Virtual Dreams

A Study of Atmospheres for Long Term Healthcare Spaces Future Design

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Master of Creative Technologies, 2021

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Abstract

Our lives are thought to be influenced by the environments we inhabit. The health care system has a profound effect on the health and well-being of people with long-term mental health conditions. We need more well-designed spaces to improve the quality of people's lives. Addressing psychological needs is essential to maintain good health.

Combining Interdisciplinary knowledge in design, healthcare, architecture, and technology can help those in need create happier and more fulfilling living environments. In this practice-based methodological study, I used qualitative methods in conjunction with an artistic and designerly approach.

By including voices of the healthcare community of people who know someone living with a long-term neuro-disability, we can incorporate these people's thoughts and insights into the researcher's design thinking. I chose as participants, the workers and volunteers and families of people who were living in the context of Huntington's disease, to carry out this study.

We can discover unique ideas using technology. Lighting, colour, surreal (dreamlike) art, biophilic design and sounds can all be used to create wholesome atmospheres to foster mental well-being. In this study, Tilt Brush, a virtual reality painting tool, was used to investigate exploratory concepts. These concepts were then further developed by 3D modelling virtual environments for use in Unreal Engine to allow participants to virtually experience these spaces.

Virtual Reality (VR) is a contemporary way to visualise and experiment with creative outcomes. The virtual mockups made as part of this master's project calm "happy places," escapes that can be lived in whilst still being connected to the outside world. These creative ideas are intended to influence and humanise the designs of future indoor environments.

Keywords: Healthcare, Indoor Environment, Psychological Well-being, Long-term Disability, Huntington's Disease, Biophilic Design, Immersive Experience, 3D Game Design, Virtual Reality.

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Attestation of Authorship

"I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent had been submitted for the award of any other degree or diploma of a university or other institution of higher learning."

Acknowledgements

I dedicate this research in the memory of my mom, Daniala Asif, who has been a constant source of inspiration in my life.

I'd like to express my heartfelt gratitude to Ann Morrison and Stefan Marks, my master's supervisors, for their guidance and support throughout my master's journey. I couldn't have done it without them.

I would like to convey my heartfelt appreciation to Ann, my Primary Supervisor, for her extensive academic knowledge, insights, constructive criticism of my methods, and assistance in resolving any difficulties that arose.

Additionally, I would like to express my sincere gratitude to Stefan, my Secondary Supervisor, for assisting me with the practical components, being available to assist me with technological issues, and providing me with the resources necessary to accomplish my goals.

I'd like to show my thankfulness to the Huntington's Association, Jo Dysart, Cheene Mundawae, and other healthcare professionals and volunteers who volunteered to participate in my research.

I'd want to thank my beloved family and friends for their continuous support and encouragement throughout this project.

Most importantly, I want to thank my dad, who has always been like a best friend to me and has always been available when I needed to discuss my ideas and thoughts with him.

Chapter 1. Introduction

C1.01 Positioning Statement

My vision is to find creative ways to improve the lives of people living with disabilities in the healthcare system. My bachelor's degree got me interested in using technologies because they have the potential to create a positive social impact on people's lives. When I started working on an immersive experience that used Virtual Reality (VR) as a storytelling tool, I quickly recognised its uniqueness. After that, I continued to utilise VR. My personal experiences in hospitals, care homes, and respite facilities piqued my interest in health research and observing the need for improving the long-term care system. My graduation project in 2019 was patient-centred care. The idea was to provide these people with a healing experience by reuniting them with their old lifestyle and identity, rehabilitating them through VR. The major goal was to lessen the negative impacts of being trapped in a limited place. Also, to alleviate the depression and loneliness that patients suffer daily by providing escape routes to more joyful realities. I made 360-degree videos by gathering information about the individual's personality and previously visited locations to recreate their memories as VR experiences. https://hooryahasif.tumblr.com/

Long term disabilities and age-related illnesses have a negative influence on people's lives. People are alienated from the world when being placed in care homes. There is no personalisation, inadequate lighting, no choice, or enjoyment.

For my master's research, I wanted to use more emerging approaches therefore I built on my previous experiences to create new ones at the cutting edge of art, design, and technology. My goal was to discover concepts for the health system for improving people's quality of life. To establish how beneficial this technology was for them, I used the most effective visuals and sounds. The mission is to improve people's quality of life by finding therapeutic ways we can improve their psychological health and well-being.

C1.02 Research Introduction

Health is often treated as a commodity rather than a state of being, and health care should be recognised as a fundamental human right. The right to hope and to belong is referred to as a 'sense of belonging'. It's pivotal to feel like you belong because it affects your mental health (Barut et al., 2016).

"The World Health Organization defines health as a state of complete physical, mental and social wellbeing not merely the absence of disease and infirmity", (Pinto et al., 2017, p. 7). Our health affects the body's structure and function, behaviour, and ability to cope in all spheres of life, resulting in a loss of health and well-being. "The term 'well-being' is a "state of being comfortable, healthy, or happy", (Pinto et al., 2017, p. 7). Well-being comes down to how we feel on the inside. When a person is prolonged with intense negative emotions their ability to function in everyday life, their sense of well-being can deteriorate because patients experience anxiety, insecurity, and unease.

According to Pinto et al. (2017), comfort is defined as a temporary state of needing relief, such as bodily or behavioural ease. A person's view of their own condition in the physical, social, mental, and spiritual elements of their existence is characterised as quality of life. Thus, improving health requires a level of well-being, comfort, and quality of life. "Disability is characterised as the outcome of the result of a complex relationship between an individual's health condition and personal factors. Because of this relationship, different environments may have a very different impact on the same individual with a given health condition." (Bianquin & Bulgarelli, 2017).

Therefore, design for health is critical for healthcare's future. Considerations for health and well-being are critical when designing spaces for individuals. Illnesses affect everyone, and as creators, we should think about how we can help those who are tormented, restore their overall well-being. It is critical to take a co-creative, user-centered, and iterative approach if we want to collaborate with the healthcare system. There are numerous ways to put our creative ideas and skills to work by addressing problems that can affect and if refined, impact

positively to meet people's needs. To determine the best techniques and approaches, it is essential that we communicate with our stakeholders.

C1.03 Research Question

Huntington's disease has a significant impact on the lives of those who have it. It affects a person's personality, behaviour, cognitive ability, and mood. Environmental influences have a substantial effect on a person's general health and well-being (Huntington's Disease Youth Organization—Teens—How does HD affect people? 2019) There is no cure for this condition, and future generations will be affected. In care facilities, there is a need for improved techniques for caring for these individuals.

Huntington's disease (HD) has a significant impact on people's psychological well-being and health. They suffer from psychiatric disorders such as depression, anxiety, and irritability which are common mental health conditions. Because, HD is a neuropsychiatric disorder, adopting psychological methods may be beneficial in creating an impact on their mood and behaviour. As a result, mindfulness practices may be required to assist in improving mental illness. There is currently insufficient evidence that interventions using music and art therapy are effective. And relaxation could be used to help to create rehabilitative experiences.

The research question:

> *How can we use virtual reality to transform and humanise care facility interiors to improve the well-being of people with Huntington's Disease?*

The purpose of this exegesis is to emphasise the mental well-being of 'Huntington's disease' patients by allowing them to experience their "happy places", that stimulate positive thoughts/trigger positive memories/associations, have a calming effect on people's health using creative processes and technologies. A person's "happy place" is a place where they keep their most treasured memories, an escape or fantasy. It's a subjective place that provides them with comfort, somewhere that makes them feel at home and safe, a place of 'care,' 'enjoyment,' 'fulfilment,' or all three. A dream-like world where the individual feels most

at ease, a place that makes you smile every time you enter it. Attending to a person's emotional needs can help achieve this.

Therefore, this study looks at colour, lighting, biophilic principles, theories, and sources of inspiration for concepts. The discovery will focus on constructs that promote participants happiness. These include designing and humanising interior spaces using virtual reality, and in so enabling people with Huntington's disease to live more happier lives. In addition, I set about learning virtual reality art procedures to design and bring their visions to life. Subsequently, the goal here is to develop virtual worlds for testing and experimenting visualising design concepts using an artistic approach. The mission is to incorporate virtual scenarios into a system that will allow affected residents in long-term care homes to experience healing escapes.

I accomplish this by speaking with workers and volunteers from the Huntington's community, healthcare workers to get their input. It would have been ideal to work directly with HD patients, but for the scope of a master's thesis, the intricacies of ethics approval would have been prohibitively complex. The lives of HD workers, volunteers and families are severely impacted by having a relative/family member of person in their care with this condition. This means the carers learn a lot about the condition and are in close contact with impacts of the environment on HD sufferers. In addition to the ethical issues, HD sufferers may suddenly deteriorate so it would not be feasible to include them in any longer-term study (or study that takes some time to conduct)

C1.04 Chapter Overview

The second chapter of the thesis is the literature review. The first section C2.01 discusses fundamental concepts in healthcare, such as health and well-being, the built environment, patients, and the definition of a healing environment. The second section discusses biophilia and salutogenic design, both associated with restorative design for human health. The following chapter C2.02 will discuss the highlighted disease, Huntington's disease, and how changing one's environment can help people live a better quality of life. Following that is C2.03 on lighting, which is a critical component of designing a space promoting health through lighting systems. Next, is C2.04 on sounds healing qualities with virtual reality. In section C2.05 I discuss virtual reality art and health. The third chapter focuses on the methods and methodologies I use. In C3.03, I discuss the data collection and analysis. In chapter 4, I start by looking at the iterative process I used to create these experiences. It begins with inspiration and mood boards, VR doodles. I conclude with a workflow process showing the steps I used for creating. In Chapter 5, creative techniques are portrayed using virtual reality to design the environments by exploring concepts and developing them. Chapter 6 discusses the plan for future work with limitations and a conclusion.

Chapter 2. Literature Review

C2.01 Healing Environments

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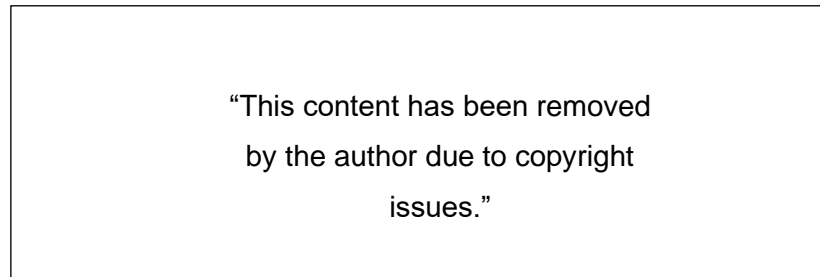
Fig. 1: Healing Architecture Model. From "Exploring the Concept of Healing Spaces" by J. Dubose, L. MacAllister, and K. Hadi, B, Sakallaris, 2018, HERD: Health Environments Research & Design Journal, 11(1), p. 48.

In the article '*Exploring the Concept of Healing Spaces'*, DuBose et al. (2018), define '*curing'* as a definite end state and '*healing'* as a multi-route journey. The authors demonstrate potential spatial healing influences as processes and experiences. DuBose et al., (2018) established the use of connections to signify healing spaces. The authors discuss the constructs of healing using this model (Fig.1), such as how patients think and feel about themselves, their lives, and their surroundings. Architecture creates an environment that influences people's sense of control and emotional responses to their care, either positively or negatively. According to DuBose et al. (2018) we can reduce patients' pain and emotional distress in homelike settings. While sensory rooms equipped with music, comfortable seating, relaxing imagery, and tactile stimulation shows to aid in the relaxation of psychiatric patients, they do not show how to reduce the need for isolation. Positive sensory engagement, specifically sight, hearing, smell, and touch, is a highly effective technique for repurposing the physical environment as a healing space (DuBose et al., 2018).

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Fig. 2: Healing Environment Framework showing the connection to Well-being. From "Healing environment and patients' well-being Finding the relationship between healing environment aspects and patients' well-being involving Dutch hospitals" by J.V. Nijhuis, C. Wentink, 2017, Semantic Scholar, p. 20.

Nijhuis and Wentink (2017) examined 230 patients from three hospitals and discovered a variety of distinct healing sensations. Individuals' mental health is expressed through their emotions, cognitive and affective responses to their lives. Well-being should be about a person's life being meaningful and purposeful. When prolonged or severe negative emotions impair an individual's ability to function in daily life, their sense of well-being may suffer.

Research shows nine physical variables (Fig. 2) can affect a patient's well-being: the spatial layout, lighting, scent, natural surroundings, art, colours, acoustic comfort, aesthetics, and ambient conditions (Nijhuis & Wentink, 2017) The relationship between healing environment qualities and patient well-being is advantageous, as the more favourable one's assessment of these traits, the better one's health. Control over numerous environmental elements, personal space, safety, and social support are the four distinct psychological and social components (Nijhuis & Wentink, 2017). Hospital design should consider the physical, social, and symbolic components of the healing environment (Awtuch & Gebczynska-Janowicz, 2017). Giving patients a sense of control and relieving their stress boosts their sense of power, and the ward environment can help foster personality and vitality.

"The term "*healing*" derives from the Anglo-Saxon root word "*haelan*," which means to make whole" (as cited in Osei, 2014, p. 27).

The healing environment is based on the concept of caring and aims to create physical environments that elicit "…positive emotions and provide opportunities for enrichment, spiritual connection, humour, and play opportunities." and an optimal healing environment is defined as one where patients can receive social, psychological, spiritual, physical, and

behavioural care" (Lorenz, 2007a, p. 263). Patients spend their time in hospitals receiving treatments, procedures, nursing care, and other therapeutic interventions. Because the design of the surroundings can have a significant impact on a patient's healing and well-being, the healing atmosphere should strive to transform the patient room into an environment that stimulates the human spirit and assists families and patients in coping with and overcoming disease (Lorenz, 2007a).

Therapeutic gardens, vibrant colours, trees, plants, vegetation, and artwork that engages multiple senses are proved to improve patients' well-being (Kirsanova, 2021, pp. 21-24). Colors have been shown to improve mood, cognition, and healing, and new research suggests that hearing water can help with relieving pain. Trees have an uncanny ability to induce relaxation and structured, cluster-free environments promote harmony as well. Sensory environments like these can aid inpatient recovery and reduce their length of stay in the care setting by incorporating these elements into spaces and cultivating atmospheres of happiness, tranquilly, and fulfilment, a therapeutic environment conducive to all forms of healing.

C2.01.1 Architecture

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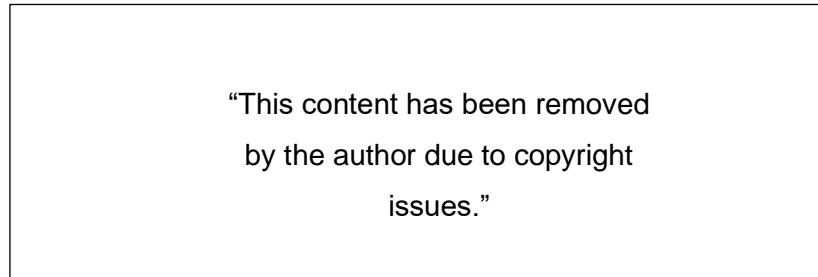
Fig. 3: Maggie's Cancer Caring Center. From Maggie's Cancer Caring Center / Snøhetta by ArchDaily, 2013, (https://www.archdaily.com/437008/maggies-cancer-caring-center-snohetta).

Hospital design evolved in the 1970s as patient preferences shifted towards more aesthetically pleasing facilities (Iyendo Jnr & Alibaba, 2014). The behaviour of psychological architectural principles has the potential to influence artefacts, architecture, habitats, and ecosystems because our constructed environment has a strong psychological response (Bates, 2018).

The *'humanisation of hospitals'* is a perfect example of this concept Maggie's Cancer Centre (Fig. 3) a *'humanistic design' for* patients in more homelike settings to give them a stronger sense of connection to and control over their surroundings. Allowing patients to choose artwork for their walls or providing them with constantly changing visuals can also help boost their self-efficacy (Bates, 2018).

C2.01.2 Biophilia

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Fig. 4: Green Homes for Dementia. From "Ikea is designing prefab homes for people with dementia" by Stinson, L. 2019, Curbed, (https://archive.curbed.com/2019/8/12/20801179/ikea-boklok-silviabo-prefab-homes)

The principle of Biophilia incorporates natural elements and structures into the built environment. Biophillic Design "proposes that humans have an innate connection to the natural world." (Gillis & Gatersleben, 2015, p. 948). Natural environments features promote human health and wellness in the built environment to alleviate stress and foster a genuine sense of connectedness. Ikea's dementia-friendly homes (Fig. 5) is an outstanding illustration of how the natural world may be integrated into this setting to benefit the health and well-being of individuals with impairments (Stinson, 2019).

Taylor (2021) discusses how the modern world gravitates toward natural architectural forms. The repetition of patterns at various scales results in the formation of intricate fractals. A century has passed since discovering the fundamental geometry shared by nature and the earliest fractal examples. Consider a future with a "fractal atmosphere" of visual, sonic, thermal, and tactile stimulation" (Taylor, 2021, p. 21). We can comprehend and predict human responses by utilising environmental psychology. Using strategies that replicate natural processes may prove to be effective. According to Coburn et al. (2019) we are drawn to nature's softly enticing sensory stimuli. Nature's attention returns, which improves cognitive performance. It elucidates the process by which nature heals humans.

C2.01.3 Salutogenic Design

Salutogenesis is an approach "focusing on factors that support human health and well-being rather than on "pathogenesis", i.e., factors that cause disease." Development (Stoltz & Schaffer, 2018, p. 3). Salutogenic design aims to create happier and healthier spaces. It is a restorative approach to healthcare that seeks natural ways to rehabilitate patients by encouraging mental and physical well-being through the development of dynamic models to transform the environment.

Awtuch and Gebczynska-Janowicz (2017) say positive distraction can potentially shift attention away from unpleasant aspects of medical settings and toward more regenerative aspects of life outside of hospitals. Art refers to visually appealing elements that improve health and are essential in hospital settings to increase patient well-being. Any pleasurable distraction may divert patients' attention away from their anxieties or physical discomfort. The notion that aesthetics can have an impact on health is not as widely accepted as it should be. The environment, according to the findings (Awtuch & Gebczynska-Janowicz, 2017), can activate higher-order cognitive processes such as emotional reflection, thereby contributing to meaningful and serene experiences.

'Ecotherapy' – the ability to interact with the environment to promote healing and growth – is a nearly forgotten ecosystem service," according to the research (Summers & Vivian, 2018, p. 1). They investigate the role of nature and ecosystem services in Ecotherapy, as well as how to treat mental illnesses. It is an a-psychological theory that exemplifies mindfulness practices that benefit the ecosystem care provided by nature. Ulrich's research in the 1970s revealed that patients' window views of nature might alter recovery durations following surgery; nonetheless, the concept of flowers and trees influencing human well-being remained largely untested. Natural landscapes boost serotonin, and green care therapies are also environmentally friendly (Summers & Vivian, 2018).

C2.02 Long-term Disability – Huntington's Disease

Huntington's disease, according to van Walsem et al. (2017) is a degenerative neurological disorder that affects around six people out of every 100,000 in Europe, North America, and Australia. This disease is distinguished by motor disability, cognitive decline, and mental difficulties. The illness is commonly identified between the ages of 30 and 50, and it lasts 17 to 20 years.

According to van Walsem et al. (2017) disease control, symptom alleviation, and maintaining functional capacity are the main goals of therapeutic treatment for patients with HD. Human health-related quality of life is a broad concept that encompasses the effect of disease and treatment on an individual's physical, emotional, and social well-being. "Two studies found that functional ability and depression, were strongly associated with decline in HRQol in HD." One study found depression and cognitive impairments as the strongest determinants of HRQol. "HD patients have a considerable level of unmet needs of healthcare and social support," implying that many patients receive insufficient care (van Walsem et al., 2017, pp. 1-5). Only one study examined access to healthcare services for patients suffering from unique long-term neurological illnesses. There has been minimal research exploring the link between healthcare delivery and health-related quality of life in people with HD.

Roos (2010) composes Huntington's disease is a progressive neurological disorder in which variables such as circadian rhythm abnormalities can be adversely affected. It is inherited, and a healthy lifestyle can help reduce HD symptoms, which are exacerbated by inactivity. Further, Heffels et al. (2020) state that when at-home care becomes insufficient or untenable, transferring to a care facility or nursing home is frequently unavoidable. Many patients with neurodegenerative disorders develop them at a young age, resulting in a long course of the disease. These patients are admitted to nursing homes at a much younger age than the average nursing home resident, who is much older. They are commonly at a specific stage of life.

Giving rats a more stimulating environment, according to Trembath et al. (2010), delays the onset and progression of Huntington's disease. Maintaining a healthy physical and mental state throughout life benefits everyone, but it is especially beneficial for those who are at risk of developing HD because it can help delay symptoms. As per research, "40% of variance is attributable to non-genetic variables, and approximately 60% is due to undefined environmental factors" (Trembath et al., 2010, pp. 1444-1445). While there is currently no cure for HD, there are numerous strategies available to help people manage symptoms and improve their quality of life.

C2.03 Lighting

Nijhuis and Wentink (2017) write how lighting has an impact on both our psychological and physical health. Appropriate lighting is one of the factors that contribute to patient satisfaction. Lighting is classified into three types: artificial light, natural light, and sunlight. Artificial light that is bright can also help with mood enhancement and depression relief. The presence of daylight helps to relieve pain and lowers the risk of developing depression (Nijhuis & Wentink, 2017).

Blume et al. (2019) writes lighting in psychiatric facilities can affect a patient's daily rhythm. "The circadian rhythm is a biological rhythm of human beings of which one cycle endures for approximate 24 hours." (Pennings, 2018, p. 11). Due to the positive effects of daylight on various body systems, it is gaining popularity in healthcare settings. A lack of natural light is harmful to the body and mind and incorporating daylight into indoor environments improves residents' health. Light boosts mood, especially during the early in the morning. While pain is an unpleasant experience for individuals, it is critical that pain levels be kept as low as possible. Pain relievers could be dangerous (Pennings, 2018).

Walch et al., (2005) discovered that patients undergoing back surgery in bright environments required 22% less pain medication and felt less stressed. Every day, indoor lighting can help to maintain circadian rhythms, sleep patterns, and psychological well-being. According to Husein Ali Husein (2020), people who get more natural light sleep better and have a higher quality of life.

Fig. 5: Healing Hospital Design. From New Aalborg University Hospital / Schmidt hammer lassen architects + aarhus arkitekterne + Creo Arkitekter by Furuto. A, 2012, ArchDaily, (https://www.archdaily.com/251883/new-aalborg-university-hospital-schmidt-hammer-lassen-architects)

The authors discuss the 134,500-square-metre hospital facilities at the University Hospital of New Aalborg (Fig. 5). Since its inception in 2013, the concept has evolved over the course of 17 years to include a wide range of green building techniques. According to the hospital's mission, they provide a safe and comfortable environment for patients receiving care at their facilities. The louvred façade filters daylight, reducing heat loss while not blocking views. Natural light floods the interior rooms, creating a strong connection to the outside world. Lighting can be used in a variety of ways, such as with automatic skylights, automated window treatments, and a lighting system.

Fig. 6: Slagelse Psychiatric Hospital. From "Design for Mental and Behavioral Health" by S. Pasha, M.M. Shepley, 2017, Routledge.

According to the authors Shepley and Pasha (2017) the Slagelse Psychiatric Hospital's design incorporates LED lighting to simulate the circadian rhythm, thereby assisting psychiatric patients in acquiring social skills and abilities. Each ground-floor room features a private bathroom. The property measures 158,463 square metres and features approximately 40 courtyards and gardens.

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Fig. 7: Light Atmosphere Model. From "Light Atmosphere in Hospital Wards" by L.M Stidsen, 2014, Semantic Scholar, p. 103

The concept of a *Model of Light Atmosphere'* (Fig. 6) is introduced by (Stidsen, 2014). The review of literature on 'Hospital of Senses' and 'Healing Architecture' presents research on senses and design experiences (p. 20). According to the concept, a user's tasks, expectations for the environment, and personal experiences can all impact space. Therefore, a lighting environment should be designed in such a way that it promotes well-being.

