Project III Report

M.Des Communication Design (2021- 2023)

Peculiar World of Charles Bonnet syndrome
A 360 VR Immersive Film based on rare medical condition of CBS

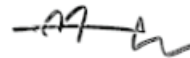**Nidhin Joseph**

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Project Guide:

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Approval Sheet

The project titled - Peculiar World of Charles Bonnet Syndrome by Nidhin Joseph of Masters of Design, Communication Design 2021-23 is approved for partial fulfillment of the requirement for the degree of 'Master of Design' at IDC School of Design, IIT Bombay

Project Guide : Bharat Parmar

Date: 30 | 11| 22

Declaration

I declare that this written document represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/ source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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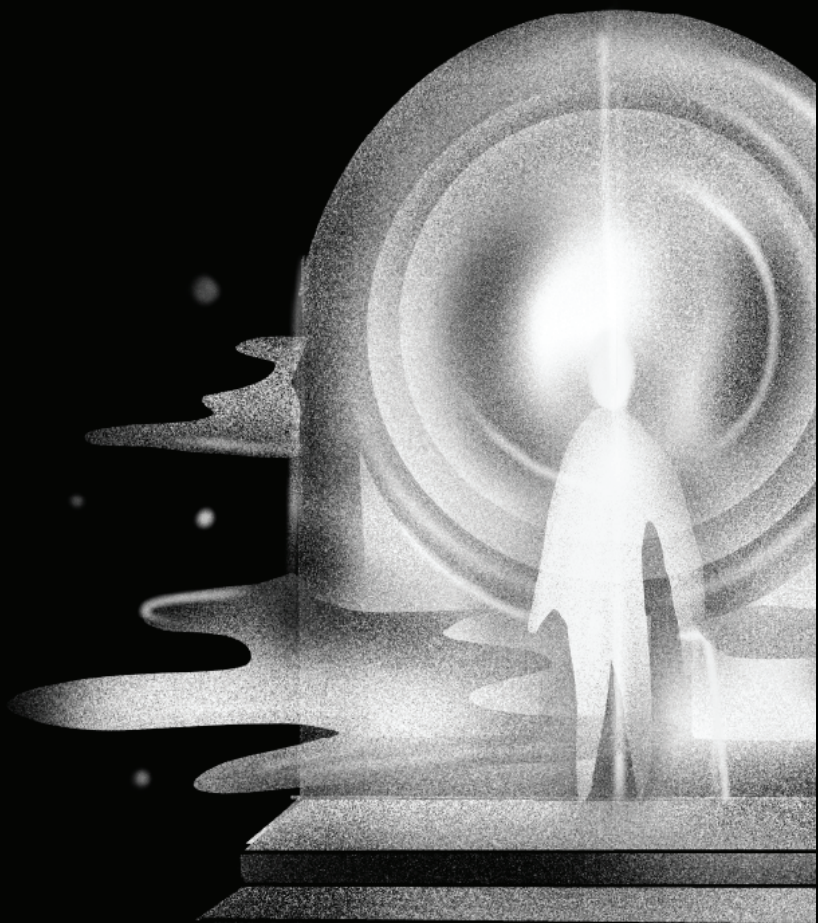
Abstract

"PECULIAR WORLD OF CHARLES BONNET SYNDROME" is a groundbreaking 360-degree VR film that provides an immersive journey into the mind of a 70-year-old person suffering from Charles Bonnet Syndrome (CBS). Utilizing cutting-edge technology like Twinmotion 2022 and Da Vinci Studio, the project crafts a narrative-driven experience guided by retrospective voice-over. It recounts the detailed hallucinations and how they affect the subject's mental health, creating a bridge of understanding and empathy between the viewer and the condition. The film represents an evolution from an initial concept of an AI-generated graphic novel to a more powerful and impactful VR experience. It aims to enlighten families of CBS patients and the broader audience about this rare medical condition, providing insights that transcend clinical explanations. Its innovative approach sets new benchmarks in medical education, combining technological prowess with artistic storytelling. The project demonstrates the potential of VR in fostering human connections and empathy, opening doors for future explorations in healthcare, technology, and education.

