create a clear and engaging interface that would allow users to navigate between psychedelic scenes while preserving the conceptual and aesthetic core of the experience.

The theoretical background included research on the therapeutic potential of psychedelic substances and the role of virtual reality in evoking similar perceptual states. Additionally, the work examined key design principles for VR user interfaces, particularly in spatial design and cognitive processing relevant to immersive environments.

The application was developed using Unreal Engine 5.3.2. The technical process included setting up the development environment, prototyping the UI in Figma, and implementing the system through blueprints and materials. Three distinct interactive scenes were created—Tunnel, Grid, and Coloured Edges—each offering adjustable visual parameters. The visual environment was enhanced through custom materials, animations, and particle systems, which were integrated directly into the user interface for both the main menu and in-experience UI.

A small-scale usability test was conducted with three participants who had no prior experience with VR. The results indicated that the developed interface provided a user-friendly navigation experience and contributed positively to the perception of the virtual content. Feedback suggested that the visual and interactive elements were effective in capturing attention and supporting user engagement.

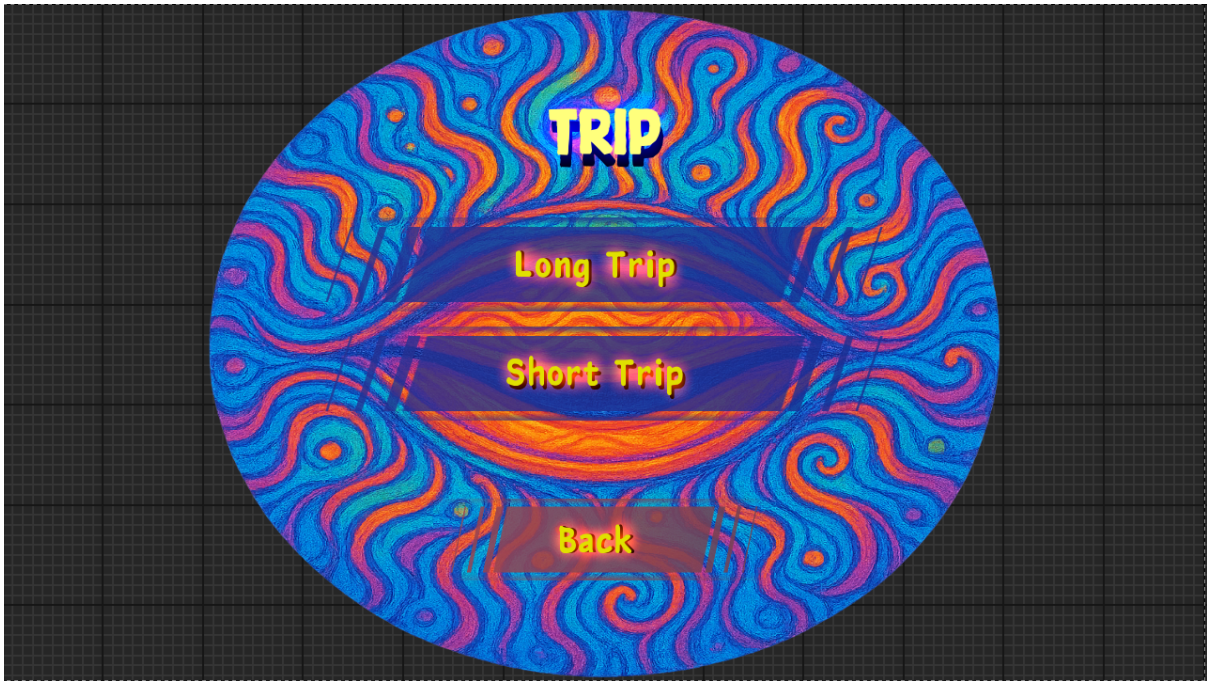
The author contributed to both the conceptual and technical development of the application, including interface design, visual effect integration, and usability testing. The outcomes of this thesis provide a solid foundation for future development, such as expanding the range of scenes or enhancing interactivity.