Stidsen (2014) talks about how lighting stimulates a variety of biological processes, including the circadian system, also known as the body clock. The lightness, colour, size, and shape of an object remain constant regardless of how we view it (Stidsen, 2014). Light's colour and texture influence our vision by reflecting or absorbing diffused light, making it visible and changing sensory perception. Material properties include 'brightness, lightness, hue, saturation, transparency, and glossiness.' (Stidsen, 2014, p. 126).

Sleep disorders are very common in Huntington's Disease, and there is clear research demonstrating how patients' sleep cycles are disrupted, resulting in a faster decline. Bright light therapy may be beneficial in terms of symptom management and improving a person sleep-wake-cycle (Moore, 2016).

An example is provided in (Wang et al., 2017), where blue light therapy was tested on mice with Huntington's disease to see how it affected their mood and behaviour, and it was found to be beneficial after the circadian system was strengthened. Sensory stimulations could be meditative in nature to help Huntington's patients relax. As a result, lighting can have an impact and create a calming environment, which can have a positive impact on their behaviour. Lighting can help with sleep, ratelessness,

loneliness, and even depression. As a result, sensory stimulation with light can improve patients' well-being and relaxation.

C2.04 Sound

Evidence shows that "restorative environments", can aid individuals in recovering from daily cognitive fatigue, low mood, and stress." (Ratcliffe, 2021, p. 1). These studies typically focus on the visuospatial experience of one's environment and make use of stimuli such as photos and films. Unseen elements of the therapeutic environment, such as sound, scent, and touch, are gaining favour. Individuals who are blind or visually challenged can benefit from virtual or augmented reality. Article discusses studies on the impact of natural noises on people's perceptions and experiences of broader natural surroundings. It investigates evidence on cognitive and affective reactions to natural noises (Ratcliffe, 2021). While tranquilly and silence are important aspects of the natural world, they do not mean full silence. It may also relate to the concept of relative silence, or noise reduction from the constructed environment, as well as the capacity to hear pleasant natural noises. Natural noises are an essential part of the outdoor experience and enjoyment.

According to quantitative studies in (Ratcliffe, 2021), they have a significant impact on how people perceive natural landscapes. Restorative perspectives and experiences can boost realism and absorption in nature. Listening to bird songs is related with a sense of well-being.

Through a series of interviews, Ratcliffe (2021) discovered that the British people commonly associated natural sounds with perceived restorative sensations such as joy, relaxation, and escape from everyday stresses. Natural noises induced both favourable affective reactions and lower arousal evaluations in research participants. Individuals who are blind or have low vision notice that they converse with nature, particularly wildlife, through sound. As a result, individuals have good emotional states such as autonomy and less vulnerability. "The singing of the birds makes me feel relaxed", one participant said, while another mentioned "calming sounds" amid nature (Ratcliffe, 2021, p. 3). Listening to natural noises tends to have a calming effect on perceived results. A greater emphasis on the meanings people associate with environments has long been neglected in restoration theory, and it may help explain why certain settings enhance psychological well-being.

C2.05 Virtual Reality

C2.05.1 What is Virtual Reality?

Virtual reality, as defined by Tuena et al. (2020a), is a three-dimensional computer-simulated world with an immersive interface. It is divided into three types: non-immersive, semi-immersive, and fully immersive. The subjective influence of immersion on experience is the sense of presence felt when using virtual reality.

C2.05.2 VR & Health

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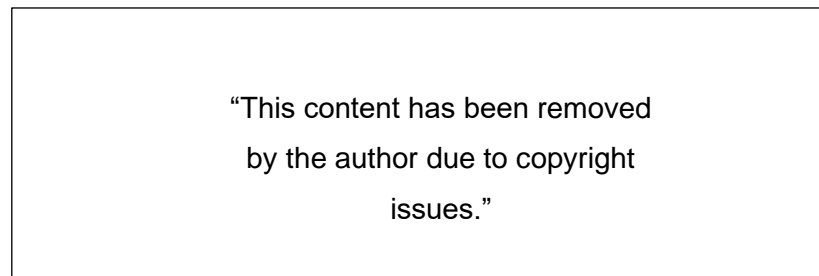
Fig. 8: A Virtual Blue Health Healing Environment. From Virtual natural Environments https://bluehealth2020.eu/projects/virtual-environments/

Virtual reality has been utilised in healthcare for several years to alleviate pain, depression, and other diseases, supporting patients in living better lives through the development of healing experiences. Blue Health (2017) is one such endeavour, with the main goal of improving people's well-being in densely populated cities by examining the effect of aquatic environments on their bodies and brains using virtual reality as shown in (Fig. 8). The Lund University in Sweden created this environment using 3D modelling and with computer graphics and Virtual reality.

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Fig. 9: 360 VR Experiment. From "What is the best way of delivering virtual nature for improving mood? An experimental comparison of high-definition TV, 360° video, and computer-generated virtual reality", by N. L. Yeo, M. P. White, I. Alcock, R. Garside, S. G. Dean, A. J. Smalley, B. Gatersleben, 2020, Journal of Environmental Psychology, 72, p. 5

According to Yeo et al. (2020), the biophilia hypothesis is when humans develop near natural environments and have an intrinsic need to be connected to nature. Boredom occurs daily and can present itself in a variety of ways. Virtual reality (VR) technology may allow users to immerse themselves more deeply in a recreated natural world, easing some of these constraints.

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Fig. 10: Computer Generated VR Experiment. From "What is the best way of delivering virtual nature for improving mood? An experimental comparison of high-definition TV, 360° video, and computer-generated virtual reality", by N. L. Yeo, M. P. White, I. Alcock, R. Garside, S. G. Dean, A. J. Smalley, B. Gatersleben, 2020, Journal of Environmental Psychology, 72, p. 5

As part of this study, Yeo et al. (2020) investigated the impact of three extreme virtual nature exposure strategies on participants' feelings, including boredom. The respondents wore 360-degree virtual reality (VR) or computer-generated reality (CG-VR) headsets and used a high-definition 2D television (TV). The study hypothesises that immersive delivery provides users with a higher sense of "presence" The Summary of Positive and Negative Experiences (SPANE) scale was used to assess mood. Individuals were asked to rate their recent experiences with the broad emotions sadness or happiness on a 1–5 scale.

Boredom is an undesirable emotion with serious effects in a range of scenarios, including care settings. Positive emotion and environmental

connectedness can increase if boredom and negative consequences are considerably minimised. When compared to the typical virtual reality mode utilised for television viewing, Computer Generated VR has a substantially greater beneficial effect because it can hold the viewer's attention and foster a stronger connection with nature, both of which contribute to increased emotional well-being (Yeo et al., 2020).

Bohil et al. (2011) state that VR is becoming increasingly popular in neuroscience and therapy research because it provides complete control over multisensory stimulation and is therefore useful for understanding sensorimotor interactions such as proprioception and visual experience (that is, interactions between brain regions responding simultaneously). Studies have shown it to be effective in cognitive development and entertainment in at least three fields: psychiatric disorders, pain management, and neurorehabilitation (Bohil et al., 2011). This technology has several distinct advantages over traditional therapies, including precise control over the level of exposure to a type of situation therapy (for example, treating a fear of flying without requiring patients to fly) and the ability to tailor scenarios to individual patient needs. Even the ability to provide therapies that would otherwise be impossible can be done now through artefacts and images directly related to a person's past experiences within a virtual environment (Bohil et al., 2011).

Depledge et al., (2011) uncovered indications in our natural environments that we can exploit to create virtual environments conducive to human well-being. For example, natural signals are present in nature to which we respond to de-stress and relax. "Colours that predominate in outdoor natural settings (greens, blues, and browns), the sounds (bird song, trickling water, breaking waves, the wind in the trees), the odours of nature (the scent of flowers)" (Depledge et al., 2011, p. 4662). In virtual reality situations, there is a lack of understanding of how to create natural and convincing ambient effects in virtual worlds using vision, sound, smell, touch, or temperature factors. It may take decades for technology to build completely immersive, multisensory, and convincing worlds on the scale of the Star Trek "Holodeck" (Depledge et al., 2011).

C2.05.3 VR & Art

User-friendly interfaces have raised digital art to a mainstream way of expression. Making art is a fundamental human characteristic that has resulted in the development of new art forms such as digital painting, picture and video editing, and multimedia (Hacmun et al., 2018). This section goes through how to make virtual reality artwork with free tools such as tilt brush. Traditional mediums such as painting, and sculpture are combined with unique digital qualities in virtual reality. Hand and body actions that create an embodied sense are used in the design process.

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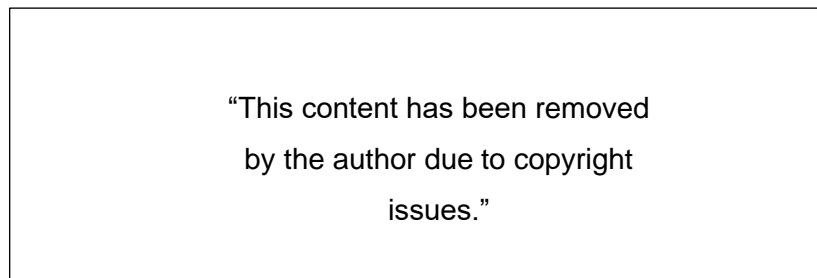
Fig. 11: "Mind at War" in Tilt Brush. From "Mind at War: VR" by Sutu Eats Flies, (https://www.sutueatsflies.com/art/mind-at-war)

The artist freely navigates in an immersive three-dimensional environment using a headset e.g., HTC Vive. Gravity is when three-dimensional objects suspend in mid-air. While the artist is working, they can constantly resize, modify, and save their work. Mind at War is a full-body virtual reality experience that takes viewers through Scott England's experiences of the Iraq War (Fig. 8). Scott's experiences before, during, and after the war are depicted in the VR paintings. Each artwork is accompanied by Scott's narration, which takes viewers on a journey into his shadows and memories. The artist uses technology to communicate his or her message.

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Fig. 12: A VR Nature World. From "Design meets beauty in the new Virtual Sculpture Garden", by M. P. Elise, 2020, (https://vtx.vt.edu/content/vtx_vt_edu/en/articles/2020/10/univlib-virtual-sculpture-garden.html)

The Virtual Sculpture Garden (Fig. 12) was inspired by Virginia's landscape. During COVID, the creator wanted to transport users to a place of beauty and design. Blender and Unity were used to make this. In the background is instrumental music. As stated in the article, Winnicott proposed "inner psychic reality" (fantasy) and "actual or external reality" (Hacmun et al., 2018, p. 5). We can create a dreamlike state in a safe and controlled environment by combining natural and imaginary elements.

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Fig. 13: Abstract VR Painting Experiment. From "User Attention and Behaviour in Virtual Reality Art Encounter", by Mu. Mu, M. Dohan, A. Goodyear, G. Hill, C. Johns, A. Mauthe, 2020, arXiv:2005.10161 [cs], p.5.

Mu et al. (2020) studied how viewers engaged with abstract virtual reality artworks. The study shows how people changed their location, examined different regions of the artwork, and modified their perspective, whether they went within the artwork for a more immersive experience or reached out to touch it. The researchers concentrate on artistic growth in virtual reality, revealing the qualities of this emergent medium and its application in art therapy.

Brushstrokes from "Wet Paint" are blended into a single mesh object. Thirty-five people convened to discuss the preferences of the attendees. Artists can benefit greatly from body movement recognition and tracking in conjunction with a gaming engine. Participants were allowed to study the artwork within the limitations of a designated physical place. As they moved around the artwork, participants turned their heads and gaze in various directions (Fig 9). Green brushstrokes were chosen by female participants over red brushstrokes in (Mu et al., 2020).

In comparison to traditional painting, virtual reality art has the potential to be more immersive. The sensation of "being there" is created by immersing users in a virtual world. There is a once-in-a-lifetime potential to "step" within or through creation's elements.
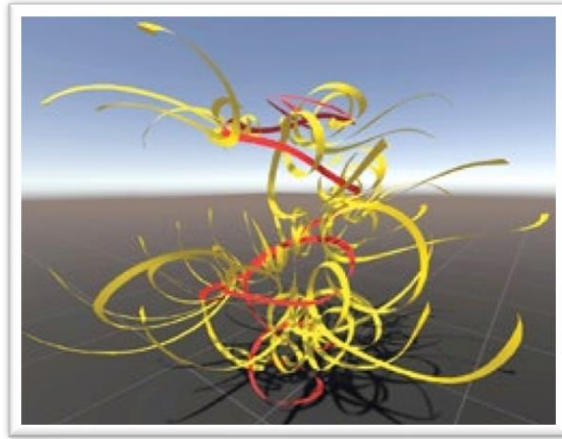
Marks et al. (2018) delves deeper into art therapy using virtual reality painting devices. This project investigates virtual reality (VR) by creating an open studio approach to drawing in a VR environment (Fig. 13). The purpose of this experiment was to see if the user could enter their universe and interact with their artwork. They were interested in investigating the concept of "virtual world sacredness" and how it relates to the physical world (Marks, 2018). Alternatively, the client could create a virtual reality experience that represents a specific scene, a virtual reality experience that represents a concept, such as security or hope. As a result, the future nature of the virtual reality application may combine with more tactile and sensory visual art. Users can 'step inside a virtual wall and emotionally interact with it' using a virtual reality (VR) application (Marks et al., 2018).

C2.05.4 VR & User Experience

Gladden (2018) writes user-centred design is a technique used by virtual world designers to improve their work iteratively. According to Rebelo et al., (2011) prototypes enable us to involve end-users early in the design process. Designers can roam in a 'virtual mock-up,' interacting with a variety of different design concepts. In a variety of disciplines, virtual reality can create a product vision. Users can communicate in virtual reality by experimenting with various colours, features, and models. In comparison to other methods, VR technology allows product developers to obtain more rapid feedback from many users, allowing for more user-centric development (Rebelo et al., 2011).

For artists seeking to envision restorative spaces, virtual reality may provide a unique space between fantasy and reality, allowing them to create dreamlike environments for those in need, using virtual reality therapy to ensure the best possible care for future generations raised in the age of technological advancements.

The thesis is unique in that it creates virtual reality worlds based on people's happy places and health and wellness thoughts to validate concepts for future in-person experiences. This study shows that by combining naturalism, lighting, and colour atmospheres with a three-dimensional artistic process, we can create enriching healing environments that help people with Huntington's disease feel better by immersing them in a world that restores health and provides a sense of purpose.

This research seeks to advance solely for their benefit, while also considering the need for more peaceful living environments. Care homes can achieve more significant results for residents in the future by combining technologies to improve experiences.

Chapter 3. Methodology
C3.01 Introduction

This study employs a methodology that is both practice-led and practice-based. The study is about the atmosphere, which looks at how spaces affect people and experience, how people interact with prototypes. The primary goal of this research is to develop virtual worlds, or "artificial dreams," that allow users to explore their "happy places" in fully immersive virtual reality environments. These concepts have the potential to have an impact on the built environment in the real world. This methodology will aid in the development of a creative step-by-step workflow for achieving these objectives that can be used in the future by other healthcare researchers and designers.

C3.01.1 Approach

For my approach practice-based methodology is the primary approach, using iterative and reflective processes. The research takes a practice-led approach, focusing on the "nature of the creative practice, leading to new knowledge of operational significance for that practice, in order to advance knowledge about or within that practice" (Candy, 2006, p. 5.) By integrating critical reflection and practice-based research, the research process alters. It goes into more descriptive and exploratory work, encouraging readers to start with the 'unknown' and work their way up to the 'known.' Practice-based research is, "an original investigation undertaken in order to gain new knowledge partly by means of practice and outcomes of that practice." (Candy, 2006, p. 1). The creative artefact is the basis of the contribution to new knowledge. Combining these approaches enables the discovery of new knowledge and outcomes through practice, aided by existing and newly created virtual artefacts.

C3.02 Methods

This investigation took on participatory methods to collaborate effectively with the healthcare workers to understand better the society of the users who are Huntington's patients, listen to their wishes, and acquire new knowledge. The research initiates with qualitative interviews and observations of healthcare community members. This study then interprets and design their thoughts and stories using UX game design practices to create visual experiences for their scenarios.

C3.02.1 Qualitative Methods

I chose qualitative research methods for this healthcare study because I wanted to collect people's experiences and incorporate their insights early in the research design process. According to Moss et al., (2012) the most frequently used method for eliciting patient perceptions was qualitative data collection via observation and arts-based research. The study uses qualitative methods as they are highly adaptable, allowing the researcher to test novel concepts. Semi-structured interviews are an effective method for eliciting participants' thoughts, feelings, and beliefs, as well as personal anecdotes, about a particular subject (DeJonckheere & Vaughn, 2019) This type of interview typically utilises a dynamic topic guide and specific groups of knowledgeable or experiencing phenomena. The most diverse sample captures a range of distinctions while also emphasising significant common patterns (Al-Busaidi, 2008).

C3.02.2 LEGO Play

According to theory, by manually constructing LEGO models, we can gain hidden knowledge and form new connections (Langley et al., 2018). In a similar fashion to playing therapy, participants express themselves through Legos. Six bricks can connect in an infinite number of ways, and it extracts the participants' unique and original contributions (What I learned running a LEGO Serious Play workshop, 2018) The bricks' varied shapes and sizes enable intricate conceptual design, demonstrating the product's versatility in conveying emotions, living patterns, and thoughts. For example, Isa and Liem (2020) chose LEGO games to stimulate creative thinking and creativity during product development. "Artefacts shed light on what may be "invisible" or assumed in participants' thought

processes and happiness perceptions" (Boer et al., 2013, p. 2). Thus, LEGOS can investigate people's emotional attachments to imagined locations and their perceptions of the problem. LEGO is an excellent tool for prototyping new applications and iterating the design process. By acting as a rhetorical and testing tool, the framework facilitates closer collaboration between designers and stakeholders. When conducted with rigour, it provides unparalleled opportunities to advance our understanding of the social and health care worlds humans exist. While qualitative research may appear uncomplicated and straightforward to some, relying on direct participant–researcher interactions can be intimidating (Austin & Sutton, 2014).

C3.02.3 Design Thinking

The "practice by reflection" method is used (Niedderer & Roworth-Stokes, 2007). Virtual reality (VR) has emerged to study and design healthcare spaces using technology as the preferred method for revealing, simulating, and exploring the emotional responses elicited by these spaces (McIntosh & Marques, 2019). Social transformation design incorporates creative ideation, participatory design, and even iterative prototyping. A practice-based research approach demonstrates critical thinking, experimental processes, and reflective "making" practices. Collecting data, documenting it, and reflecting on it will aid in the development and refinement of new concepts and the creation of virtual models. A reflective journal will aid in our comprehension of the techniques used during the concept generation, experimentation, and development phases.

C3.03 Design of Study

C3.03.1 Data Collection

The researcher drew the participants from the Huntington's Disease healthcare community. Data were collected from 22 healthcare workers (Table 1: Demographics) over two weeks via semi-structured in-depth face-to-face interviews and participant observation.

During the one-on-one interviews, the researcher began by introducing themselves to the participants. They began by discussing the project's context and purpose. The researcher asked individuals to share their knowledge of Huntington's disease and related topics and speculate on the types of environments they believe these individuals would thrive.

We accomplished in-depth interviews with patients regarding their personal experiences and the environments in which they live. The researcher initiated the conversation by asking the healthcare providers four open-ended questions.

1. How did it feel to be associated with individuals who had or are currently suffering from Huntington's Disease?

2. Do you believe that the environment influences individuals who have Huntington's Disease?

3. What aspects of their living environment do you believe could be improved?

4. How do you believe we can make their environments more pleasant, comfortable, and meaningful?

The primary objective of the question was to elicit data about the healthcare worker or volunteers prior or current experiences. The researcher rephrased the questions several times in response to the participants' responses to facilitate discussion and ensure that she understood what they said. The researcher asked to write five keywords describing their "happy place." Then instructed participants to use LEGO to create a scenario resembling their "happy place." It was a visual activity. They were asked on a few simple points to aid in their construction. This strategy sparked a discussion about their respective

experiences and points of view. The interviews I conducted helped elicit stories about people's happy places to incorporate them into virtual reality experiments. This demonstrated how various concepts relating to people's dreams and visions can be investigated in real-world settings to improve patients' quality of life.

Bricks can create representations of thoughts, ideas, experiences, and emotions in a metaphorical sense. This study's purpose was to see which LEGO prototypes are using to assist individuals in developing concepts, ideas, and comprehensive design responses. Participants were able to create models of their happy places using LEGO, which significantly aided the researcher in the research design process. Each participant was encouraged to provide additional details about their model. All these approaches have the potential to benefit from collaborative problem solving and mutual understanding.

C3.03.2 Demographics

Age	Gender	Ethnicity		Education	Job Role	Expertise with HD
50 – 60	Female	Indian/Fijian			Support Worker	Day-to-day care for residents with Huntington's Disease.
50 – 60	Female	NZ European	Registered Nurse	Managing Aged Care		Has looked after many people with this disease/condition.
30 – 40	Female	NZ European	Level 4, Mental Health and Addictions	Support Worker		Work alongside service users with Huntington's disease.
30 – 40	Female	Indian/Fijian	6th Form, Health Support Assistant Level 4, Health and Safety rep, NzNo Delegate	Healthcare Assistant		Do Daily Care
50 – 60	Female	NZ European	Secondary School, School Certificate, Diversional Therapy	Support Worker		Assisting & supporting residents in person centered care.
30 – 40	Female	Chinese	Master's level, Registered Nurse	Registered Nurse		Take care of their daily living.
30 – 40	Male		Nursing	CM		Manage and assist people with Huntington's for long term care.
20 – 30	Female	Nepali	C.L Nursing Diploma, Back Country Nurse,	Health Care Assistant		Doing a job for 6 months, supporting them with daily

			Childcare, Labour Care, General Nursing Management		activities, cannot improve the situation but can give them comfort.
50 – 60	Female	NZ European	Postgrad Degree, Nursing	Nurse Specialist for Huntington's disease	30 years H.D specialist care for DHBs.
40 – 50	Female	Samoan/Niuean	Bachelor of Applied Science (pharmacology)	Volunteer	Worked with HD community for ten years. Interface and Interactions with people who suffer from HD and their families.
20 – 30	Female	Filipino	Tertiary, Bachelor of Psychology, Conflict resolutions level 4 certificate, First Aid, Suicide Awareness	Support Worker	Support workers to give them better quality of life.
50 – 60	Male	South Africa	Tertiary, Master's Degree	Health Professional	Clinician
50 – 60	Female	Indian	Level 3	Healthcare Worker	
50 – 60	Female	Nz/ Maori	Physicalist, Level 4, Healthcare Assistant	Physio Assistant	Communication, Daily Care, Walking, Exercise
30 – 40	Female	Nepalis		Support Worker	
30 – 40	Female	Islander/Tongan	Level 3	Support Worker	Assist them with their care.