Creating "PECULIAR WORLD OF CHARLES BONNET SYN-DROME" has been a deeply personal and transformative experience for me. Collaborating with medical experts, patients, and a talented technical team allowed me to craft a project that transcends mere entertainment. The stories of those living with CBS touched me profoundly, guiding the narrative and shaping the emotional core of the experience. I want to extend my heartfelt thanks to everyone who contributed their time, expertise, and personal narratives to this project. Your support and belief in my vision have made this journey rewarding and impactful. Together, we have created something that will hopefully enlighten many about this rare condition and foster empathy and understanding.
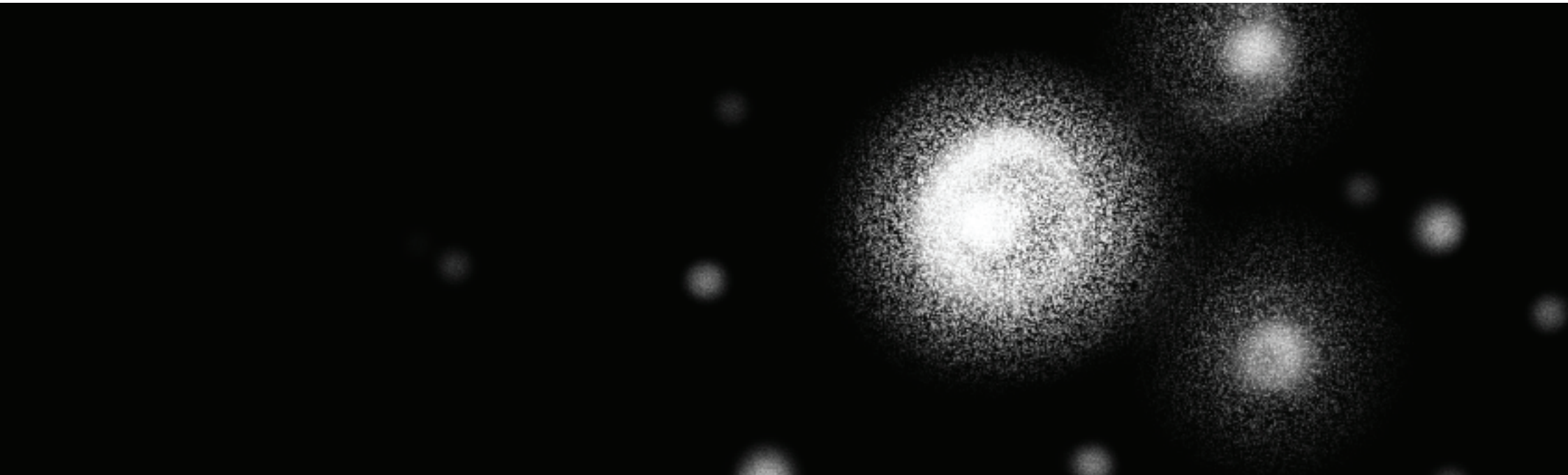
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Introduction

Imagine.. !

*You are in your eighties, visually impaired and being at home alone and one day evening out of nowhere as you where in your living room and as you look around you could see gigantic chess pieces floating around you !
Or imagine you are seeing things which you cannot reason for you would be startled…*

*Things appear with much clarity and precision than your usual vision.
You heart trembled….!
You are wondering.. What is this I am seeing..!*

You would be feeling frightened .. !
First thought in your mind would be first I slowly started losing my vision and now Am I losing my mind.

The fear of being judged about sanity and the stigma linked to it can make you stay silent.. And you suffocate alone in the mental pressure of silence…
But Let me welcome you to the Peculiar World of Charles Bonnet Syndrome. Here you can find the reason for your hallucinations

You are too frightened to tell anyone!

1.1 About the Project

PECULIAR WORLD OF CHARLES BONNET SYNDROME: A name that speaks volumes, an experience that transcends the ordinary. This isn't just a VR project; it's a foray into the unknown, an exploration of the intricate mysteries of the human mind.

The world of Charles Bonnet Syndrome (CBS) is one that few have ventured into. It's a place where the mind paints vivid pictures, unseen by any other eye. A condition that predominantly affects the elderly, CBS causes complex visual hallucinations that can be both fascinating and frightening.

What began as an AI-generated graphic novel soon blossomed into something more profound, more impactful - a 360-degree VR experience. A five-minute immersive journey into the perspective of a 70-year-old CBS patient, narrating his hallucinations and their effects on his mental health.