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Appendices





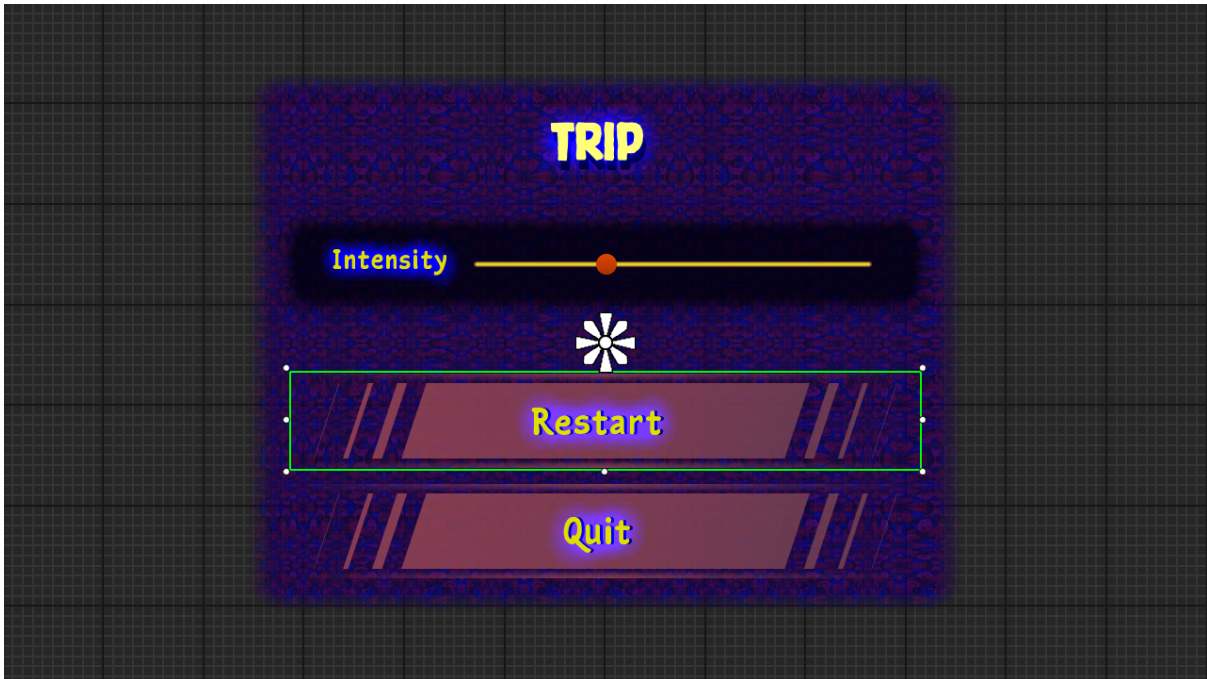


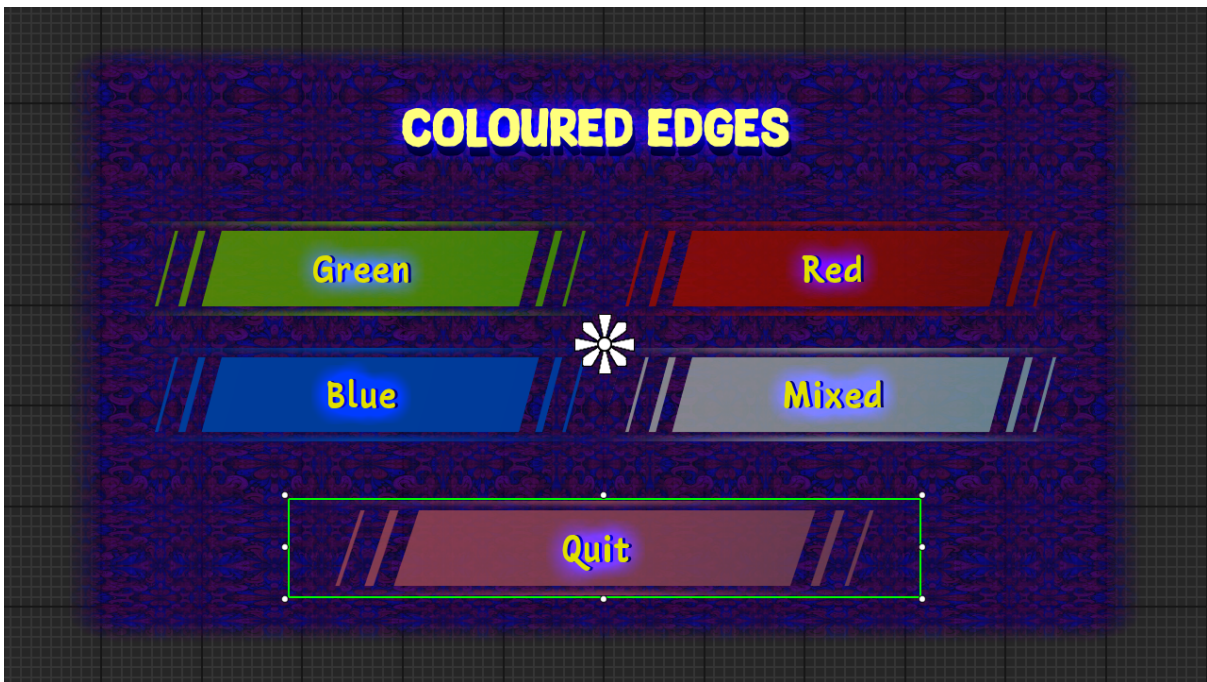
CONTROLS

-  - Press B to open the menu
-  - Press Right Trigger to start the experience
-  - Press A to fast forward

CONTROLS

-  - Press B to open the menu
-  - Press the right trigger to close this message





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