Age	Gender	Ethnicity	Education	Role	Involvement
20 – 30	Female	Indian	Diploma in Health Sciences Management level 7	Support Worker	Supporting daily activities.
30 – 40	Female	Indian/Fijian	Level 4, Secondary, Nursing Degree		
40 – 50	Female	Chinese	Degree/ Tertiary, Bachelor of Science	Healthcare Assistant	Caregiving
50 – 60	Female	NZ European	High School Year 13	Volunteer	Living with a family member with Huntington's. Involvement with the H.D.
30 – 40	Female	Indian	Postgraduate	Clinical Manager	
50 – 60	Female	NZ European	Enrolled Nurse	Enrolled Nurse	Taking care of Huntington's clients

Table 1: Demographics

C3.03.3 Lego Models
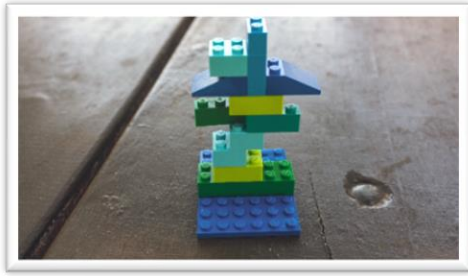
Fig. 15: Lego 1

The sea, Trees, Music, Nature, Dancing

Fig. 16: Lego 2

Music, Mountain top over-looking Mountain view, People, Warmth of someone else, Snow

Fig. 17: Lego 3

Space, Quiet/ Silence, Nature, Peace, Colour
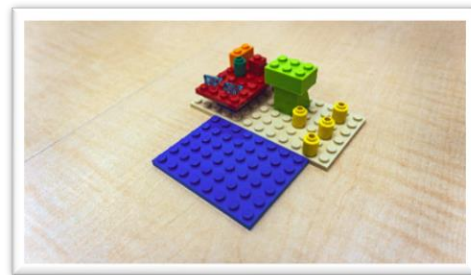
Fig. 18: Lego 4

Island, Family, Wine, Love, Food
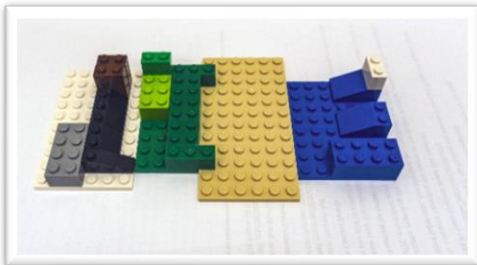
Fig. 19: Lego 5

Outside, Water, Ocean, Breeze, Calm, Sun
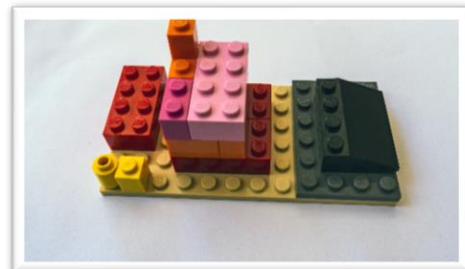
Fig. 20: Lego 6

Calm Place, Family, Spending time with Elderly, Children future

Fig. 21: Lego 7

Beach, Walking, Mum home – Waihau Bay, Kawhia, Wellington – Brothers
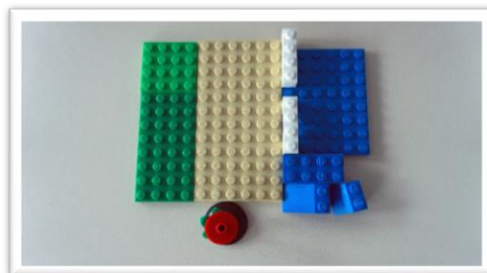
Fig. 22: Lego 8

Beach, Sunny, Windy, Small House

48

Fig. 23: Lego 9

Happy, Modern, Colourful, Family, Peaceful
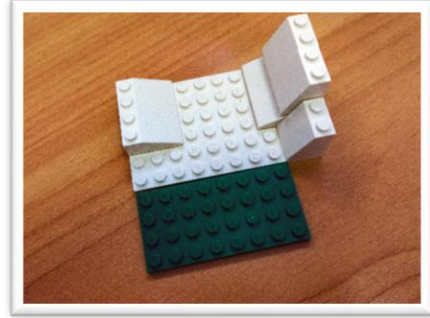
Fig. 24: Lego 10

Simple, Less Colour, Windy, Less work, Less people
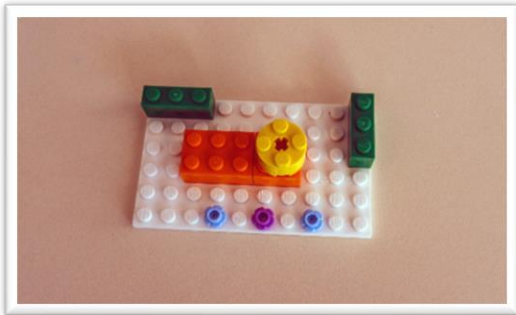
Fig. 25: Lego 11

Temple, Peace
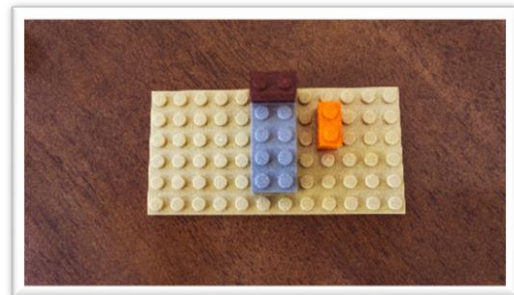
Fig. 26: Lego 12

Beach, Sleep

Fig. 27: Lego 13

Self-time, Comfort, Quiet, Relax, Being me, Colour of Nature
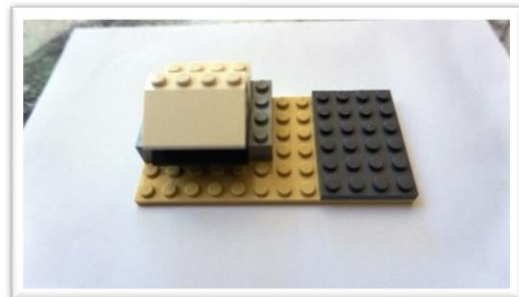
Fig. 28: Lego 14

Peace, Family, Abundance, No Discrimination
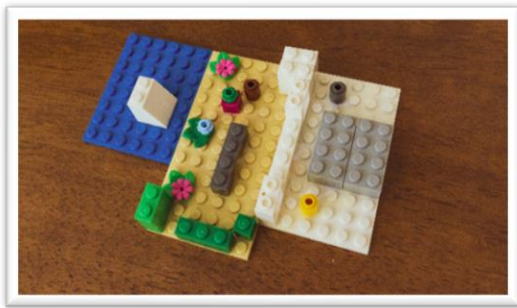
Fig. 29: Lego 15

Clean, Food, Care, Comfort, Entertainment
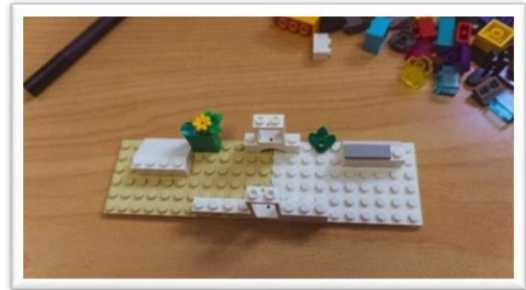
Fig. 30: Lego 16

Family, Plant, White, Tidy, Quiet
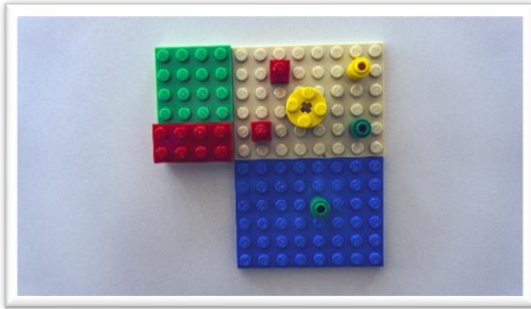
Fig. 31: Lego 17

Mt Manganui Beach, Tauranga, Family
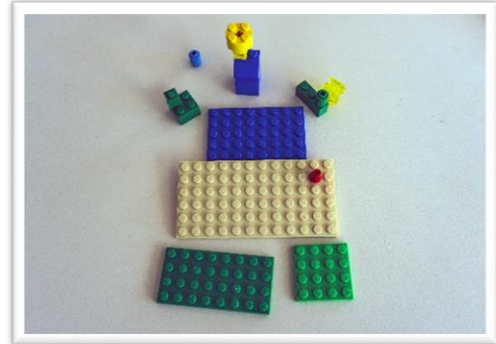
Fig. 32: Lego 18

Beach, Childhood, Calm, Sound of Waves, Peaceful, Cool Breeze
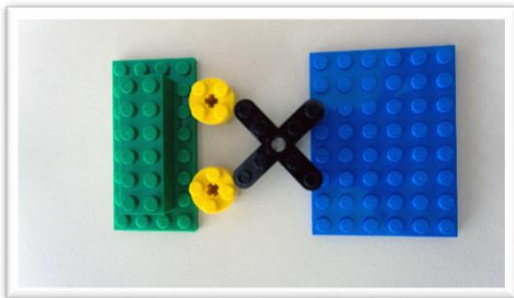
Fig. 33: Lego 19

Water, Greenery, Breeze, Peace, Happy

C3.03.4 Participant Observation

Fig. 34: Lego Pieces

Colour was more important to the participants than other variables, and many made intentional choices. For example, many participants knew which colour piece they wanted to use and made a point of obtaining it when assembling their Lego model. Green and blue were the most popular colours, and the results revealed that some people prefer brighter settings, while others prefer subdued settings. Others preferred an all-white or extremely muted colour scheme. The Lego bricks came in a wide variety of bright colours (Fig. 34). Nature was a recurring theme throughout the experiment, with many participants including plant and tree elements in their Lego creations. Only a few people objected to the overuse of plants. Everyone took their time creating and imagining, taking anywhere from 2 to 8 minutes depending on the level of detail they desired. While some expressed a desire for warmth, the vast majority expressed a preference for calm and breezy weather or slightly windy but comfortable weather. They talked about how far they were from scenic areas like sitting in the grass or sleeping on the sand with mountains in the background.

C3.04 Analysis

The term "theming" refers to the process of identifying shared concepts, themes, or ideas. Following that, participants' words, phrases, and text passages give meaningful names that accurately convey their meaning (Austin & Sutton, 2014).

C3.04.1 Results

Participant x1 desired to assist a family member, and thus became involved and performed the required tasks. She developed resentment toward her husband because of his transformation and her desire to assist him in any way possible.

"It was difficult to figure out what they were thinking," she says. She advises people to live in the present moment and not to worry about the future. There is still a glimmer [sic] of hope at the end of the tunnel."

Huntington's disease is poorly understood, and little is being done to assist those affected. She says that the living environment of a disabled person should be favourable to their sense of health and safety. They require personal space. She believes that more information about Huntington's disease should be made accessible. Music, she claims, is beneficial because it is relaxing and keeps distractions at bay. Her "happy place" is surrounded by mountains, forests, and the sea, which she finds comforting, especially when she is near water (Fig. 15).

According to Participant x2, life is filled with both happy and sad moments, as well as rewarding ones. He has previously worked with a variety of people who have Huntington's disease.

He stated, "when time is limited, we frequently lose sight of what is truly important in life."

When he discusses the environment, he emphasises that it is more than a physical structure. "Many patients are isolated from their families and experience loneliness. Most people's mobility decreases as the disease progresses. Individuals become isolated and lonely because of their circumstances. Humans have an active cycle in which they perform tasks, get some sun, and then rest, which is impossible to replicate indoors.

Isolation is exacerbated when stimulating activities, communication, or the ability to communicate while indoors are unavailable. It would benefit them to have the opportunity to spend time away from the house. Many people spend an inordinate amount of time in bed or watching television, which are both poor choices."

He recommends increasing natural light and open space to create the illusion of a larger, brighter space. He goes on to emphasise the significance of both systemic and patient-centered thinking. Due to the difficulty of housing frail people in the same space, he recommends smaller support living units or in-home care. A calm, bright environment with a fireplace and the ability to visualise the immediate area around the fire with tree shapes and shadows is the participant's "happy place" (Fig. 17).

Participant x3 is a support worker for the Huntington's Disease Association. She describes it as a learning experience, but one that has proven extremely useful in her line of work. She sees a wide range of Huntington's disease patients at various stages of the disease.

"Some are just getting by making ends meet, some are struggling; some are on their own. I have seen rest homes in the most horrible conditions. Some, individuals have families, while others are appeared [sic] to be happier with their current circumstances. Huntington's disease manifests differently in everyone. Certain members of the community receive care. While some are excellent, she claims that others are unaware of the disease," she explains. Understanding illness can help one make sense of their surroundings and feel more secure. The inability to process objects is a problematic aspect of Huntington's disease. Huntington's disease, she claims, is present in most mental illnesses, including anxiety and depression. It can be beneficial to create a calm environment, and she clarifies that the sounds could be ambient rather than music. Furthermore, ASMR sounds like someone is preparing a meal with pots and pans. Her "happy place" is atop a hill with a 360-degree view, above the clouds, surrounded by someone's warmth and feeling the breeze (Fig. 16).

C3.04.2 Summary

Participants shared their personal experiences and perspectives on patient care, emphasising existing challenges and the importance of patients improving their well-being in a more pleasant and comfortable environment.

These interviews revealed that these patients require constant stimulation, private, secure, comfortable, a peaceful, and open environment where they can see and hear what is going on outside. Constant stimulation of a peaceful place would benefit patients' health while they are in their "happy place".

While everyone is unique, the overarching goal of this project is to experiment with and develop creative solutions by incorporating individuals' thoughts into these concepts and investigate them through virtual reality.

I observed how they used colour, space, and elements by listening to people's experiences. In listening to participants stories, these interviews were crucial for assuring the research's authenticity and avoiding preconceived notions. By providing themes and design ideas, "happy places" can contribute to constructing immersive, atmospheric spaces.

Chapter 4. Research Practice

C4.01 Iterative design cycle
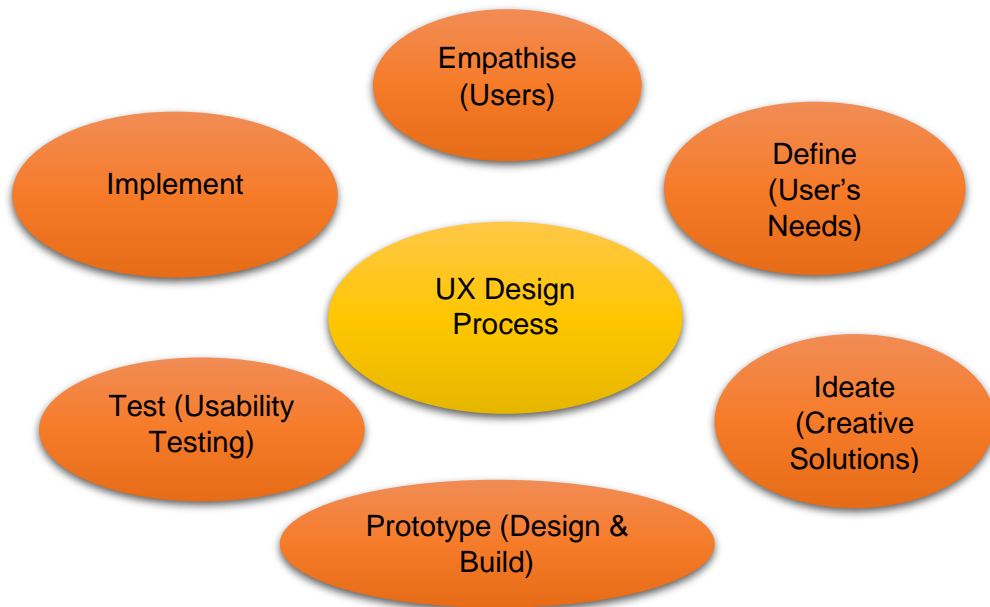
Table 2: UX Process

The iterative design method employs experience processes. Among the stages are concept reflections, prototypes, and tests. Early testing determines a functional prototype's efficiency and usability, increasing the likelihood of project success and future research. Prototyping, evaluating, analysing, and refining are all part of the iterative design process. It is a process that includes reflection to provide a positive user experience, which is then iterated on throughout the design phase. The design of a product has the potential to do much more than improve its appearance or feel. Well-designed frameworks make it easier to use good services. The goal of this study is to identify knowledge gaps that may lead to new ideas. We collect data on a user's desires, motivations, and perceptions. Using the user's Lego prototypes, a virtual environment design prototype is created. The artistic storytelling process serves as a foundation for creative processes, resulting in the creation of healing environments. The ideas will be expanded into a future work application system.

C4.02 Inspiration

C4.02.1 Biophilia

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Fig. 35: Biophilia Inspiration Board

Thoughts

When considering a healing environment, biophilia was my first source of inspiration. Then, I started by looking at various elements, such as the structure, techniques, designs, and locations where biophilia is used (See Figure 35). My initial interest in curvy organic systems was motivated by their psychological properties. I discovered methods that make use of nature and trees growing from the inside (MARCOS, 2016), as well as grass on the inside (Tayloe, 2017), open ceilings (Mclean, 2020) and the abundant use of wood ("Studio Gang's Curvaceous Wood Pavilion at Chicago's Lincoln Park Zoo, 2011). My attention was drawn to the circular and hexagonal shapes (June et al., 2020). I learned from my previous research that patients found these geometries to be relaxing. Blues, greens, and browns are the predominant colours for biophilia that I find healing. I'm compelled to create designs that are expressive of the natural world by combining these natural ideas together. One idea is to illuminate plants or objects, which could create a space atmosphere, while using colours that contribute to a space's comfort, sense of purpose, and belonging.

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Fig. 36: Lighting Inspiration Board

C4.02.22: Thoughts

Lighting is an important aspect of the atmosphere of a room. Soft lighting can help to create a meditative atmosphere (Fig.36). The LED lights ("Lighting Design for Healthcare—WSP, n.d.) in the Moodboard and the orange fog shown in Unreal Engine ("Corridor – Blade," n.d.) piqued my interest because fog determines the atmosphere for the scene in a distinct style. Exterior-facing windows, various types of wood, and, of course, skylights can all help to boost one's mood. I came across an unusual type of house in the shape of a seashell ("The Nautilus House | The Owner-Builder Network, 2012). I genuinely loved the vibrantly coloured grass, which emitted beautiful hues throughout the space, adding to the overall sense of well-being.

One idea you can see is illuminating the entire space with one or two colours and then using a ceiling light circadian system ("Colour-Infused Spaces Aid Mental Wellbeing | Stylus, 2021) Chromatic hues are also environmentally friendly. Applying bright LED light treatments throughout the healing process may aid in both mental and physical restoration. I am most intrigued by the possibility of utilising sunlight in the spaces I design.

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Fig. 37: Surrealism Inspiration Board

C4.02.31: Thoughts

I observed digital artists who create surrealistic settings (Fig. 37) by combining unusual natural forms and structures with fictitious concepts (11 Digital Surrealists, 2020) They were successful in incorporating colour, lighting, and biomimicry design elements. The vibrancy and colour palette can be customised based on each color's unique set of health benefits, such as depression relief or sleep aid. These designers created floating beds in the water (Dribbble—20210308_Good-Places_03_CAM-01.png by Camilo Ciprian, 2021, p. 2021) well as flowery landscapes (Portal Spaces / Flower Field by Danny Jones on Dribble, 2020).

Hugo Fournier, a futuristic and award-winning architect, is best known for his work on "La Serre" ("Hugo Fournier on Instagram et al., 2021) The concept shows the growth of nature indoors with the shape of the structure in a curvy design. I also loved how the artist incorporated natural elements, such as the fuchsia in another design and how they've used monochromatic red, pink tones throughout. It emphasised vividly dreamlike spatial styles such as surreal spaces and calming and intriguing features, as demonstrated another concept by a different artist the cloud tree called "daydreaming" by Morten lasskogen. He calls it his atmospheric creation (Avant Form, 2020).

Joe Mortell's work is characterised by bizarre concepts and an abundance of natural elements and vegetation (Lucy, 2021). As you can see, most interests revolved around colour and lighting, including biophilia and I enjoy the idea of surrealism. I concentrated on these four primary areas for the visual aspects of the design to successfully generate atmospheres and imaginative ideas for "happy places" in telling a story through my designs.

C4.03 Doodles

Fig. 38: Doodle 1

Fig. 39: Doodle 2

C4.03.1 Thoughts

I began jotting down some of my own ideas using the inspiration boards but also my happy places. To complete the method, I needed only a few bright pens. The process of forming circular and curvy forms in my mind as I imagined myself in a world of colour, fantasy, and magic was relaxing (Fig.38). The vast space is strewn with various natural elements, ranging from decorative to suspended and unusual in scale. When I'm in the clouds, I consider possible routes to a mystical place; (Fig. 39) there would be an adventure and the sensation of being completely alone, possibly with some animals, but plenty of pure nature and various painterly colours. This is ideal for me because it is calming and relaxing, which I prefer as my "happy place."

C4.04 VR Art
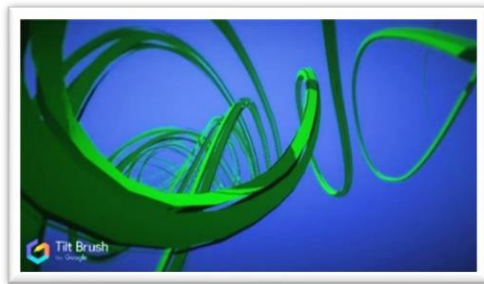
Fig. 40: Vines

Fig. 41: Bubbles
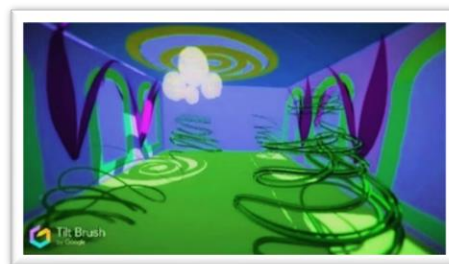
Fig. 42: Nature Indoors

Fig. 43: House

Fig. 44: Mountain
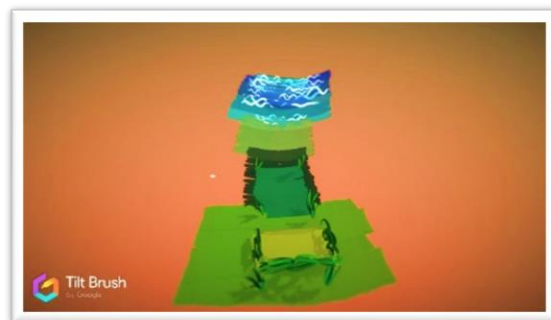
Fig. 45: Grassy Path
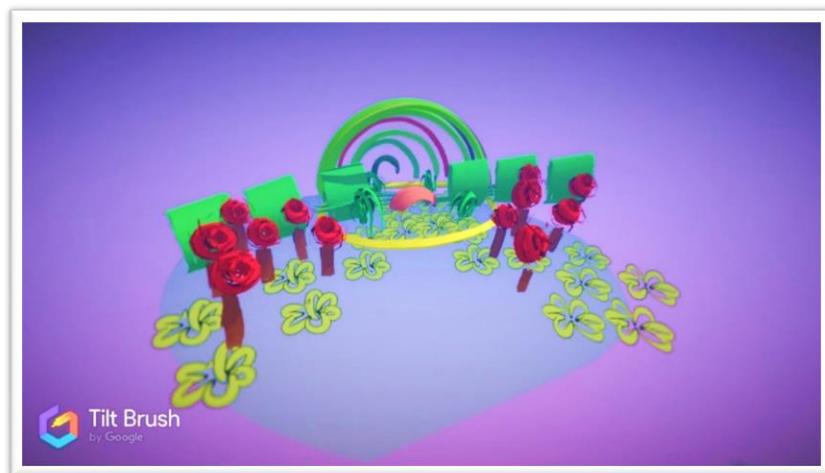
Fig. 46: My Happy Place

C4.04.1 Thoughts

I had the idea of creating virtual reality "happy worlds" based on stories about residents of care homes for several months, but I had no idea who or how to do it. At the time, it was merely an idea. Tilt Brush is a virtual reality artistic tool that enables users to create three-dimensional drawings in VR. As a result, while I awaited the processing of my ethics application, I research and learn how to incorporate it into my design workflow. To become acquainted with Tilt Brush, I began creating elements based on my doodles (Fig.38) and (Fig. 39). It took some time for me to get used to drawing in the air with my hands. But I love painting. (Fig. 42) expresses an open-ceiling room lit by white luminaires, and I liked the curvy shape of the vine brush. I used a variety of blue and green hues, yellow and white in (Fig. 44) which depicted a small mountain-dwelling that I aspire to own as my peaceful place. (Fig. 45) illustrates a grassy meadow that leads to an ocean or lake. Then, I create a dome-shaped structure (Fig. 46), as domes fascinate me, and then add large flowers, as I imagined myself in a happy place surrounded by giant flowers. While the initial attempts were successful, additional experience with Tilt Brush was required. On the other hand, concepts began to emerge. They were free-spirited and playful.

C4.05 Concepts

Inspired by participant-created Lego prototypes, I create five new designs. I work on 4-5 concepts for about two weeks. Then I made two more. I devised seven distinct Tilt Brush concepts. I combined my thoughts and made themes. While I did differentiate the concepts theoretically, they all have a biophilic quality. Participants incorporated biophilia into their Lego creations, overtly and subtly, including trees, plants, and water. I experimented with various brushes before settling on the paper brush. The paper one was my favourite because the texture added depth to the drawing. I customised the artworks components, colour and scale. My thoughts began to emerge as I began to investigate the possibilities.