Powered by Twinmotion 2022 and Unreal Engine, with 360 film editing using Da Vinci Studio, this project does more than just tell a story; it invites you into the peculiar world, allowing you to witness firsthand the reality that CBS patients face daily.

The narrative-driven, personal focus, paired with retrospective voice-over, sets the stage for a unique and moving exploration of a rare medical condition. It's not just about the sights and sounds but about feeling, understanding, and evolving.

1.2 Project Motivation

Why Charles Bonnet Syndrome? Why venture into the uncharted territory of a rare and misunderstood condition? The motivation behind "PECULIAR WORLD OF CHARLES BONNET SYNDROME" is as multifaceted as the hallucinations it seeks to explore.

At the core of this project lies empathy. Empathy for those who experience vivid hallucinations that are both beguiling and terrifying. Empathy for the families who strive to understand a condition that seems so foreign, so outside the realm of common experience.

The project's inception was marked by a desire to illuminate the obscure, to shed light on a condition that's often misdiagnosed or overlooked. In a world where mental health is gaining much-needed attention, this 360-degree VR experience seeks to contribute by fostering understanding and compassion for CBS patients.

Additionally, the transformation from an AI-generated graphic novel to an immersive film was driven by the urge to make the experience more tangible, more real for the families of CBS patients. The aim was to create a medium that would not merely inform but allow individuals to walk in the shoes of someone battling CBS, thus evolving their comprehension of this rare medical condition.

Through cutting-edge technology and creative storytelling, this project stands as a testament to human curiosity, compassion, and the unending pursuit of knowledge.

What on earth is happening to me?

1.3 Project Evolution

The project's genesis was not a straightforward path. It evolved and reshaped itself, traversing through different mediums and ideas, culminating in the immersive "PECULIAR WORLD OF CHARLES BONNET SYNDROME."

Initially conceptualized as a graphic novel with AI-generated illustrations, the project sought to provide a unique perspective on Charles Bonnet Syndrome. The creation of storylines based on real-life experiences of CBS patients laid the groundwork for an authentic and insightful exploration of the condition.

But as the project unfolded, it became apparent that the essence of CBS, the visual and emotional complexity of hallucinations, needed a more engaging platform. The transition to a 360-degree VR experience became a transformative step, taking the viewer into the mind of a 70-year-old person battling with CBS.

The process involved intricate scriptwriting, adjusting the previously developed storylines to suit the new medium. The use of Twinmotion 2022 powered by Unreal Engine, along with 360 film editing using Da Vinci Studio, added layers of depth and realism to the project.

The evolution was not merely a change in medium but a refinement of vision. It involved the adaptation of a narrative-driven personal focused retrospective voice-over, making the film a poignant and impactful piece of art. The project's metamorphosis reflects a bold and innovative approach, always striving for the best way to connect, educate, and resonate with the audience.

1.4 Unique Selling Points

The "PECULIAR WORLD OF CHARLES BONNET SYNDROME" is not merely a visual experience; it's an empathetic journey into an unexplored world, filled with layers that set it apart from anything similar.

1. **Immersive Understanding:** Using 360-degree VR technology, the project transcends traditional storytelling methods. It does not just narrate a story; it immerses the viewer in the emotions, visuals, and mental landscapes of an individual facing CBS.
2. **Authenticity:** Rooted in real-life experiences and carefully crafted storylines, the content strives for authenticity. It paints an accurate and compassionate picture of Charles Bonnet Syndrome, bridging the gap between medical understanding and human connection.
3.**Technological Innovation:** With Twinmotion 2022 powered by Unreal Engine, the project harnesses cutting-edge technology to bring to life intricate hallucinations and psychological experiences. It's an amalgamation of art, technology, and medical insight.
4. **Educational Purpose:** Beyond entertainment, it serves an educational purpose. It's a tool for families, medical professionals, and anyone interested in understanding a rare medical condition from an insider's perspective. It fosters empathy and broadens awareness.
5. **Narrative Excellence:** The adaptation of a creative script and narrative-driven personal focused retrospective voice-over adds a human touch to the technology. It's not just about seeing; it's about feeling, empathizing, and relating.
6. **Adaptability:** The journey from an AI-generated graphic novel to a 360-degree film reflects adaptability and an innovative spirit. It's a testament to the creative process's flexibility, adapting and transforming to realize a unique vision.