C4.05.1 Colourful House

Fig. 47: Colourful House

C4.05.2 Garden Room
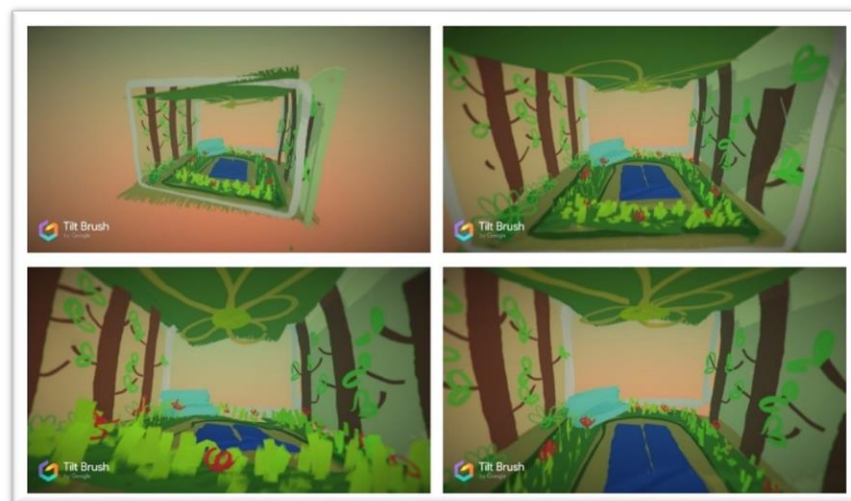
Fig. 48: Garden Room

C4.05.3 The Blue
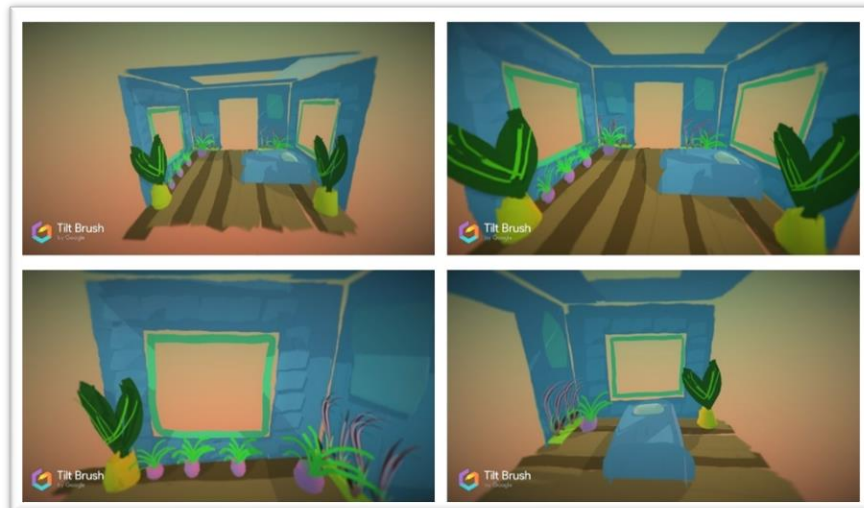
Fig. 49: UndertheSea

C4.05.4 Dome Forest

Fig. 50: Dome Forest

C4.05.5 Modern Natural

Fig. 51: Modern Natural

C4.05.6 Serene White

Fig. 52: Serene White

C4.05.7 Warm Haven
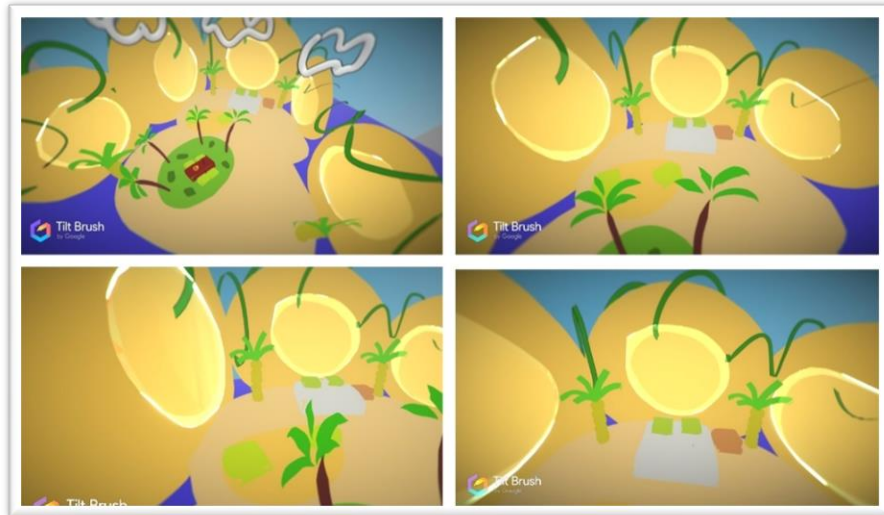
Fig. 53: Warm Haven

C4.05.8 Thoughts

(Fig. 48) depicts a Garden area with a small pond, which a participant described as "a place to quietly sit and read," The colour green is dominant. Many participants expressed a desire to live near the ocean. I designed a room with blue walls (Fig. 49); it could be a room beneath the ocean blue. I wanted to concentrate on something earthy, so I built a dome filled it with trees and grass as a participant wants to be surrounded by trees (Fig.50). My favourite colours were oranges and greens. I started working on a more modern fantasy design that included natural elements throughout the space, such as a large lawn (Fig. 51). Then I made something more peaceful (Fig, 52). It gradually incorporates softer pastel hues.   Another is more open and welcoming, with a homey, island-like vibe and warm colours (Fig. 53). To create these conceptual themes, I combined my ideas with elements from people's stories. I designed a colourful house (Fig. 47) that resembles a participant's happy place (Fig. 19), but I added elements to the interior with my own thoughts. I installed a bed with pillows for the participant because they would like to be comfortable.

C4.06 Challenges

Fig. 54: Colourful House in UE

I spent weeks fine-tuning Tilt Brush models in Blender before importing them into Unreal Engine (Foundation, 2021) Blender's slowness and inability to handle the high polygon count of tilt brush components posed a problem. My progress was hindered significantly by severe technical difficulty and error. I should have painted with a single brush and then imported the file directly into Unreal Engine. These techniques resulted in a distinctly cartoony atmosphere. The stroke colours are saved to the vertex colour channel when you use Tilt Brush. A massive amount of geometry combined with multiple materials can produce a basic appearance with different colours if we use one type of brush: paper, and as many colours. I completed the task with the colourful house model (Fig. 54). Learning the fundamentals of Tilt Brush was fun, but when I imported the 3D sketch into a 3D engine, I was hoping for a more finished result. More powerful methods can achieve high-quality results. Instead, I decided to 3D model these spaces and experiment with that approach.

C4.07 Workflow

1. Modelling

2. Sculpting

3. Texturing

4. Lighting

5. Rendering

6. Animation

7. Composition

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1. Blender 3D

2. Zbrush

3. Adobe Substance Painter (SSP)

4. Unreal Engine (UE4)

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1. 6 Concepts

2. 3D Model Low Poly Models in Blender Using Tilt Brush Concepts

3. Create Blockouts, Appling Basic Materials

4. Test Scale in UE4

5. Create High Poly Models from Low Poly

6. Add Sculpting Details for More Complex Models in Zbrush. Use Dynamesh.

7. Create a Low Poly in Zbrush by Decimation.

8. Zbrush Master UV Unwrap Tool

9. Bake Low Poly & Hi Poly in SSP to Create Normal Map

10. Texture Paint Models in SSP.

11. Export Textures for UE4 & Export Models from Blender.

12. Place Models and Create Materials Using Texture Maps and Apply to Models in UE4.

13. Setup Lighting & Colour in UE4

14. Create Materials for Nature Assets.

15. Add Ambient VR Sounds

16. Usability Test at Every Stage.

17. Final Build in UE4.

Table 3: Workflow

C4.08 3D Modelling

C4.08.1 Blue Ornament
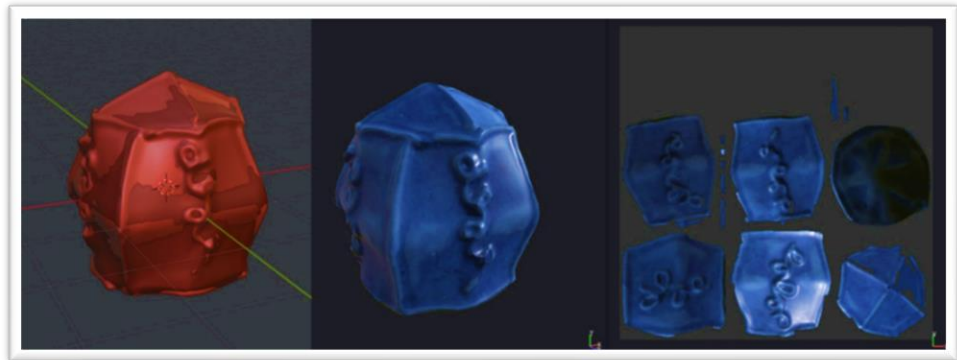
Fig. 55: Test Model 1

I begin by creating a few test models. A slew of technical issues arose. In Blender, UV unwrapping is difficult. Zbrush was an excellent UV Unwrapping tool. Zbrush was also widely used for sculpting and detailing, as seen in this model (Fig. 55). I experimented with the texturing software Substance Painter to create normal maps. I began with a soft blue oddly shaped ornament, subdivided it, and then decimated the hi-poly to a lo poly, for example, 786,432 to 3072. I created the normal map by combining meshes and transferring geometry details from the hi- to the lo model. I was unaware of the functions of substance painter. To ensure proper baking and physical representation in UE4, I discovered that all models in 3D software should be scaled 1:1. The geometric surface had to be correct to avoid errors. This was a difficult procedure, the models' baking kept failing; after two weeks of trial and error, I succeeded, and one model worked.

C4.08.2 Tree Stump
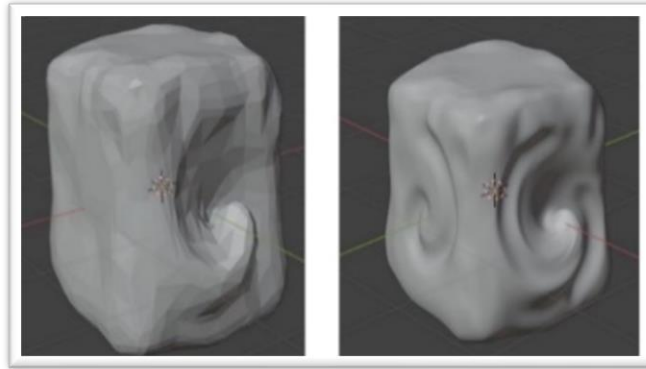
Fig. 56: Test Model 2 lo poly

Fig. 57: Test Model 2 Hi poly
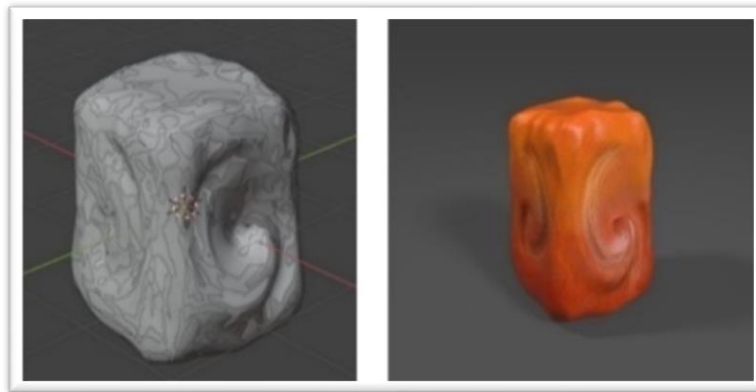
Fig. 58: Test Model 2 Hi Lo Combined

Fig. 59: Test Model 2 Textured

I made a new test model. I knew I wanted a tree stump in the garden room (Fig. 59). I used Zbrush to create an organic texture reminiscent of natural elements by sculpting a curvy swirl around each polygon and then reduced the 338,688 polygons to 1662. The true challenge this time was reviving the baking map process. It was difficult to keep low polys and accurate UV, but I needed to bake maps to move on to the next step. Setbacks occurred regularly, but I persevered. I painted the tree stump orange to give it an autumnal feel and to match the maple trees I'll be attempting to create in the garden room. Orange is a warm colour that I intend to use in the garden room.

Chapter 5. Results

C5.01 Garden Living

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Fig. 60: Garden Room Inspiration Boar

C5.01.1 3D Modelling

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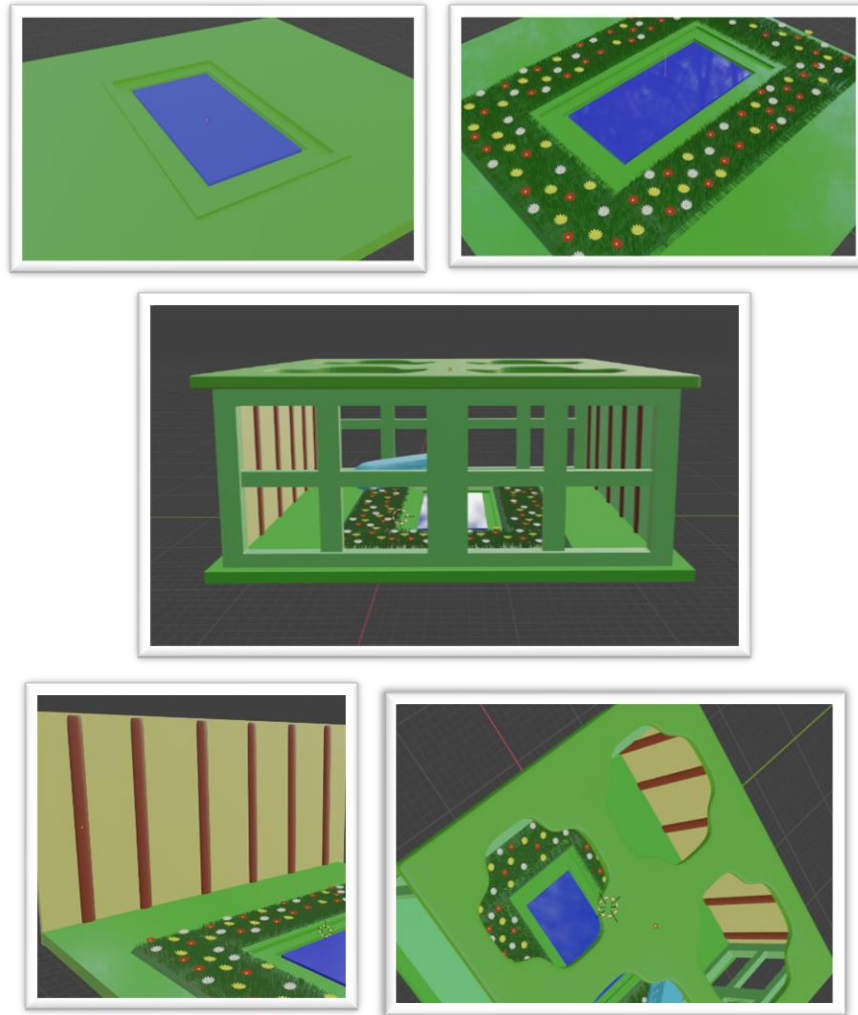
Fig. 61: Garden Room 3D Modelling

I experimented with the composition of the garden room design while 3D modelling in Blender, as shown in (Fig. 61). I looked at the tilt concept (Fig. 48), but I tweaked it slightly because I made design decisions. I worked on various meshes throughout the process, including the ceiling and windows. Green, the primary colour, contrasts nicely with the oranges. I made large windows to allow for views from all sides. The pond was in the heart of the room. I fine-tuned it in Blender until I was satisfied, then began testing an initial setup in UE.

C5.01.2 Texturing
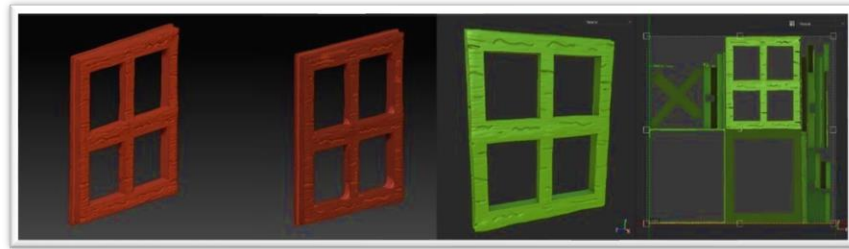
I wanted the garden room's wooden windows to have a biophilic green wooden appearance. I used Zbrush to add details like dashes and a wood grain texture using an alpha.
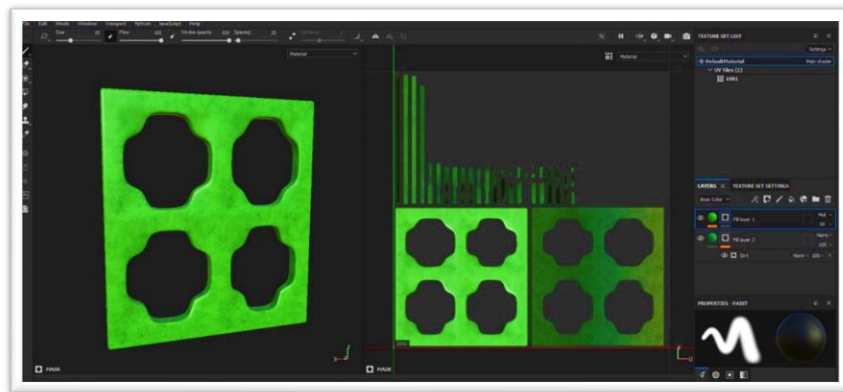
Fig. 63: Texturing Ceiling in SSP

UV was a constant issue with this ceiling, which I redid several times. Rather than adding details, I decided to leave the mesh as a simple surface. The shape of the ceiling, on the other hand, was what I wanted. While texture painting, I experimented with texture filtering and added a dirt filter to give the colours a powdery layer. As my experiments progressed, I was thinking new things with this software.

C5.01.3 Test One
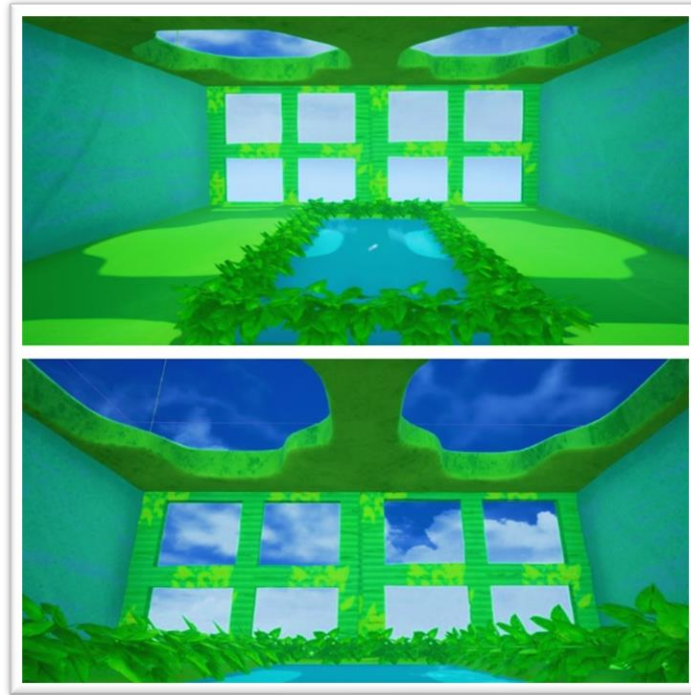
Fig. 64: Garden Room UE Test 1

I performed the first test in Unreal Engine with the HTC Vive virtual reality headset. There were errors in the scale of the environment. It's critical to get the scale of your models and texture details just right when working in VR. I began by incorporating the pond (Fig. 64), which would serve as the area's focal point. The water material was created by modifying UE's lake shader. Because of the problems with the light sources, I experimented with lighting and shadows; despite the sun's peculiar shadows, the virtual reality texturing appeared to be quite acceptable. Under the flowers, there were no shadows. To accurately represent the real world, I discovered that the height and width of each model had to be consistent. Instead of making three-dimensional meshes for plants, I'm thinking about using paint effects.

C5.01.4 Test Two
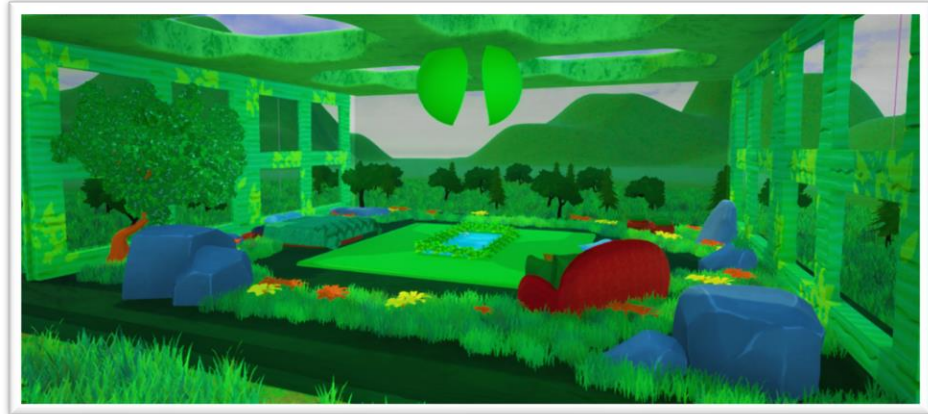
Fig. 65: Garden Room UE Test 2

After assembling all the assets (Fig. 65), I ran a second test to understand the space and colours. I formed the room using the large windows on all sides. I needed to position the sofa ideally while also considering the placement of the plants and trees. Additionally, I was not a fan of the green hanging flower on the ceiling, but I desired something; there, although the ceiling could do without it. Lighting was very dark at this point as I only had one sun and skylight and the sky sphere.

C5.01.5 Test Three
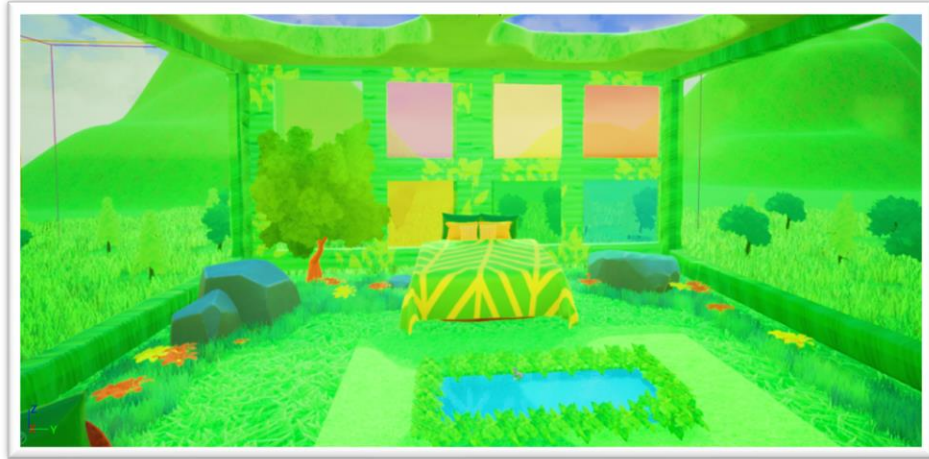
Fig. 66: Garden Room UE Test 3

During testing, I addressed the lack of light. When I switched out the static lights for dynamic ones, it brightened up. In addition, I was constantly experimenting with the settings for capturing the coloured glass reflections on the windows. When I added pieces to this space, I ignored it as a room and instead incorporated rocks, trees, plants, and other outdoor elements, allowing my creative spirit to flow freely and create. Green and yellow started to appear in the design (Fig. 66), most notably in bed designs. Instead of adding grass in the centre with the foliage tool, I put it around the corners. While testing again, I discovered that the sofa model was significantly larger than necessary, the grass did not match the colour of the ground. Every single item was far too large. The blue skies' open ceilings were the best yet. The environment had to be breezy and quiet, with subtle nature sounds, very serene and fresh, vibrant, and exuberant, with plenty of space for reading and sitting.

C5.01.6 Fluffy Trees

Fig. 67: Maple Tree

Fig. 68: Maple Tree Close-up

Fig. 69: Diffuse Map

Fig. 70: Opacity Map

Photoshop was used to create diffuse and opacity maps (Fig. 69 & Fig. 70) for the leaves. Using my pen tablet, I quickly drew out the leaves in the appropriate colours and layers. Photoshop materials were then used to create a material shader in Unreal Engine to attach the tree leaves to the tree, as shown in (Fig. 68). Because this room has an autumnal feel, I made maple tree leaves.

C5.01.7 Material Instances
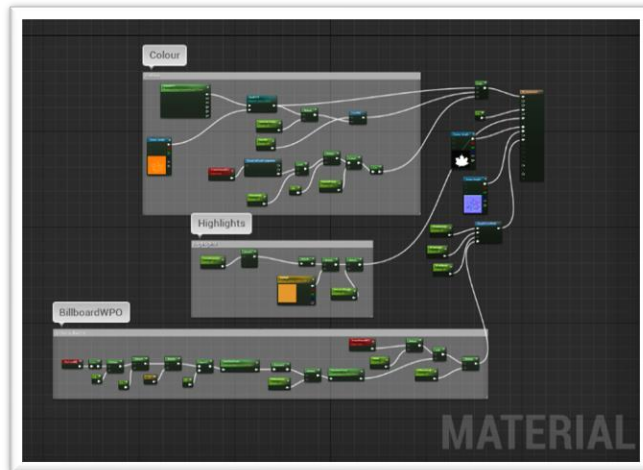
Fig. 71: Tree Material Blueprint

You must create your own shader or "Materials" for your mesh in a game engine. These materials completely control mesh lighting, shading, and colouration. Materials instances can be created from your shader, and the settings can then be adjusted, as shown in (Fig. 72). This allows us to adjust the number of highlights, fluffiness, and inflatability until we are happy with the outcome. The material's blueprint is shown in (Fig. 71).
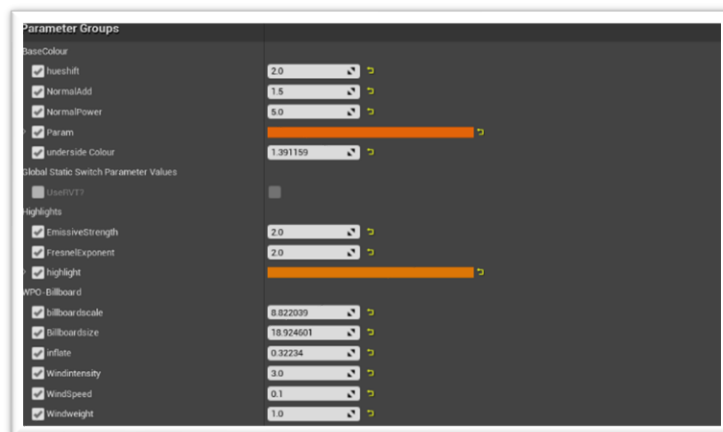
Fig. 72: Tree Material Settings

C5.01.8 Test Four

Fig. 73: Garden Room Test 4 in UE

I tested the setting with trees enough to give the impression of "being outside." Colours were essential in creating a welcoming and inviting atmosphere. The bed and couch were a perfect match for the colours in the room. The participant will be seated on a sofa with a 360-degree view of the room. The overall visual appeal of the experience should be strong. A variety of seating options add to the room's cosiness. I put a few rocks near the windows. I actively edited the lighting because I wanted more harmony between the various components (Fig. 73). It should light up the room but in a soft, vibrant way.

C5.01.9 Materials

C5.01.9.1 Grass

Fig. 74: Green Grass
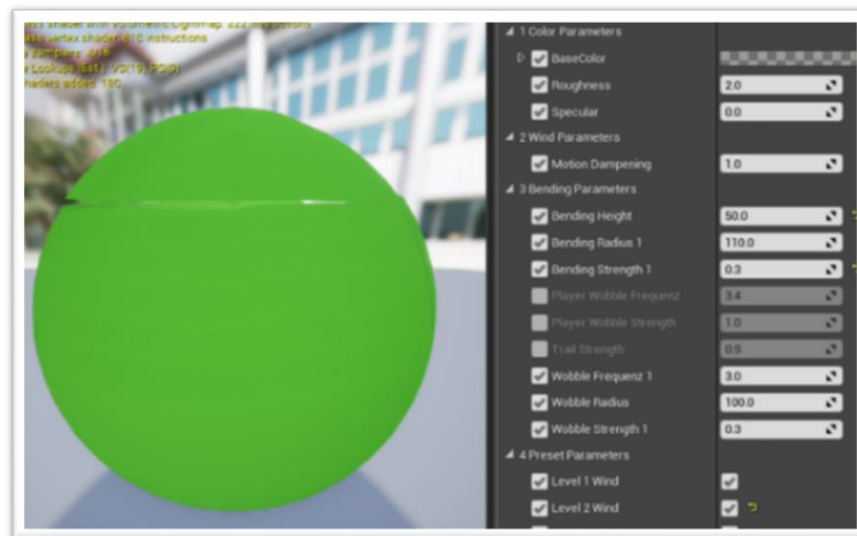
Fig. 75: Grass Material Settings

I created a grass shader, then a material instance, and applied it to the grass mesh using Unreal Engine's foliage tool. I explored with the settings (Fig. 75) until I got the desired shade of green that matched the ground colour (Fig. 74). The shader came in handy when creating a slight windy variation.

C5.01.9.2 Glass

Fig. 76: Green Glass

The grass was laid around the room using a mesh I created in Blender. The desired outcome is fluffy soft grass made to feel like it's growing from the ground.

Fig. 77: Glass Material Settings

I was also tinkering with the glass (Fig. 76) to get the desired green colour and translucency using the material settings (Fig. 77).

C5.01.9.3 Stained Glass

Fig. 78: Stained Glass Material
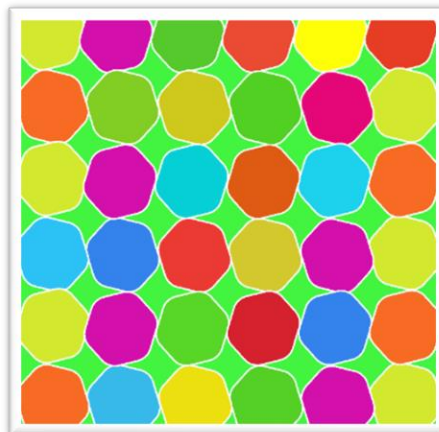
Fig. 79: Stained Glass Illustrator Texture

The stained glass texture was created in Illustrator (Fig. 79) and then imported as a material into Unreal Engine. By selecting a light option from the menu, I made it glow (Fig.78). Rather than using a traditional stained glass pattern, I created a hexagonal texture to complement the ceiling space on the floor and the room's surfaces. This was well reflected in the organic shape of the ceiling and the patterns on it. The colour palette was intentionally kept colourful like the other windows in the room.
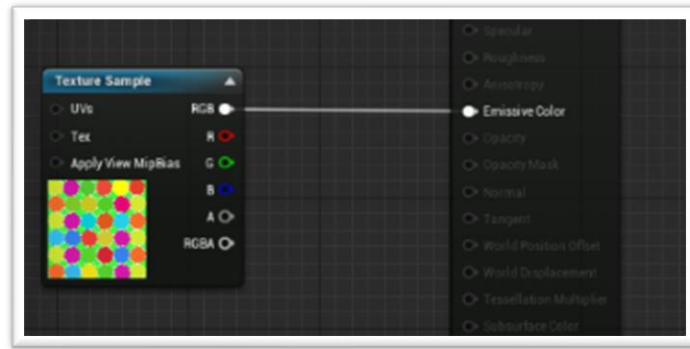
Fig. 80: Stained Glass Blueprint
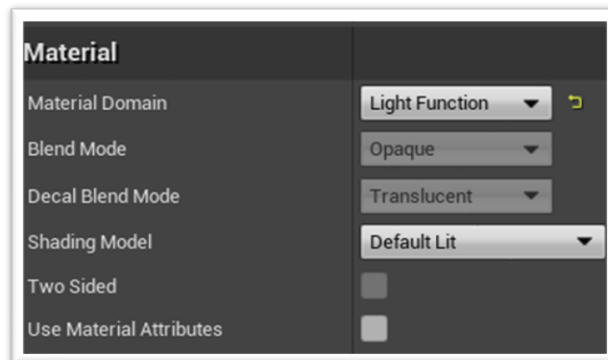
Fig. 81: Stained Glass Settings

C5.01.10 Texturing
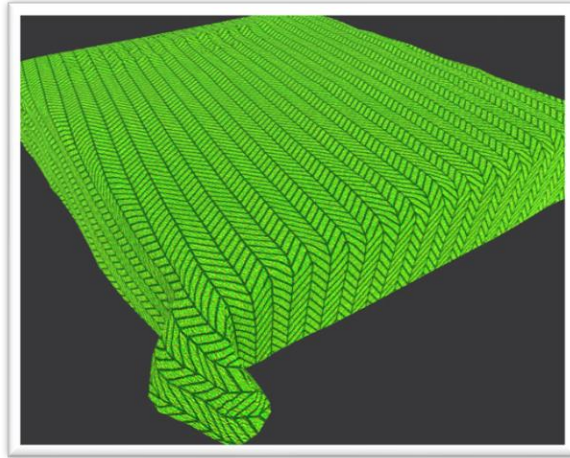
Fig. 82: Texturing Green Blanket in SSP

I wanted to update the bed's pattern to something more attractive and complementary to the space's greens. I discovered this triangular pattern while texturing (Fig. 82), which resulted in an appealing biophilic aesthetic. Furthermore, I chose to incorporate it into a few of the pillows.

Fig. 83: Garden Room Bed Close-up

C5.01.11 Final Design

Fig. 84: Garden Room Final Design
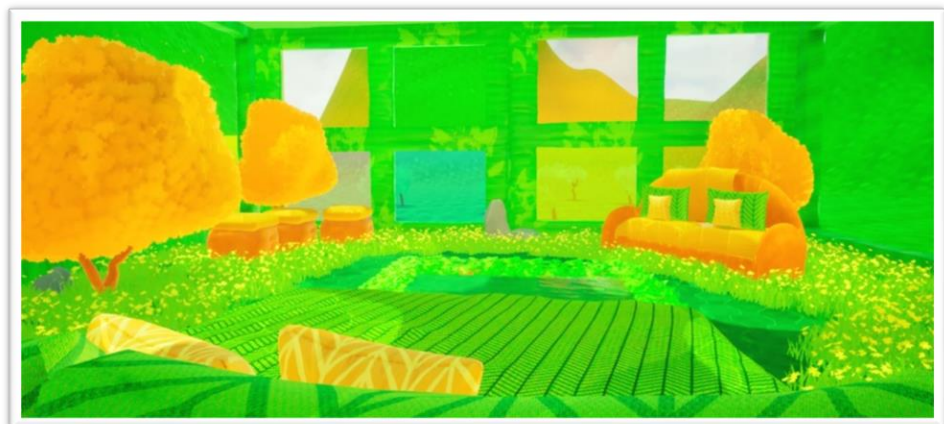
Fig. 85: Garden Room Final Design Image 2

C5.01.11.1 Thoughts

I repainted the sofa furniture to match the bed (Fig. 85). The lighting improved as I worked on this environment. The final design (Fig. 84) was visually appealing while still retaining a painting style. Throughout the lighting process, I employed techniques such as directional lighting to draw attention to specific areas and highlight various features and colours. The sky and the sun were both dynamic. For lightening the mood, I included fog because even a little mist adds realism to the environment. The goal was to create a simulated autumn garden atmosphere in a room using lighting and sound effects. Using the Unreal Engine's water plugin, I tested the pond's appearance. It produced lifelike water. I had to play around with the settings to get the exact colour I wanted.

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C5.01.12 Sound

Fig. 86: Garden Room Sofa Close-up

Spatialisation is the process required to ensure that listeners can hear the sound from all directions. Ambient sounds in virtual reality require more than stereo recording. Four channel ambisonic recording is necessary for virtual reality because it enhances the quality of the VR environment, allowing the participant to become more immersed in it. I edited the sounds to make them ambisonic and adjusted Unreal Engine settings like pitch and volume. Animals, children playing in the park, and pleasant instrumental ambient music uplifting and happy will be the sounds in this environment. Greens, oranges, yellows, and browns all contribute to the impression of being in a lively setting. I used the same particle system that I used to make the flowers to create butterflies. Moving something creates a more immersive and authentic experience. Butterflies, with their healing properties, contribute to a therapeutic garden environment.

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Fig. 87: UndertheSea Inspiration Board

C5.02.1 3D Modelling

Fig. 88: UndertheSea 3D Model

The blue room concept (Fig.49) emphasises the significance of creating a calm, tranquil, and pleasant environment. While decorating the room, I referred to my inspiration board (Fig. 87). I observed how the forms were used and positioned and tried to recreate those designs. It necessitated the construction of a room out in the ocean (Fig. 88). This space's narrative revolves around someone who is enveloped by the sea. I went back to my Tilt Brush drawing and tried to recreate the bed and some plants. To complete the organic look, I carved circular holes in the walls. Each idea, according to my hypothesis, will have an open ceiling. It's nice to look up at the sky and appreciate how blue it is. For the plants, I used pale blues with hints of yellow, purple, and green. It'll be dominated by blue because that's the colour palette I've chosen for it. To create the atmosphere, I imagined something gentle, below, and serene in the air. The model's details will be modified, textured, and finally imported into UE for testing.

C5.02.2 Texturing

C5.02.2.1 Sea Arch
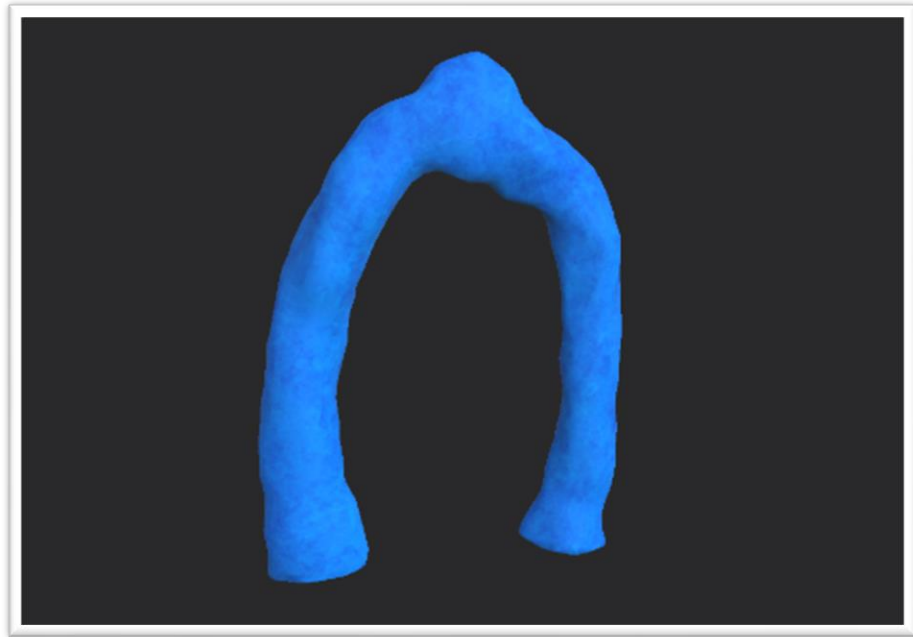
Fig. 89: Texturing Sea Arch in SSP

Wave erosion or solution both contribute to the formation of sea arches. The extinction of these organisms could have disastrous consequences for the oceans, which are home to mor$e than half of all life on Earth. Because sea arches are sea elements (Fig. 87), I built a simple 3D model rounder than rectangular because I wanted to collate circular pieces in the concept. I went with a soft stone-like texture (Fig. 89). However, as I experimented with different textures and colours beneath the sea, mossy greens came to mind.

C5.02.2.2 Sea Wall
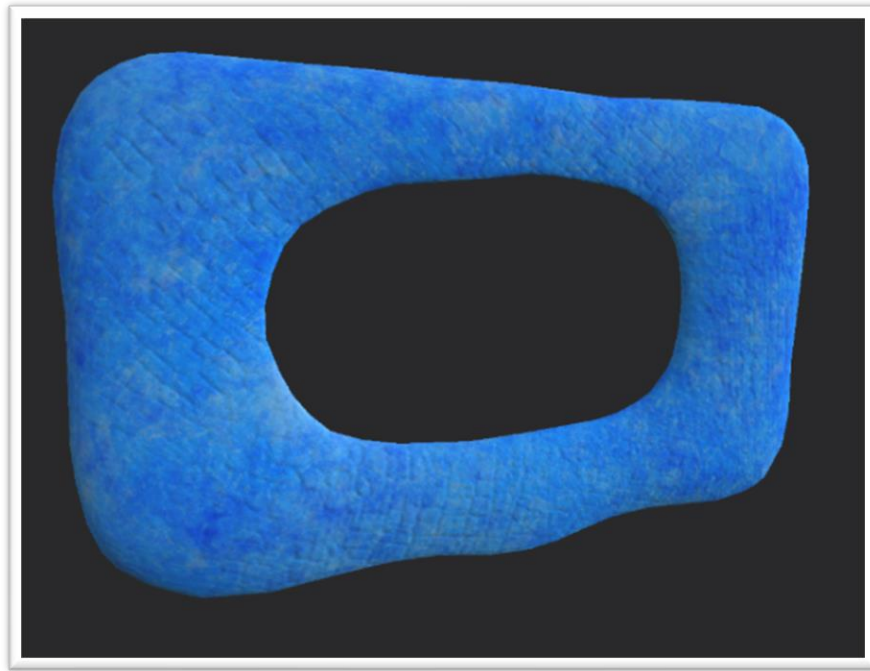
Fig. 90: Texturing Sea Wall in SSP

The first thing I did was give the walls of the blue room a natural round shape. I subdivided the model slightly sculpted it to add scratches (Fig. 90). I made the normal map in Painter by converting the hi-poly mesh to low-poly and used paintbrushes for something basaltic. I added some unevenness with concrete textures and highlighted some surface scuffs by painting multiple layers of a bright blue and various shades of dirt. This was inspired by the image of a person looking out (Fig. 87).

C5.02.2.3 Sea Cushion
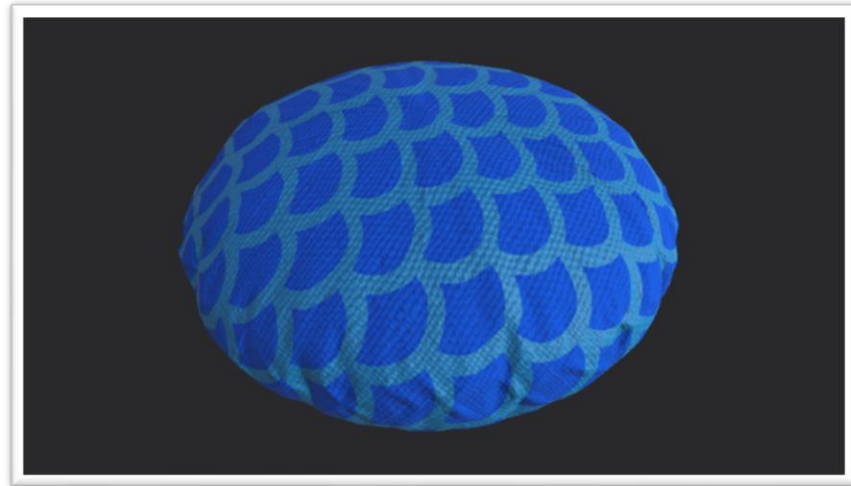
Fig. 91: Texturing Sea Cushion in SSP

I create a blue cushion with a soft material. I wanted to maintain the same pattern throughout the procedure. I was drawn to the meditation room (Meditation chambers by Office of Things wash workers in colourful light, 2020) (Fig. 87) use of round design, beginning with a circle cushion, and the practice was influenced by fish scales and the skin of other sea creatures, as shown in (Fig. 91).

C5.02.2.4 Sea Seat
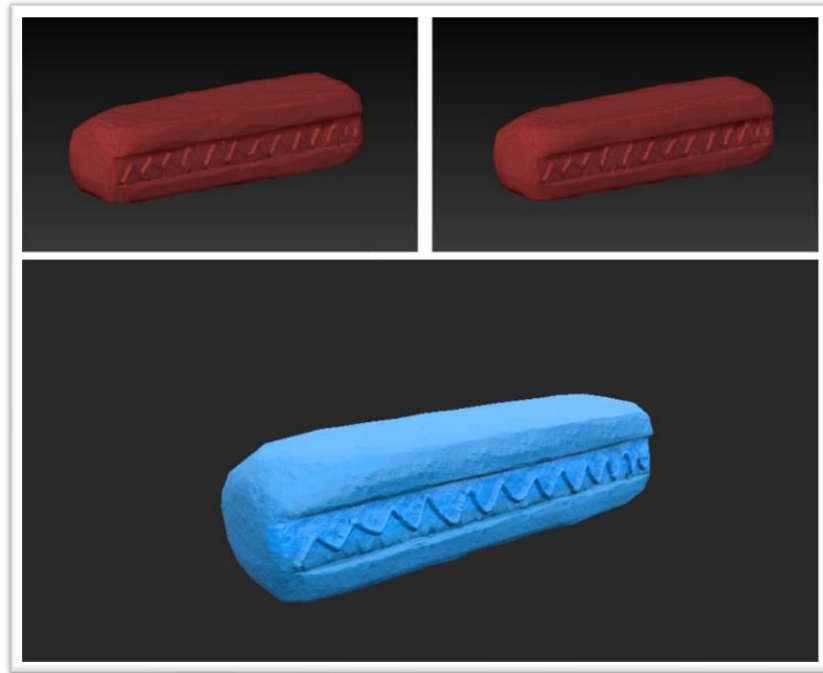
Fig. 92: Texturing Sea Seat

There are three pictures. Lo, Hi and textured (Fig.92). A participant's story about sitting on the ocean embankment inspired the design of this concrete seat. Using Blender, I created a rock-like seat. I started with a rectangular mesh and then drew a pattern for the squiggles with a brush in Zbrush. I personalised the stone by carefully trimming and polishing it until I was satisfied with the outcome. My first Painter step was to create a blue base and then add scratches and grunge. I kept the bright blue to match the rest of the colour scheme.

C5.02.3 Test One

Fig. 93: UndertheSea UE Test 1
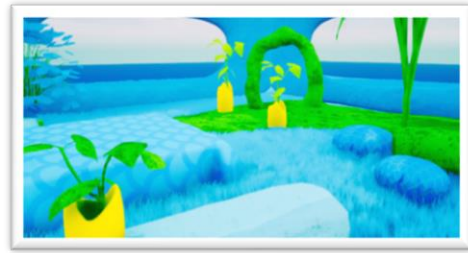
Fig. 94: UndertheSea UE Test 1.2

I experimented with foliage and landscape tools in UE. The first thing I did was add an ocean floor to the scene. I sued the landscaping tool to create a bumpy surface. After that, I gradually added the other elements and started building the space. When using the HTC Vive, there were a few beds scale issues (Fig. 93). I resolved them after extensive testing. Blue, green, and yellow schemes appear to blend naturally (Fig.94).

C5.02.4 Test Two

Fig. 95: UndertheSea UE Test 2

I spent a long time experimenting with lighting settings to achieve the desired mood, a soft blue and soothing atmosphere. The lighting is dynamic, and I experimented with post-processing effects after adding exponential fog and lowering the sun's intensity. This small undersea house (Fig. 95) received a lot of shade, making it feel colder. Other seating areas in this space include a yoga-inspired blue cushion place on the floor. I maintain the space's simplicity and oddity with a single tree and a few potted plants. Experimenting with various blue shades visually enhanced the blue-cold atmosphere. I wanted to make sure the space had enough elements for an immersive experience.