In essence, the unique selling points of this project lie in its ability to connect, engage, and educate. It's an experience that transcends boundaries, allowing viewers to not only see but feel what it's like to live with Charles Bonnet Syndrome.

1.5 Genre: Educational / Medical Experience

In a world saturated with content, choosing the right genre is akin to setting a course for an uncharted land. The "PECULIAR WORLD OF CHARLES BONNET SYNDROME" embarked on a journey where few have ventured, selecting the Educational / Medical Experience genre.

The choice wasn't accidental or capricious. It was a deliberate decision to explore a subject both mysterious and impactful. Charles Bonnet Syndrome (CBS), though rare, is a real and life-altering condition. The project's aim was to open a window into this hidden world, providing insight, understanding, and empathy.

This genre brings a new dimension to education. It's not about textbooks and classrooms but using technology and storytelling to teach and touch hearts. By immersing viewers in a 360-degree VR environment, the experience becomes more than learning; it becomes a lived reality.

It's a bridge between medical jargon and human connection, breaking down complex medical phenomena into relatable experiences. It translates scientific understanding into emotional insight, turning abstract concepts into tangible feelings.

The choice of genre elevates the project from mere entertainment to a purposeful and enlightening journey. It's a brave venture into unexplored territory, driven by the desire to make a difference, to educate, to inspire, and to bring the hidden world of CBS closer to the hearts and minds of its audience.

1.6 Target Audience

The fascinating adventure into the "PECULIAR WORLD OF CHARLES BONNET SYNDROME" was designed with a particular audience in mind. This wasn't merely an artistic endeavor; it was a targeted effort to reach, inform, and engage specific individuals and groups.
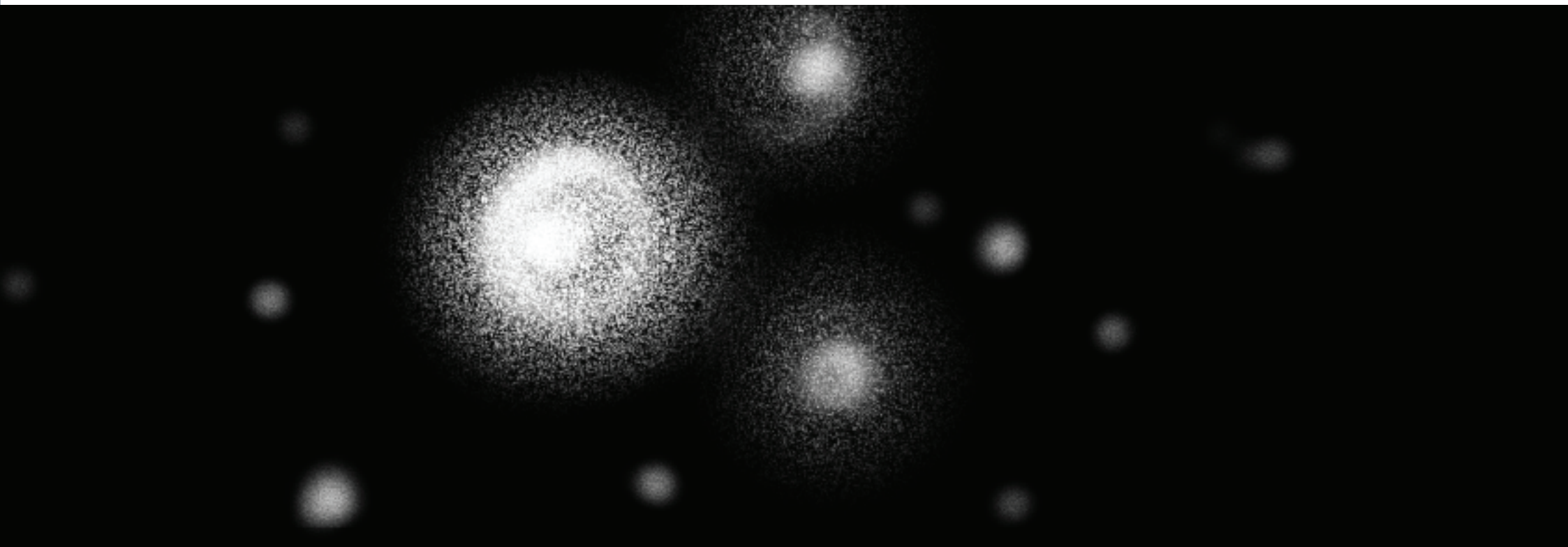
1. Families of CBS Patients:

They stand at the core of this project. The film aims to provide them with insights into what their loved ones are experiencing. By allowing them to "walk" in the shoes of a CBS patient, the project fosters deeper empathy, understanding, and compassion.