C5.02.5 Bubbles
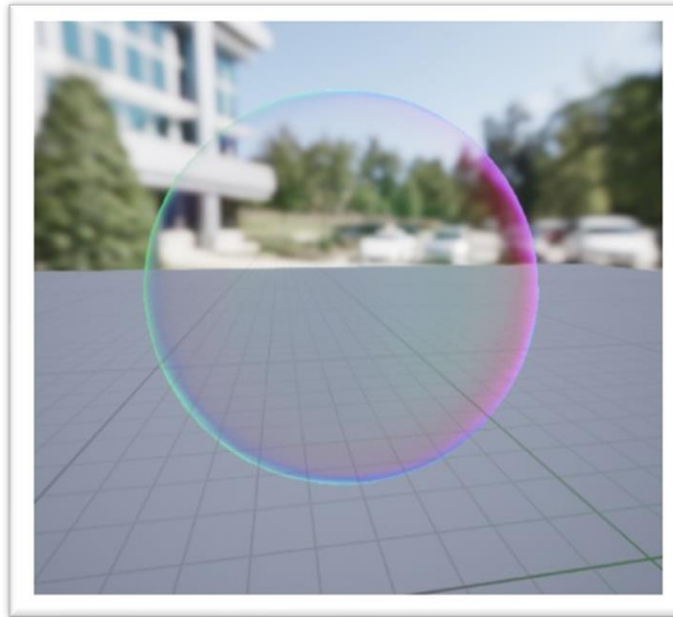
Fig. 96: UndertheSea Bubbles

I learned the particle system in UE4. To add bubbles, I created a translucent material (Fig. 96) using three textures: a water map, a swirly mask, and a noise texture. The blueprint is in (Fig. 98). Using the bubble material, I created the particle system. Following that, I experimented with the settings, which allow us to alter the size, angle, and speed of the bubbles. I reduced the density of the bubbles before gradually increasing it. I wanted the bubbles to be gentle and soft, covering the entire room from floor to ceiling.

C5.02.6 Lighting: Caustics
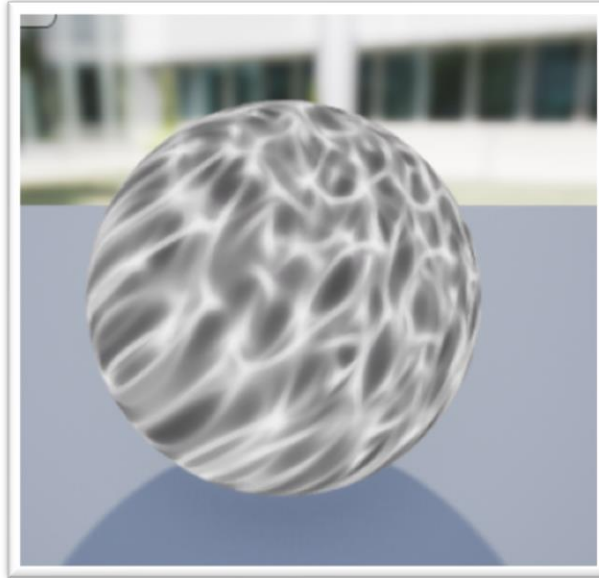
Fig. 97: UndertheSea Caustics

Lighting has a significant impact on how participants will perceive the environment. there are several visual design functions or perceptual goals. These goals include making critical scene elements visible, directing the viewer's attention to important aspects of the scene, visual focus, creating depth, evoking moods, and creating atmosphere (El-Nasr, 2005). Real-time acoustics and lighting are generated to simulate moving waves and their integration into the surrounding environment. To accomplish this, I created a material like (Fig.97) and applied it to the scene's primary lighting source, the sun actor. Although the room isn't completely submerged in water, it captures the atmosphere I was going for: the sensation of being completely immersed in a virtual undersea world while remaining inhabitable.

C5.02.6.1 Material Blueprints
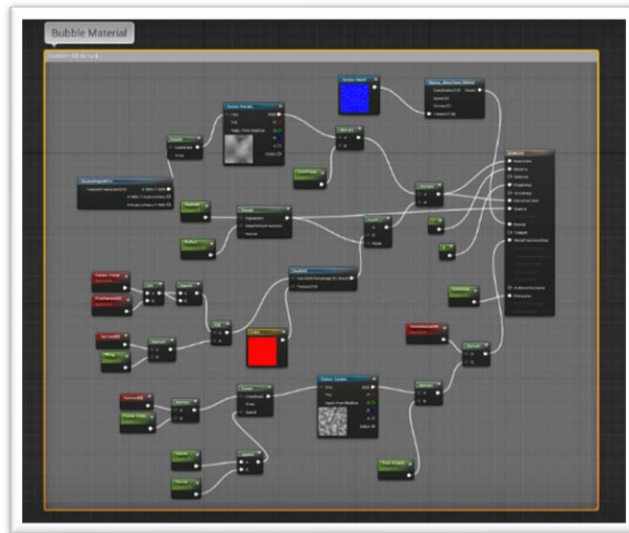
Fig. 98: Bubble Material Blueprint
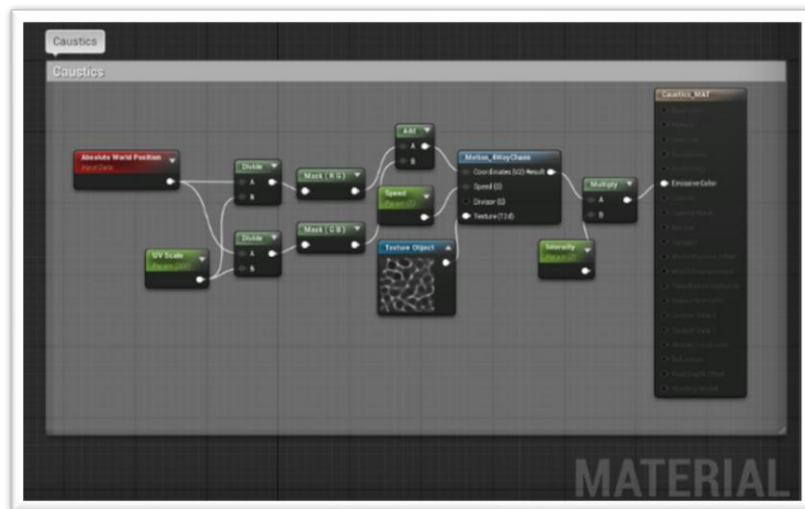
Fig. 99: Caustics Material Blueprint

C5.02.7 Test Three

Fig. 100: UndertheSea UE Test 3

For example, blue skies could be used to improve cognition. A mental process, according to neuroscientist Jonah Lehrer, creates thinking spaces as artists create experiences through their art. Neuroscience teaches us how to think critically about space to achieve blue healing. The stone seat (Fig. 100) is visible. Soft bubbles can also be seen rising in the water. I also applied blue sand on the ground and took the moss away because I enjoyed this clean like atmosphere.

C5.02.8 Final Design & Sound

Fig. 101: Close-up of Sea Seat in UE
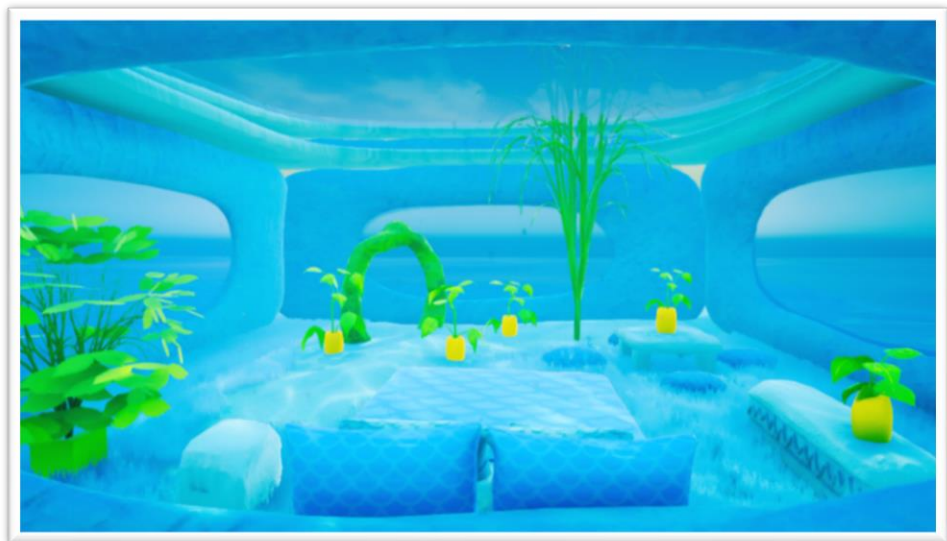
Fig. 102: UndertheSea Sound Test

C5.02.8.1 Thoughts

I used four-channel water sounds and ambient music to create the ocean soundscape. Two sound actors play these two ideas in the scene (Fig.102). I hoped to achieve deep ocean acoustics in the patient's small house by tinkering with Unreal Engine settings. I was inspired by floating houses while creating this concept (Floating Homes: The Future is Now, 2018). The audio was spatial, allowing users to immerse themselves entirely in the VR environment. I did this with a VR headset, going back and forth adjusting the sound frequencies and attempting to achieve something very low and deep. The goal was to sync sounds with caustics or waves reflected off surfaces (Fig. 101). This method of introducing the blue seas into the participant's life is bringing them closer to the natural world.

C5.03 Serene

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Fig. 103: Serene Inspiration Board

C5.03.1 3D Texturing

C5.03.1.1 Cylindrical Structure
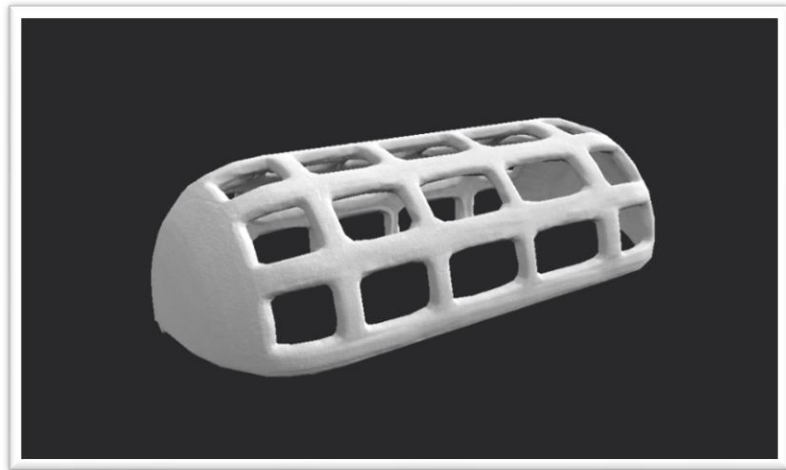
Fig. 104: Serene Exterior

The use of white interior and exterior was to achieve simplicity. When I was designing the exterior structure, I wanted something soft and curved as well as long. I was hoping to replicate my "Tilt Brush" concept (Fig.50). It has a distinct appearance inspired by Zaha Hadids Architecture (Hotel Puerta America, 1st Floor by Zaha Hadid Architects | Hotel Interiors, 2021). I texturized it white and used the smooth texture of raw concrete (Fig. 104). This room will be in the sky, above the clouds, with plenty of window holes to keep things cool and breezy, which is good for your health. One of the participants' favourite spots was up in the hills. So that's the feeling I was going for: "being above".

C5.03.1.2 Cylindrical Couch
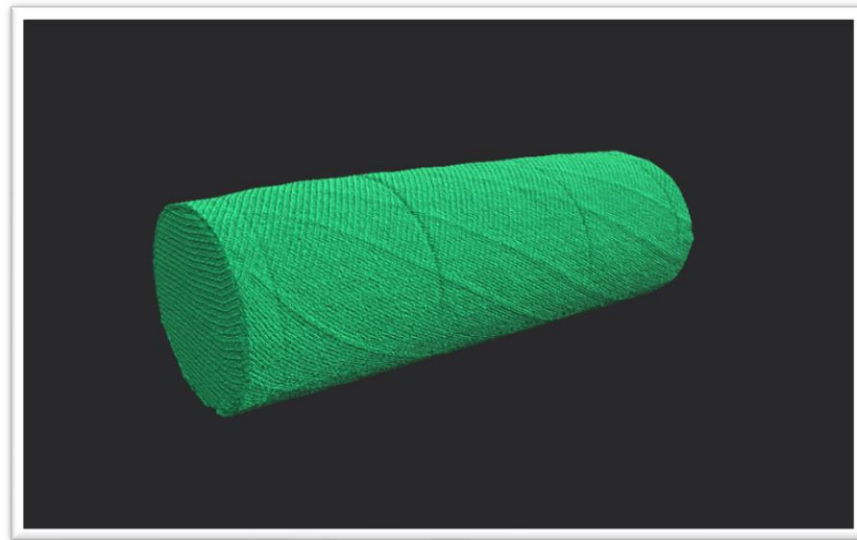
Fig. 105: Serene Pastel Green Couch

To create this cylindrical couch, I used pastel colours and a subtle texture (Fig. 105). I wanted a shape like the exterior, one that was long and round. I used the one couch model to construct the entire couch, such that you would do with modular furniture. This approach worked well in the context of the scene. To add texture, I combined an embossing fabric with a hurdle stitch material. I was beginning to use textures and materials in substance painter ineffectively but, I still needed to fine-tune my techniques.

C5.03.2 Test One
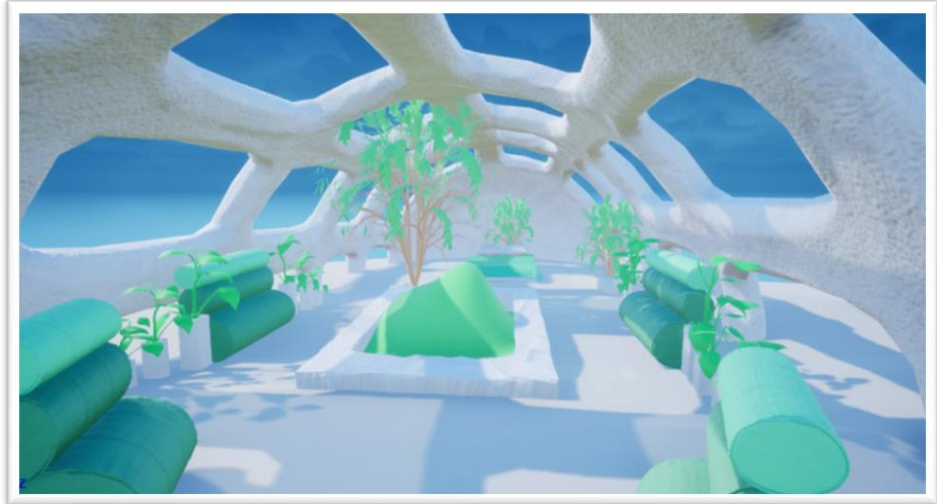
Fig. 106: Serene UE Test 1

I began placing the elements in the scene how I did in Blender. Then I added the textures I already created to the models. The austere mountain reminded me of standing atop a small mountain (Fig.106) and used the mountains plant on the inspiration board as an example (Fig. 103). I placed several white plant pots around the room in equal qualities on both sides. I added a nice smooth concrete texture to the pots. This was inspired by the stories of two participants who desired a minimalist lifestyle with few plants. the idea is to have an atmosphere of a dreamy existence in the clouds. I also wanted to later concentrate on clouds. I will add lighting that casts soft shadows to create a pleasing appearance.

C5.03.3 The Bed

Fig. 107: Serene UE Test 2

It's a concept where humans can live in a habitat above the ceiling clouds but with a sense of trees and mountains and trees. The palette of this space is primarily made up of pastels shown in (Fig. 103) and is also likely monochromatic. a participant who used a mountain-top view to describe her happy place. "At the top, there are clouds. It would be very bright, blue with clouds. Not overcast. There is a nice breeze, a cool breeze. But like if I am at the top, I can see more. You know, like if I am at the top 360 scenery, so I can look around like I look up to on top of One Tree Hill." So, I aimed for a cool room with a gentle breeze and soft sun shadows, a reminder of spring. I used the same couch texture for the blanket for consistency (Fig. 107). The bed will provide the primary participant point of view.

C5.03.4 Test Two
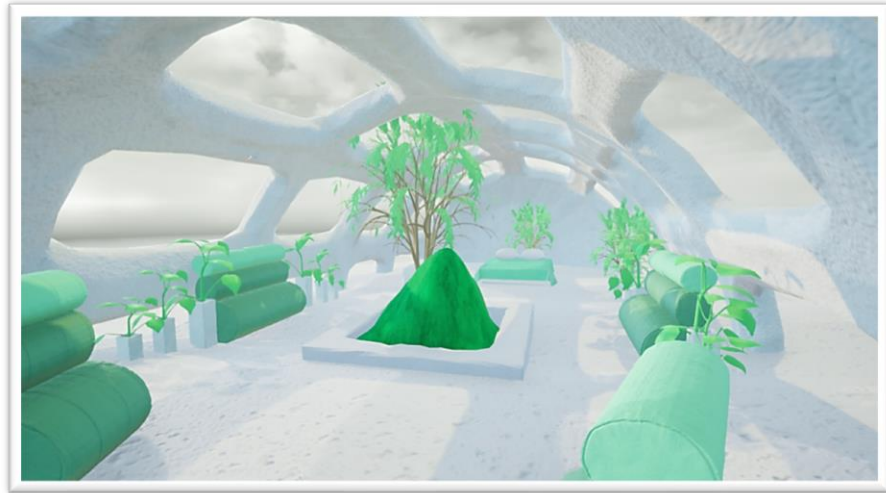
Fig. 108: Serene Test 2

In this next test, I spent a significant amount of time experimenting with lighting and cloud atmosphere. I wanted to create something like 'Daydream' by (James Tralie | Digital Artist on Instagram: "Daydreaming ☁️.", 2020) Throughout the room, there is a white concrete floor. I try to improve the lighting in the scene by carefully incorporating the directional lights. I wanted to focus more on the illuminance because keeping everything white, as shown in (Fig.108), is a little dull and cold and not as "comforting". The environment must have a naturalistic feel to it. I enjoy using colour a lot, and the pastels were necessary to create the right atmosphere, but I preferred the effect to be more subtle rather than as bright as in the other rooms.

C5.03.5 Test Three

Fig. 109: Serene UE Test 3 Lighting

Fig. 110: Serene UE Test 3 Lighting 2

C5.03.5.1 Thoughts

I used post-process effects to try to fix the atmosphere helped create a customised mood for the concept. I fine-tuned the settings such as colour grading parameters like saturation, contrast, gamma, grain, highlights, mid-tones. I tried to keep the environment brightly lit while adding soft yellow highlights for a touch of warmth but coolness.

I made the leaves, the diffuse and opacity maps (Fig. 111) and (Fig. 112). Instead of a single leaf, I wanted the leaves to be in a cluster. I then filled in the space with grass that was the same colour as the trees.

Fig. 111: Diffuse Map

Fig. 112: Opacity Map

C5.03.6 Final Design & Sound
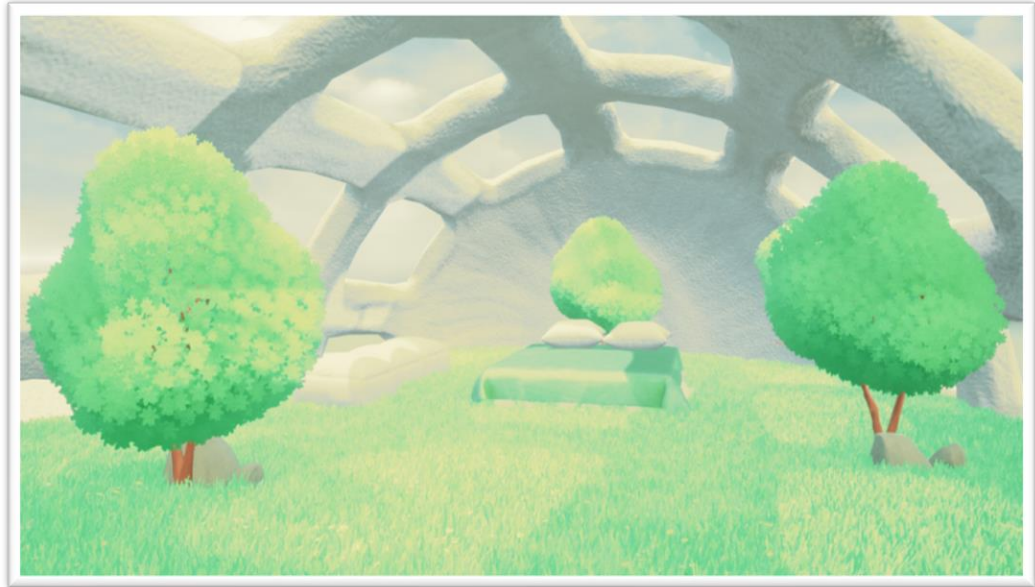
Fig. 113: Serene Final Design

This illustration (Fig. 113) depicts the final design of the serene space, with a focus on the bed. I wanted to keep enough trees in the environment, but I also planted some small white dandelions in the grass because I didn't want large flowers in this area. I hope to create an uplifting but relaxing atmosphere for this environment by using an airplane, birds, and wind sounds aswell as some relaxing bubble wrap ASMR (autonomous sensory meridian response) sounds to accompany it. I wanted to experiment with ASMR an idea from one of the participants. I tested it many times to make sure it gives a deep healing, soulful, with a sense of hope and for the music I mix it with a few instrumental piano sounds.

C5.04 Dome Forest

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Fig. 114: Dome Forest Inspiration Board

C5.04.1 3D Modelling
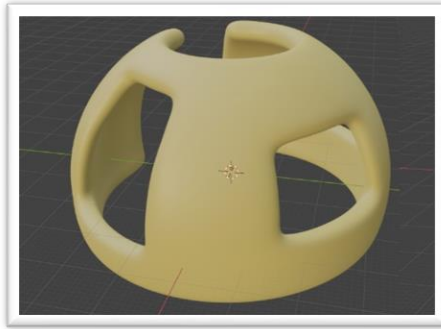
Fig. 116: Dome Interior 3D Model

The idea is to create a habitat in a desert space that could be a healing earth-like bubble to meditate in (Fig.50). When I first started working on a dome (Fig. 115), I quickly ran into a slew of problems. I reworked the dome in a variety of ways until it was nearly perfect. I added a few finishing touches to the interior, such as a variety of shaped furniture. I will envelop these with trees. After developing the elements, the design came together. The colour scheme for this woodland-themed bedroom will consist of earthy and bright neutrals (Fig. 116). This setting is both surreal and natural at the same time. The form of the dome should make one feel safe. The forest is an influence on this concept.

C5.04.2 Texturing
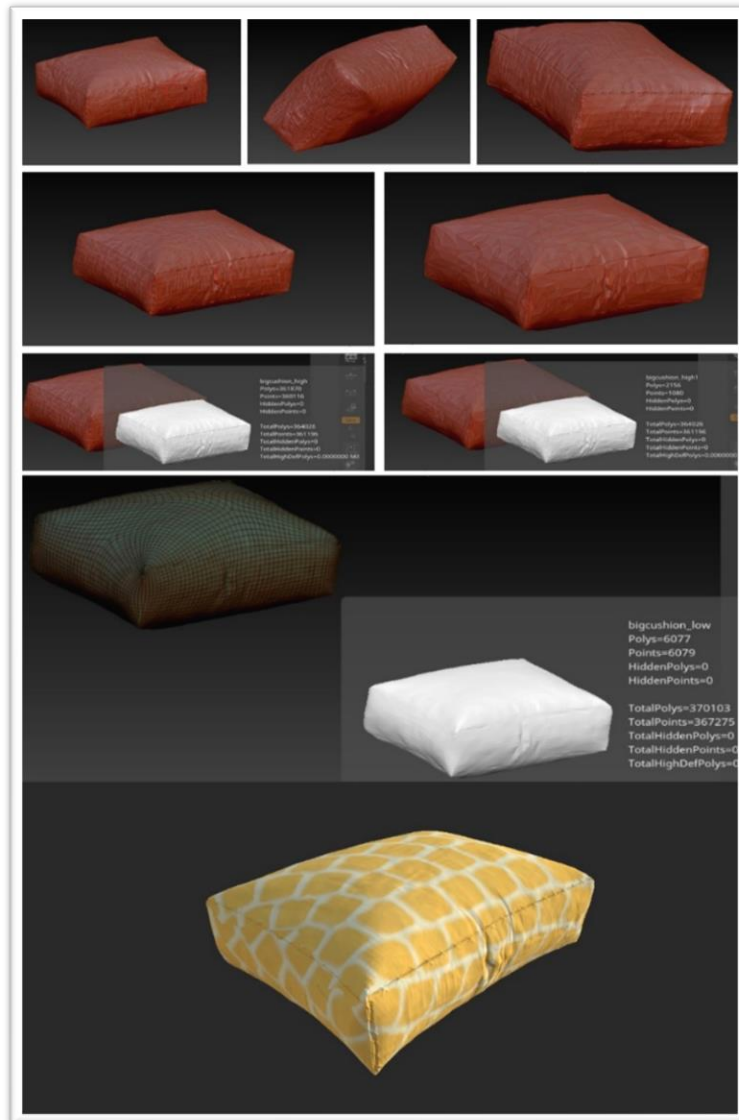
Fig. 117: Dome Forest Texturing Big Cushion
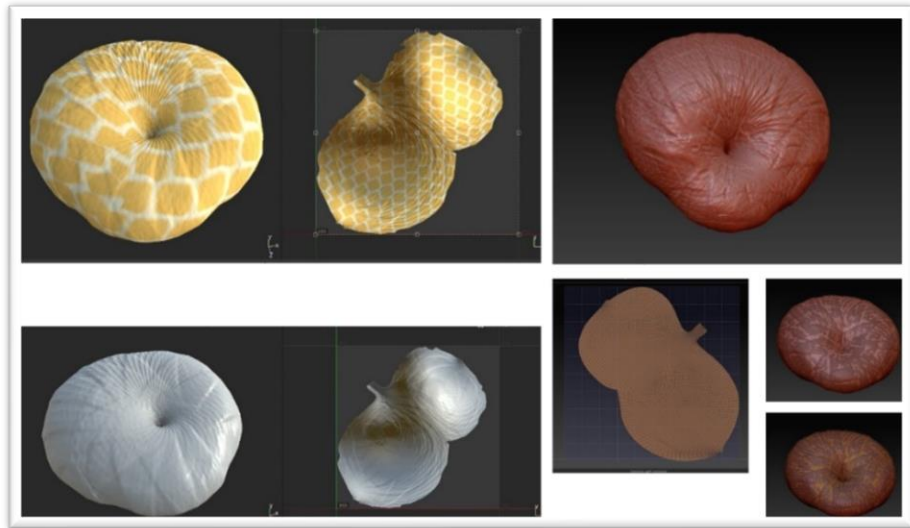
Fig. 118: Dome Forest Texturing Ornament

I used a colour palette of yellow squarish patterns inspired by the shell-shaped surfaces of biophilic materials to texture the dome elements. For the sofa seat, I desired a large, comfortable cushion (Fig. 117). I finished with a honeycomb pattern. To give the big cushion a realistic fabric appearance, I used Zbrush to add bumps to it before baking it. The ornament (Fig. 118) was a fun experiment; I liked how organic the spherical aspect appealed. I used the same colour and pattern as the large cushion, but with a different stone texture.

Fig. 119: Dome Forest Test 1

I started by arranging all the textured objects in the scene (Fig. 119). It took some practice to use sunlight, brightness, and highlights in the lighting, but I remembered the techniques I'd previously used. Every design concept aims to maximise comfort while maintaining the space's ability to tell a story. Something soft orange with yellow undertones started to emerge. I wanted to sprout trees from the inside to make it a little more magical, and I was hoping to create a soothing forest-like atmosphere. I had to change the environment scale during my testing. On the ground, I've spread a layer of desert-like sand. The participant described being surrounded by tree shadows. I was constantly repositioning the sun in the scene to achieve the desired shadows.

C5.04.4 3D Models

C5.04.4.1 Flower

Fig. 120: Dome Forest Big Flower

I got inspired to make this large flower (Fig. 1*20*) because I wanted something oversized and surreal, like an umbrella hanging over the seating areas in this room. I created the flower's petals in Blender 3D and sculpted them into a final form in Zbrush. I used the image on my inspiration board (Fig. 1*14*). It was my first time making a flower model with such fine details. The polycount was enormous. I did my best to cut it down, but it was hard to manage, and the Uv unwrap issues resurfaced. It took a long time and a lot of trial and error to complete just this one model. It was ideal for these scenes, so I worked hard to get something close to perfect. Big flowers are known to have a calming effect on the mind.

C4.04.4.2 Pinecone

Fig. 121: Dome Forest 3D Pinecone Model

In this space, I wanted to incorporate more organic, round shapes found in a forest. So, I modelled something that resembled a pinecone (121). To my surprise, it turned out to be cuddly. I textured it with earthy brownish colours, as well as dirt filters and grunginess. Initially, I thought about hanging them in small sizes around the ceiling with a lighting material and creating something glowing but, I saw how round and comfortable it was. I realised I could turn it into a fun seat, perhaps one or both ways. If I were to make it into a piece of furniture, I needed to replace the textures with a simple fabric.

C5.04.5 Test Two

Fig. 122: Dome Forest UE Test 2

Fig. 123: Dome Forest Close-up of Big Flower in UE

I made the dome's surfaces resemble tree bark (122). However, because it was so heavy, I grew to dislike it over time; instead, I preferred something softer and woodier. Because the yellow grass experiment did not go as planned, I had to try different colours or intensities. The pinecone chair has a light function on the sides that would shine in the room. This may necessitate further consideration. To make it look like it was afternoon, the textures and lighting throughout the space needed a lot of work.

C5.04.6 Test Three

Fig. 124: Dome Forest UE Test 3 Lighting

I changed the dome texture again and preferred it this way. I wanted to make sure the materials of the trees were the same as the dome. Lighting was also improved, not too bright or dark. To create a sense of cohesion, I used similar patterns throughout the entire space and, it finally came together with the right colours and textures (Fig. 124). The sun was soft and the grass colour was also better. I added small orange flowers because they contrasted well with the atmosphere.

C5.04.7 Test Four & Lighting

Fig. 125: Dome Forest Lighting Post Processing

Fig. 126: Dome Forest Post Processing 2

C5.04.7.1 Thoughts

I experimented with the post-processing settings, trying to figure out how to achieve the mood I desired. I wanted something with the sun setting in the early afternoon (Fig. 126). But I didn't want it to be too dark, so I went with warm lighting. As a result, the atmosphere became very orangey, and the tone was nice and earthy; I liked how the lighting made me feel cosy when I tested it in VR, but it did feel a little dull in the woods (Fig. 126). I wanted to brighten the woods in the concept and try to create a little shine in the scene with the sun and fog. I also created yellow flower trees and placed them around the room. I wanted the trees to be soft and fluffy, so I fixed the inflate and size options (Fig. 125).

C5.04.8 Test Five & Lighting

Fig. 127: Dome Forest Lighting Post Processing

C5.04.8.1 Thoughts

I kept tweaking the settings of the directional lightings in the scene to see if I could fix the brightness to glow over the room in different intensities and colours, yellows, oranges, and whites. I wanted the atmosphere to be creamy, but fresher, so I turned up a few highlights and the scene became sunnier. Then I played around with the post-processing again, this time setting the temperature to 8000k.

C5.04.9 Final Design & Sound

Fig. 128: Dome Forest Final Design

C5.04.9.1 Thoughts

I'd like to recreate the sensation of being in the woods, something very soft. I created sounds reminiscent of nature by using woodwind bird songs and leaves rustling in the wind (Fig. 127). The goal was to make it as comfortable, pleasing, and soothing as possible. Animals that make a lot of noise, such as monkeys, should be used with caution because they can quickly irritate people. Rustling forest trees and soft animals will be the primary soundscape. I added the noises in the same way that I did the other effects, by first working on these four-channel sounds and then a two-channel music track for the background music of something happy.

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Fig. 129: Modern Natural Inspiration Board

C5.05.1 3D Modelling
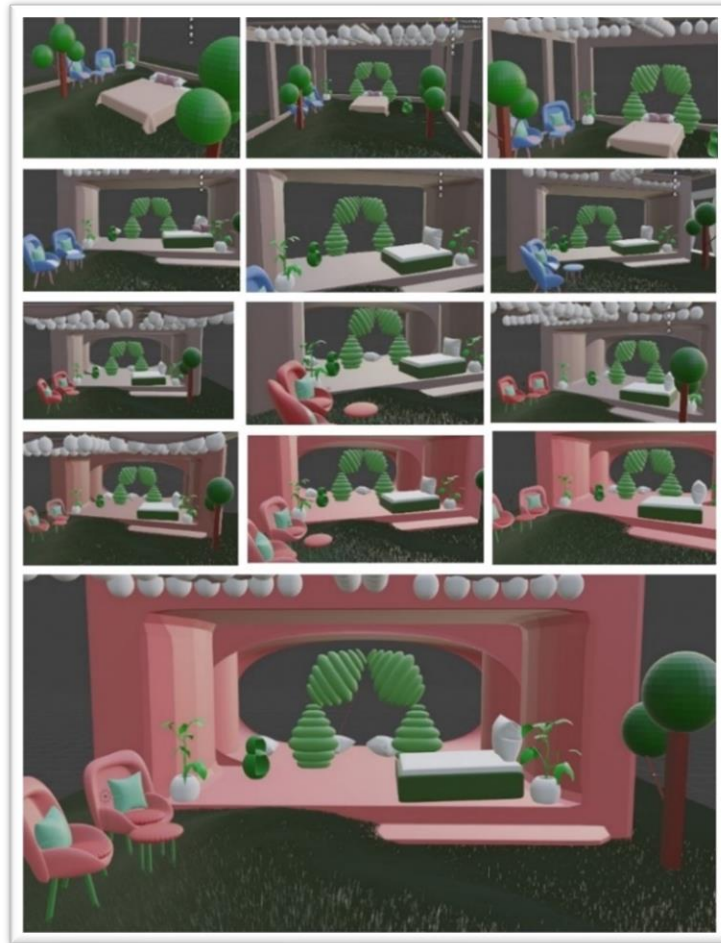
Fig. 130: Modern Natural 3D Modelling

While creating this model, I documented the building process of the composition (Fig. 130). I wanted to make sure there was unity. The first image begins right the original look and then progresses to how I made design decisions in changing and ending up with the composition I was satisfied with. The green curvy element could be interpreted as bushes or shrubs. I wanted white luminaires above on the ceiling as a modern aspect. Shapes were natural and curved. This space will appear to be a large backyard: spacious and open. My mood board was the inspiration for the colours such as reds, pinks, and greens (Fig. 128).

C5.05.2 Texturing

C5.05.2.1 Rock Wall

Fig. 131: Modern Natural Pink Wall Texturing

I wanted to go for a modern, chunky, and sleek look when designing this wall (Fig. 131). I used textural tones with a slight pinkish layer of grime and dirt to make the effect more realistic. I 3D modelled a chair in Blender and then painted it in SSP with red fabric (Fig. 133). I followed the same procedure with the cushion (Fig. 132). I used red fabrics because I wanted to go for a warm and loving mood.

C5.05.2.2 Red Cushion
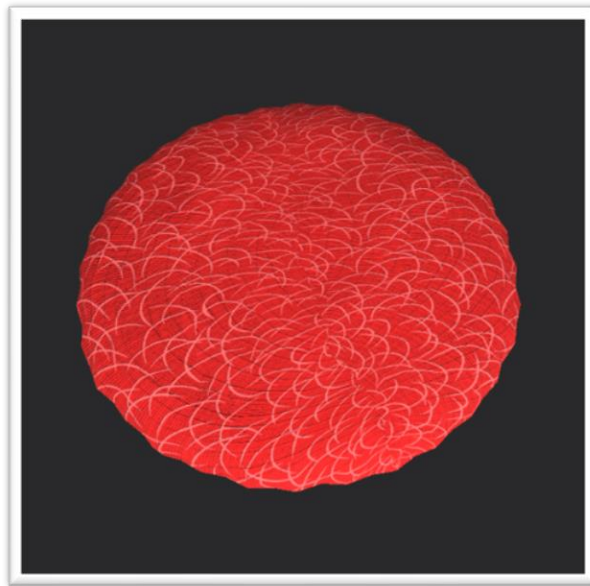
Fig. 132: Modern Small Cushion Texturing

C5.05.2.2 Red Chair

Fig. 133: Modern Natural Chair Texturing

C5.05.3 Test One

Fig. 134: Modern Natural UE Test 1

Fig. 135: Modern Natural UE Test 1 View 2

C5.05.3.1 Thoughts

After finishing the initial lighting pass and creating a simple scene, I went back to add more fine-grained lighting and asset placements. I textured the bed and coordinated the blanket's colour with the walls (Fig.134). To add to the immersive experience, I planned to attach vines to the walls and ceilings (Fig. 135).

The lighting was configured similarly to the previous spaces, with sunlight, skylights, and a sky sphere. I experimented a lot with the skylight to try to create a bright, lively atmosphere, but it was a little shaky. I tried out a swing because I thought it was fun. I made some large 3D plant pots and textured them with wood. Curvier visual elements, as well as rose trees and flowers, will be added to this room in the next step. Whilst the lawn is blank, I filled it with various elements such as trees and lakes, as well as another seating area.

C5.05.4 Trees

Fig. 136: Flower Rose Tree Photoshop Texture

Fig. 137: Flower Rose Tree Closeup
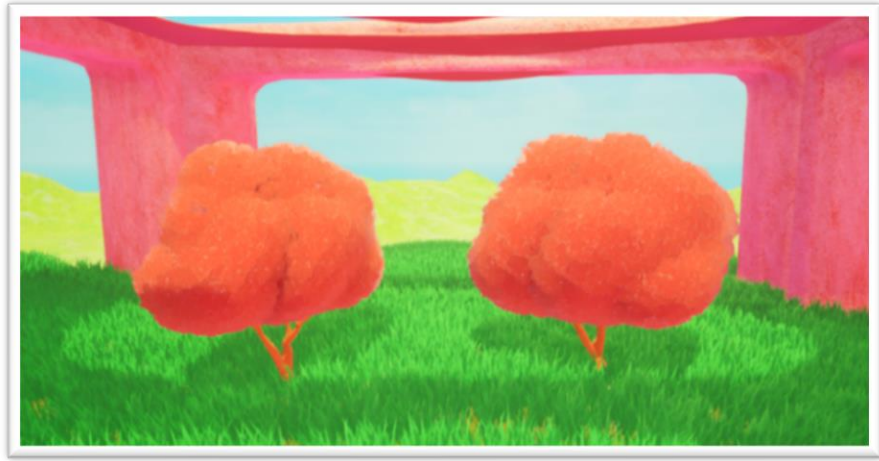
Fig. 138: Flower Rose Tree in the lawn

:

C5.05.4.1 Thoughts

This tree's texture maps were created in Photoshop (Fig. 136) and then imported into Unreal Engine as texture maps. I was able to customise the settings to suit my needs. As a result, I cut down on the number of trees until there were just two remaining. The ambience created by these two trees (Fig.138) and the lighting reflected in a circular pattern on the ground were perfect. It took a lot of tinkering with the lighting to make this scene look as bright and vibrant.

C5.05.5 Test Four & Lighting

Fig. 139: Lighting Test 1 Bed

Fig. 140: Lighting Test 1 Lawn

C5.05.5.1 Thoughts

At this point, the lighting was bright and colourful. I also reworked some textures and increased the scene's objects (Fig. 140). For a long time, I've been tinkering with the lighting in this environment, attempting to achieve the desired mood, and it's been looking very flat and bright. With the intention of creating a large open area with a lake feel, I designed this room with water features and glass windows. Lighting was used to draw attention to specific shapes in a room, as well as to illuminate and improve depth perception. In this case, fog can be useful. I used volumetric fog to create the desired mood and feeling, as well as to visually guide the user's eyes into the garden lawn from where they will be sitting (Fig. 139).

C5.05.6 Final Design & Sound

Fig. 141: Modern Natural Final Design 1 Bed

Fig. 142: Modern Natural Final Design 1 Lawn

C5.05.6.1 Thoughts

I worked hard to improve the lighting in this scene over the others because I felt something wasn't quite right. Maybe it wasn't the lighting, but the pinks and reds or even the grass. Regardless, I believe the atmosphere is how I imagined.

I envision an enchanting, ethereal, atmospheric acoustic soundscape for this space. Its goal is to assist the participants in relaxing and falling asleep (Fig. 141). Each moment is distinct, with its colour and sound feelings. The sound of a nearby stream or lake is also relaxing. Instrumental music has a very emotional healing power, and the vibrations of music give you a feeling of warmth and tenderness (Fig. 142). I tweaked the volume, pitch, and other frequencies to fine-tune the sound.

C5.06 Warm Haven

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Fig. 143: Warm Haven Inspiration Board

C5.06.1 Test One
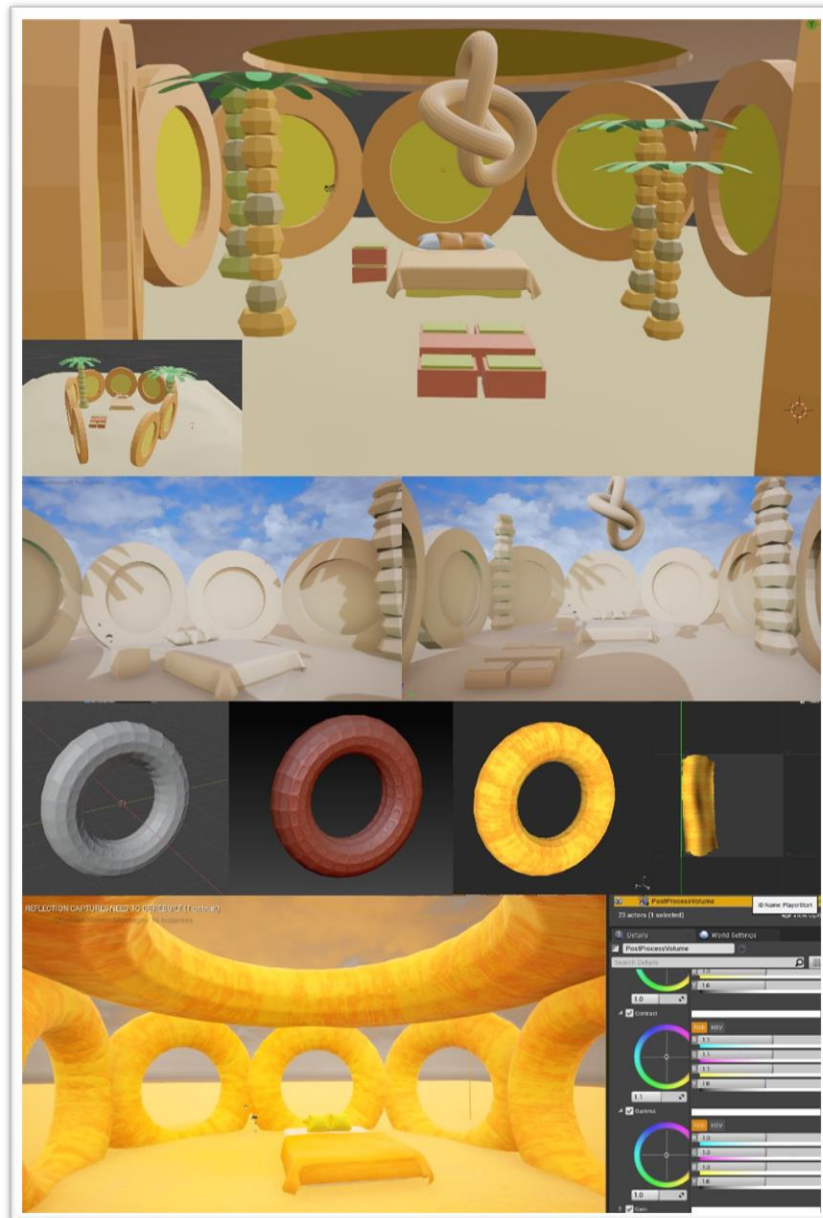
Fig. 144: Warm Haven Test One

C5.06.1.1 Thoughts

I wanted to create a mood that transported the listener to a tropical island where they could lie on the sand bed and listen to the waves crashing nearby (Fig. 26). I wanted an object with a circular shape when I was building the walls of my cosy haven, like the tilt brush concept I drew (Fig. 53). To accomplish this, I used the torus tool to create a circular model, then smoothed it with beveling and the subdivision modifier. Three layers of texture are applied to the round windows. After a moist yellow base, I apply an orange layer (Fig. 144). In addition, to add depth, I used a wood grain texture. Inspired by the mood board, I imagined the texture to resemble pineapple slices (Fig.143).

I experimented with different levels of yellow and orange intensities when it came to lighting because I wanted the effect to be subtle. I used an open ceiling again, using the window model. My goal was to make the participant feel as if they are looking up at a tropical island's sky.

According to this participant (Fig.18) this room will soon have a table and chairs set up. The windows are enormously large, open, and round, providing a view of the ocean horizon. Next, textured and place palm trees in front of each window.

C5.06.2 3D Models

Fig. 145: Pineapple Table in Zbrush

Fig. 146: Pineapple Table in SSP Yellow

Fig. 147: Pineapple Table in SSP Orange

Fig. 148: Palm Tree in Zbrush

Fig. 149: Palm Tree in SSP

Fig. 150: Adding in Models

Her happy place had an island-like atmosphere, and she desired palm trees and time with her family (See Fig. 18) "It's a palm tree. A lovely little table. The palm tree from the other side. That's what red wine is. Bring some water for the kids. For my husband, there will be plenty of delectable food. That's where I keep my picnic basket." I added the palm trees (149), chairs, and the table (Fig. 146) kept them yellowish because I like the idea of staying to one or two colours for the elements when creating the desired atmosphere. The lighting was a bit too yellow (Fig. 150), but I wanted this room to be a tropical warmth but like a sunset type. While testing it with the VR headset, it began to come together well.

C5.06.3.1 Ceiling
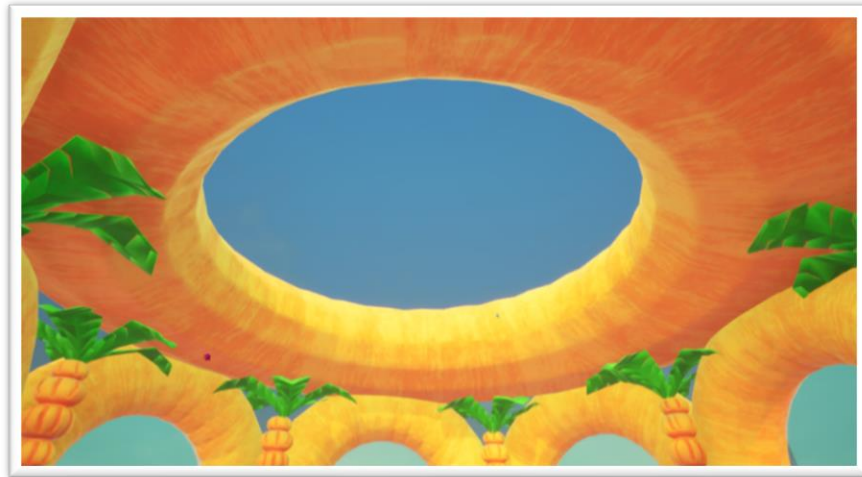
Fig. 151: Open Skylight Ceiling

I used the window for the ceiling in (Fig. 151) as well because I wanted to keep the shape consistent. This also enabled me to maintain the same blue open sky in all the spaces. You can get a better look at the bed (Fig.152). I continued to use the same shade of yellow that I'd used throughout the space. It was a delight for me to be able to maintain the roundness I desired.

C5.06.3.2 Bed

Fig. 152: Closeup of Bed
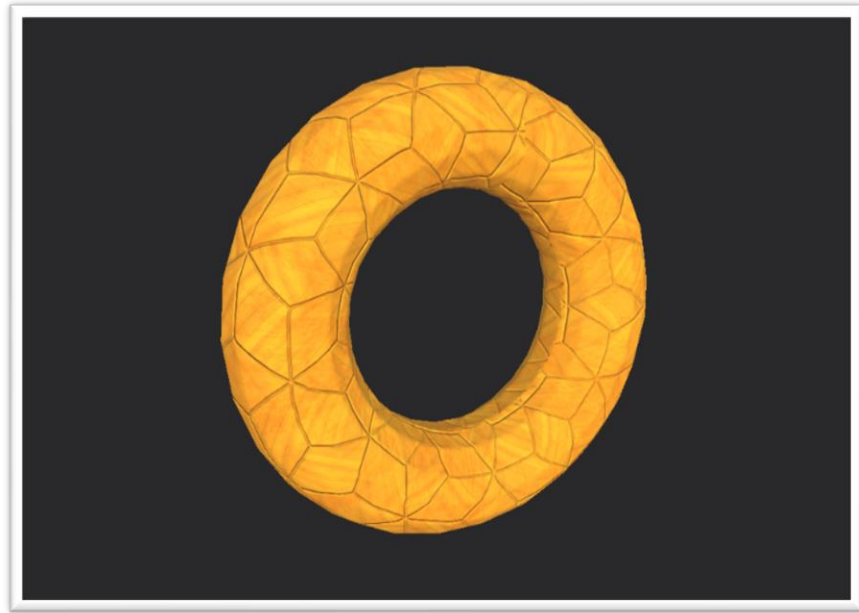
Fig. 153: Texturing Windows

I applied a wooden texture to give the window character, and as a result I got a pattern that resembled pineapple cuts. When I finished and saw my result (Fig. 153), I was surprised at how easy it was to get what I wanted with the texture. I used it effectively in the space in harmony with the other objects and I observed a specific design shape emerging due to the window placement.

C5.06.5 Test Three

Fig. 154: Warm Haven Lighting Test 1

So, to achieve my goal, I decided to improve the lighting and try to convey a more tropical atmosphere (Fig. 154). I knew there was only one way I could do it: by trial and error, utilising existing light settings and possible post-processing effects. However, it produced a room with bright sunlight and soft shadows, which was exactly what I desired. I was able to solve it after a lot of tinkering. I added a beach ball and an umbrella (Fig. 155) to represent a beachy island location to convey the idea of a sandy beach place.

Fig. 155: Warm Haven Lighting Test 2

C5.06.6 Final Design & Sound

Fig. 156: Warm Haven Final Design Closeup of Bed

The sound of the ocean waves will fill this small room, which is surrounded by water. Among the other sounds are gentle birds and beautiful uplifting and relaxing ambient music. A purple sky on the horizon and soft sand on the ground are depicted in the scene (Fig. 156). I went with something very coastal which could help the participant sleep in bed by inducing a meditative state. This ocean that surrounds the island and the sandy ground gives it the island like feel.

Chapter 6. Discussion & Future Work
C6.01 Discussion

My research began with an investigation of healthcare design for people with long term disabilities. This was accomplished by eliciting insightful responses from healthcare cares and professionals regarding the overall concept, problem, and purpose. It prompted me to develop a practice-based approach that focused exclusively on the best artistic processes for utilising creative design workflows to create virtual worlds of "happy places". It was an iterative design process that included concept generation, testing, and refinement.

The goal of the study is to identify knowledge gaps that can be used to generate new ideas. Prototyping is the process of transforming these ideas into a virtual world. The purpose of my designs was to demonstrate how we can use various design elements, moods, atmospheres with technology to create virtual environments to explore design concepts. I achieved this by creating objects for every place using shapes and structures. The choice of these places was created based on participants' voices and the VR doodles. I also incorporated patterns from the real world and designed them into these interior/exterior virtual spaces. To create the rooms, I wanted to emphasise visual texture, shadows, warmth, and coolness of colours during the development process. These are explored with the lighting settings to create 'caring' spaces.

I needed to research to discover if the visuals, lighting, colour, combined with sound in the environments are healing. I also wanted to investigate how effective virtual reality is for improving the psychological well-being of people suffering from long-term illnesses like Huntington's Disease. However, the only way to determine the impact of the environments is to observe how individuals respond to the different scenarios. After determining the users and creating designs, testing designs iteratively, using a proper human-centered approach with action research approaches will aid in further organising the next part of the design process.

I gathered qualitative data but needed to gather quantitative data, which will be a part of the next steps. I will collect data using a heart rate monitor

to better understand people's perceptions of how different spaces and lighting affect them, track emotions and behaviours, and explore the most powerful ideas through prototypes that can be generated as "healing experiences". Quantitative data is essential for testing and proving the impact of what has been created. A control group will be present to see if the findings under consideration have any effect on the study group. It can help with the fundamental viability of the study and then allow the data to be compared, which will be extremely useful.

More input from people and responses from HD families and professionals will help evaluate this research using a co-design approach. This would necessitate testing to determine whether these concepts work. Then, proceed to the next step and test it on actual participants. Any additional user studies would necessitate a re-design and re-iteration process. Each step necessitates a greater amount of feedback. It is currently unknown how much of an impact these VR scenarios will have on them. More research is required to determine how people will react to the technology and designs.

It's all about getting a sense of the design concepts from within a 'digital mock-up.' Because of the use of VR as a tool for visualising them, costs and time need can be saved before making real or expensive prototypes. The benefit of VR is that it is useful in making simulations. It allows communicating a vision of the designs. It provides users with detailed communication concepts and methods. Users, such as experts, can test different models using VR, which will help get the rapid feedback desired.

C6.02 Limitations

Optimising virtual reality environments is a process that must be completed before user testing to ensure that they are safe and comfortable to use. This will be accomplished by modifying the settings in the scenery engine. For VR optimisation, such as switching to a forward rendering pipeline and removing all extraneous lights, such as post-processing, volumetric lighting, and baking lighting. Another disadvantage is that the user cannot move to another region of the environment to explore it, so teleportation would have improved the experience. A significant limitation was that it required a significant amount of VR equipment to be connected to a not so portable laptop or PC to be experienced.

I created six environments by incorporating people's ideas, thoughts, and stories. Based on consideration and the wisdom of reflection and feedback, fewer creations could have been made with a greater emphasis on user evaluation to discover the effects of the creations on participants. This would have also helped me make the environments more personalised to every individual.

Another limitation was the lack of feedback after the designs were created, which was an extremely important aspect of the study that needed to be completed.

There are some drawbacks to using VR because it is based on software and technology that computes and renders the virtual environment. This means that while it won't be able to create a completely realistic world, it will be able to change perception and interaction in the virtual world.

C6.03 Future Work

The vision in five years' time is to develop an application system that caregivers' families can use for their loved ones, who live in care homes. Individuals choose and design their own personal dream-like world, and step into their "happy place". I will need to focus on getting a lot of experts to try out the VR environments, then develop it and get feedback again to see what works and what doesn't with the use of prototypes. Usability will be critical in determining whether patients can use it. Then I'll need to involve more HD families to get their feedback and re-design the work based on what people preferred and didn't prefer.

The testing of this study could be accomplished by focusing on early-diagnosis/diagnosed patients who are still functioning in society and thus capable of giving consent, i.e., on the 'low-risk' side. Interviews are typically low risk, but a VR intervention is not. Putting a VR headset on a neurological patient, even one in the early stages, would be extremely difficult for any ethics committee to approve.

To accomplish the evaluation in this study, three things would have to be done: the VR environment would have to be designed and ready with appropriate inputs, it would have to be tested on a healthy population first, and consultations with health professionals would have to be conducted before selected Huntington's patients could experience the VR environments. Individuals in aged care, such as those with dementia, may be better suited to participate in a user-study as a solution.

Even without a VR headset, technology can be ever evolving so that the immersive experience can transform peoples actual living space into an entirely imaginary space and create an atmosphere they desire. It all comes down to experimenting with various technologies to determine the most appropriate for multiple individuals. The increasing adoption of emerging technologies, such as Artificial Intelligence (AI) and Virtual Reality (VR), has profoundly affected the lives of the elderly and disabled (Kyung & Park, 2020). This research paper discusses creative technology ways to enhance their daily living.

C6.04 Mobile Application

Fig. 157: UI Frames

Fig. 158: UI Frames

For future work I have shown some simple UI frames are shown in these images (Fig. 157) and (Fig.158) how it may work. It will allow people to create a customised and personalised world. The big idea behind expanding on this project is to transform their care space into a virtual immersive space of their "happy place". After testing to accomplish this, a specialised application may be created so that people can escape to places that are meaningful only to them. This could be possible only after receiving thorough input from people.

Chapter 7. Conclusion

My mission was to find a unique and creative way to improve people's lives in long-term care facilities, particularly those whose psychological well-being is badly affected. My goal was to use an emerging approach to accomplish this, and I believe I achieved a portion of it by speaking with healthcare participants, asking them to create their "happy place" with Lego, and then using virtual reality to visualise their "happy places." This was a creative process that allowed me to experiment and discover design ideas that could have benefited actual users. However, I was unable to conduct the testing due to an inaccessible user group for my master's degree study and time constraints. But I'm elated that I was able to incorporate other people's ideas and turn them into virtual worlds.

Before I created these worlds, I listened to people's stories to get a sense of their preferences, and I was adamant about adopting this strategy. I didn't account for the complexities of working with HD patients to obtain an ethical clearance, which ended up taking six months. This took a long time, as I set unattainable goals for my master's thesis. I was grateful for the healthcare community's participation but receiving feedback from them after creating the virtual worlds would have helped to strengthen my research.

Another significant challenge I faced was learning the technical aspects of virtual reality for design so that I could go deeper into creating the worlds. However, the vision for this idea is: people who are suffering from long term mental health issues in care homes can share their preferences in a future application, and an individualised world is created for them, allowing them to enter and experience their own world, their own "happy place."

This project uses individuals working in the health field, such as the participants, in the research process to bring change in the future design of health environments. This study allowed me as a researcher to develop expertise and skills in various fields, including healthcare, VR art and game design. It allowed me to gain practical experience communicating with stakeholders, collecting data, and conducting analyses. This project aims to inspire researchers in health design to use their work to make a positive impact in the healthcare society.

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Appendices

Participant Information Sheet

Date Information Sheet Produced:

9th September 2020

Project Title

"Virtual Dreams: Lighting Atmosphere Study for Long-term Healthcare Spaces' Future Design"

An Invitation

My name is Hooryah Asif, and I am doing a master's degree in Creative Technologies at Auckland University of Technology. I am undertaking a healthcare research and design project for my qualification. You are invited to take part in the investigation study because you showed your interest through the flyer. Please take as much time as you want to read the material carefully.

What is the purpose of this research?

The built environment has a huge effect on people living with long-term illnesses, such as Huntington's disease. It affects their emotional and psychological well-being, which is why the way we can create better environments is essential. The atmosphere, the lighting, and the colours, sounds we use to build the mood of our built environments, can help improve well-being. Therefore, better healing spaces need to be developed with your ideas, listening to your experiences and feelings. The purpose of this study is to understand your visions and dreams, to enable me, as a researcher, to critically integrate your views into my concepts to be tested in virtual reality. This will help to discover the most effective ideas that could be used for the future generation of healthcare architecture, particularly for people with long-disabilities like Huntington's. I want to know your hopes to help me make an incremental difference in the improvement of people's lives.

How was I identified and why am I being invited to participate in this research?

You have been accepted as a volunteer or a worker aged between 20 to 80 years old since you are part of the Huntington Diseases Association

(HDA). You have been identified to take part in this research because you have experienced or met someone who has or had Huntington's, and you are passionate about doing something for people's lives.

How do I agree to participate in this research?

You will agree to take part in this study by completing the consent form. Your participation in this research is voluntary (it is your choice) and whether or not you choose to participate will neither advantage nor disadvantage you. You are able to withdraw from the study at any time. If you choose to withdraw from the study, then you will be offered the choice between having any data that is identifiable as belonging to you removed or allowing it to continue to be used. However, once the findings have been produced, removal of your data may not be possible.

What will happen in this research?

This research is being undertaken to determine how our views can shape our real-world environment. How can your dreams make it possible for us to create spaces in which we would all want to live in? This research aims to link my ideas with your ideas to create a shared goal for rehumanising the future of Interior spaces for healthcare using virtual reality.

You are going to be asked to share your knowledge on Huntington's and the spaces you wish for these individuals to live in. This will be done by answering a few questions about your experiences and the environment in which people are affected. The next step will be an exercise that will ask you to write a few words down about your 'happy place.' Then, to help you express your thoughts, you will try to build a scenario using Lego. Some short and simple questions will be asked to help start a discussion while you are building. We are going to have a conversation about your ideas.

The aim of gathering your ideas through these interviews is to take them into my VR experiments. This is to find out how different spaces and lighting affect people. VR aims to consider the emotions and behaviours to discover the most effective ideas that can be constructed as "healing environments" for real-world health care spaces through these prototypes.

The feedback form will help me consider your suggestions about how the interview and the Lego exercise was conducted, so that I can take your feedback in understanding how the experience made you feel. It also

helps to know whether the questions posed clarified what you wanted to say. Please take the time to fill out the form as your feedback will help me improve the way I conducted this meeting as it allows me to reflect on and draw conclusions from the techniques selected. Your honest feedback matters as it can be a good learning opportunity for me and so that the research methods used can be refined for the next stage of my study. A demographic form will also be given to ask some details about yourself.

A control group may also be involved as it helps to determine whether the findings under review have a meaningful impact on the study group only in the presence of the control group. It can assist with the fundamental viability of the study and then allow the data to be compared, which in the VR stage will be very useful.

The interviews will be conducted separately, in a private space in a public place to do the individual meetings. This room will have a sign on the door "do not disturb". Things will proceed after contacting and scheduling a date and time at the private meeting room that is acceptable and comfortable for both participant and researcher. This can be done from December 20 – January 30. This room will be located either at the university or at the Huntington's centre as suits you. Some meetings may be done through zoom if that is also what you are comfortable with.

What are the discomforts and risks?

It is okay if you feel any discomfort in showing or talking about what you have done but be assured that everything will remain between you and I and your identity will not be disclosed outside of this study unless you agree upon it. The session will be conducted in a relaxed and friendly manner, but you will have no pressure to share.

What are the benefits?

Participants: This project is to encourage individuals in the health context such as you to become a voice in the research process, to be a part of enabling change for the future design of health environments to be creatively shifted according to your hopes.

Researcher: This study enables researchers like me to gain expertise and develop skills in a wide variety of disciplines, such as healthcare and interior design. It also enables me to gain real-world expertise in communication, data collection, and analysis techniques with

stakeholders. This thesis would allow me to qualify for a master's degree in creative technologies.

Wider Community: The goal of this project is to inspire health design researchers to make a positive impact through their work. This study will also spread knowledge to society about people living with this long-term disability, Huntington's disease. The findings could potentially help to enhance healthcare spaces by using the findings for future research.

How will my privacy be protected?

Images and videos of your creations and interactions will be taken during this task, but your names and personal data will not be collected or used. Privacy and confidentiality in the collection and reporting of data will be respected. Everything will be confidential, and you will be given the opportunity to consent for images and videos to be taken and if you are okay with your face to be shown.

What are the costs of participating in this research?

You will be giving approximately an hour or less for this research.

What opportunity do I have to consider this invitation?

You will get two weeks to decide in your participation for this study.

Will I receive feedback on the results of this research?

You can find a summary of the findings and analysis of this study through this blog link, once its complete. **https://hooryahasif.tumblr.com/**

What do I do if I have concerns about this research?

Any concerns regarding the nature of this project should be notified in the first instance to the Project Supervisor, *Ann Morrison,* ann.morrison@aut.ac.nz *,* 09 921 9999

Concerns regarding the conduct of the research should be notified to the Executive Secretary of AUTEC, *ethics@aut.ac.nz* , (+649) 921 9999 ext 6038.

Whom do I contact for further information about this research?

Please keep this Information Sheet and a copy of the Consent Form for your future reference. You are also able to contact the research team as follows:

Researcher Contact Details:

Name: Hooryah Asif

Email: hooryahasif@gmail.com

Contact Number: 0223819246

Project Supervisor Contact Details:

Name: Ann Morrison

Email: ann.morrison@aut.ac.nz

Office Phone: 09 921 9999

Approved by the Auckland University of Technology Ethics Committee on *type the date final ethics approval was granted*, **AUTEC Reference number** *type the reference number*.

Consent and Release Form

Project title: *"Virtual Dreams: Lighting Atmosphere Study for Long-term Healthcare Spaces' Future Design"*

Project Supervisors: *Ann Morrison and Stefan Marks*

Researcher: *Hooryah Asif*

¡   I have read and understood the information provided about this research project in the Information Sheet dated dd mmmm yyyy.

¡   I have had an opportunity to ask questions and to have them answered.

¡   I understand that taking part in this study is voluntary (my choice) and that I may withdraw from the study at any time without being disadvantaged in any way.

¡   I understand that if I withdraw from the study then I will be offered the choice between having any data that is identifiable as belonging to me removed or allowing it to continue to be used. However, once the findings have been produced, removal of my data may not be possible.

¡   I permit the researcher | artist to use the photographs that are part of this project and/or any drawings from them and any other reproductions or adaptations from them, either complete or in part, alone or in conjunction with any wording and/or drawings solely and exclusively for (a) the researcher's | artist's portfolio; and (b) educational exhibition and examination purposes and related design works.

¡   I understand that the photographs will be used for academic purposes only and will not be published in any form outside of this project without my written permission.

¡   I understand that any copyright material created by the interview session is deemed to be owned by the researcher Hooryah Asif and that I do not own copyright of any of the photographs, videos or audio recordings.

¡   I understand that during this research my name and personal data will not be obtained or used. Privacy and confidentiality in the collection and reporting of data will be respected.

¡   I agree to take part in this research.

Choose one

¡ I do not give permission for identifiable images and videos to be used.

¡   I give permission for identifiable images and videos to be used.

¡   I agree to be contacted for stage two of the study which involves Virtual Reality.

Participants   Signature: ....

…………………………………………………………

Participants   Name:

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Participant's Contact Details (if appropriate):

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Date:

Approved by the Auckland University of Technology Ethics Committee on *type the date on which the final approval was granted* ***AUTEC Reference number*** *type the AUTEC reference number*

Note: The Participant should retain a copy of this form
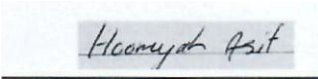
Letter of Consultation

This letter is intended to confirm that a member of the Huntington's Disease Organization, Cheenee Mundawe, has been contacted by the primary researcher on many occasions in the past month. Information was presented to this member on the background and purpose of the study of the various sections of the research project. The primary researcher obtained some advice from the participants' consultation on their role and helped plan the study approach using their suggestions. This allowed the investigator to understand and consider the most convenient way to do this study. This was intended to contribute to all limitations and risks being understood. To ensure that the researcher has appropriate and acceptable practices, they have been able to work on the changes that have taken place over this period. It influenced the methods, the questions, the changes in the user group, and the overall approach to the participation of the group members. It has provided important knowledge to the primary researcher so that they are better aware of the disability. It also made it possible to simplify the study to make decisions more appropriate for the study. Additional safety safeguards have also been identified for the participants. The consultation will continue for the next phase of the research project as the primary researcher will apply for an amendment.

Huntington's   Disease   Association   (Signature)

Date 28/9/2020

Primary   Researcher   (Signature)

Hoomyah Asit   Date 28/9/2020

Virtual Dreams

Lighting Atmosphere Study
for Long-term Healthcare Spaces' Future Design"

In healthcare settings, today's architecture has affected individuals living with long-term disabilities, and we need to prepare and create healing spaces to improve the quality of life. To help create better environments and help develop the human world; we need to work together. The built environment affects people with Huntington's Disease, which has a profound effect on their mental and psychological well-being.

I would like to work with you from the Huntington Disease Community, volunteers, and workers to listen to your stories hopes, and dreams and incorporate your insights into me research and design study.

This interview session will include some questions and some Lego building to help us have a discussion and let you express your ideas. Then, I am going to take your thoughts and integrate them into my Virtual Reality concepts to test in the next stage of the study.

Criteria: Workers and Volunteers ages between 20 and 80 who can contribute to the conversation and use Lego, all? welcome.

If you're interested in participating in this study, please contact me to book any day and time from Dec 20 - Jan 30.

Name: Hooryah Asif
Email: hooryahasif@gmail.com
Contact number: 0223819246

Locations: Huntington's centre, University or Zoom. You may choose any suitable for you.

Refreshments will be served

Participant Demographic Form

What age group are you in?

☐ 20 - 30

☐ 30 - 40

☐ 40 - 50

☐ 50 - 60

☐ 60 - 80

What is your gender?

☐ Female

☐ Male

What is your Ethnicity?

What is you Educational Background?

Education Level

Qualifications

Courses

Other

What is your job role?

☐ Volunteer

☐ Support Worker

☐ Other Worker

Please specify _____

What is your expertise with Huntington's disease?

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Do you have a Background in any of the following?

☐ Architecture

☐ Interior Design

☐ Interior Decorator

☐ Spatial Design

☐ Lighting Design

☐ Virtual Reality

Have you ever used Lego before?

☐ Yes

☐ No

What did you use it for?

Have you ever used virtual reality before?

☐ Yes

☐ No

If, yes, how many times?

_____

Did your VR experience relate to healthcare?

☐ Yes

☐ No

Do you think it has potential in the healthcare industry?

☐ Yes

☐ No

Why?

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Any Comments

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Feedback Form

Did you enjoy this Interview session?

☐ Yes

☐ No

☐ Neutral

Were the questions well – thought out and interesting?

☐ Yes

☐ No

☐ Neutral

Are you satisfied with how the discussion took place?

☐ Yes

☐ No

☐ Neutral

Did you feel like using Lego was useful or valuable for the interview?

☐ Yes

☐ No

☐Neutral

How helpful was it in expressing your thoughts or what you were imagining? (Circle one)

Not helpful   Neutral   Very Helpful

And what did you like or not like about this process?

Your thoughts will be considered for the next part of my study, would you be interested in viewing the concepts in Virtual Reality?

☐ Yes

☐ No

Neutral

Any Comments

Other Interviews

Participant x

"There are ups and downs in people's lives, as well as happy and sad times. It is a journey I had the honour of sharing with over 900 other people. As a result, experience ranges from genetic testing to palliative care. The issue with huntingtins is that it affects people at an early age, and when people require 24-hour care, the only option is residential care, rest homes, or care homes. However, most of those places are for people over the age of 65. There are some places for people under the age of 65, but they will be surrounded by elderly people, so the environment young people go into is not necessarily one that will meet their needs."

Her belief is that no environment should exist because there should be sufficient funds to care for people at home. If service users desire in-home care, the government should fund it. When people require additional space, they can only use the bedroom or lounge. If they have Huntington's disease, they may become trapped in their own bodies. She asserts that keeping the Huntington's brain active and stimulated is far better for it. Individuals frequently underestimate the brain's capability. When activated in response to a significant stimulus, it exacerbates the stimulus. She then describes her happy places as a nice little table, a palm tree the colour of red wine, some water for the kids, a picnic basket filled with delectable food.

Participant x

She is a healthcare assistant who claims to have observed numerous things while working in an office environment and learns about Huntington's disease on her journey. Colours and lighting, she believes, can have an emotional effect on patients. Her happy place comes with a detailed narrative; she begins by describing it in terms of the sun, the sky, the soft ground, and the mountains. The sound of the ocean is one of her favourite sounds, along with the sound of birds chirping and the feel of a gentle breeze in her hair.

"There is just something about the sound of the ocean that I really love," she explains. "It's calming, yes, but it's also liberating at the same time

because you just feel at peace with everything. Ocean is a shade of bluey green and turquoise. And then there are the mountains in front of me " she continues. "At one point, I went through a difficult period. I drove down to the Coromandel and simply discovered a spot that looked like this model. "It just it was like a release of some sort".

Participant x

An interview with another support worker they say that the Individual's they take care of prefer outdoor activities such as picnics rather than indoor ones.

"One person is bored because he is unable to interact with others or go outside. He is being given scant attention, which is unjust. When his family arrives, he is at his happiest. Another patient prefers to stay inside but is happier when friends visit; however, he still spends most of his time in his room because that is his preference. He may, however, go outside because prolonged sitting indoors is unhealthy. They prefer picnics more than indoor activities."

"In my opinion, taking care of Huntington's disease is quite difficult for any med student. You must provide them with additional space, free of clutter."

She claims that novel tools and methods for understanding and caring for them are considered necessary. Someone or something must pique people's interest and entertain them. She believes that participating in a variety of activities would be extremely beneficial for just one person, but there is no safe way to do so in this place. In her happy place, she would grow and learn about maple plants. She enjoys the movement of the air and would like to take a seat; there is also a large window. As a result, this is a perfect setting for her to read her book (Fig. 27).

Ethics Approval

Ethics Approval for 20/338 was granted for the study on 18th December 2020.