2. Medical Professionals and Caregivers:

Doctors, nurses, therapists, and other healthcare providers can greatly benefit from an immersive understanding of CBS. The project seeks to go beyond clinical descriptions and help medical professionals perceive the emotional and psychological dimensions of the syndrome.

3. Educators and Students in Medical and Health Fields:

The educational genre naturally attracts educators and students, especially those focused on mental health, psychology, and medical disciplines. The project provides an enriching supplement to traditional learning resources.

4. General Public Interested in Psychological & Medical Phenomena:

Beyond the narrow confines of specialized groups, the project also reaches out to those intrigued by the human mind, psychology, and rare medical conditions. The film can be an eye-opening experience, raising awareness and adding a nuanced layer to the public's understanding of such conditions.

5. VR and Technology Enthusiasts:

The innovative use of VR technology can draw interest from those passionate about VR, gaming, and interactive media. The project's cutting-edge execution places it at the intersection of art, education, and technology.

By identifying and understanding its target audience, the "PECULIAR WORLD OF CHARLES BONNET SYNDROME" ensures that its message is not lost in the vast ocean of content. It speaks directly to those who need to hear, see, and feel its story. It becomes more than a film; it turns into a communication tool, a bridge between worlds, a means of touching lives.
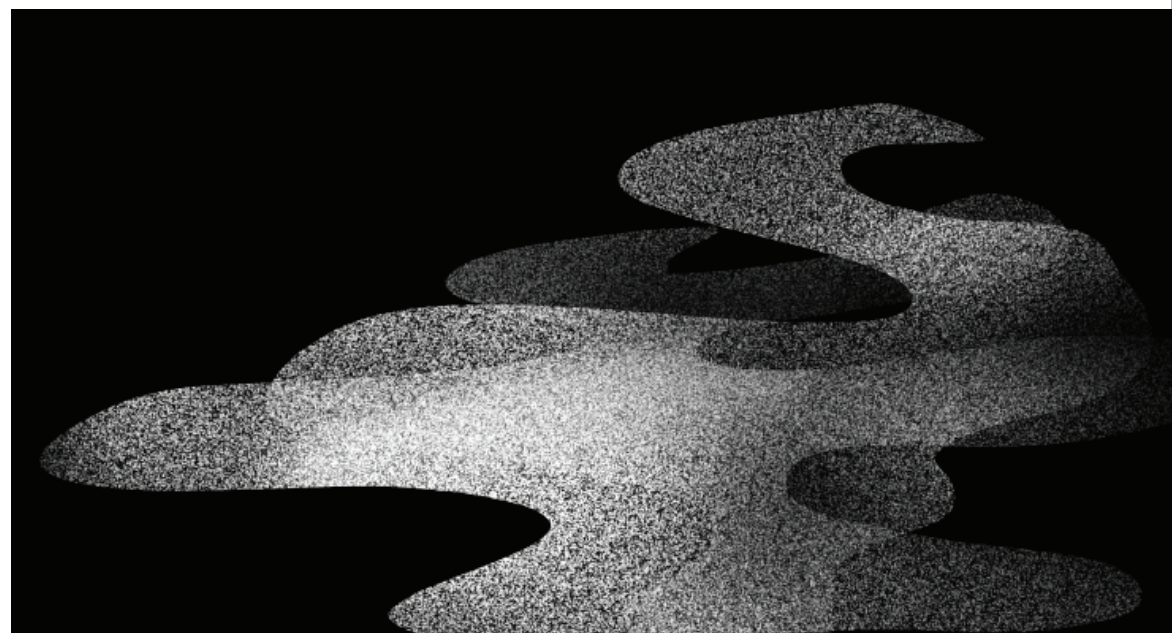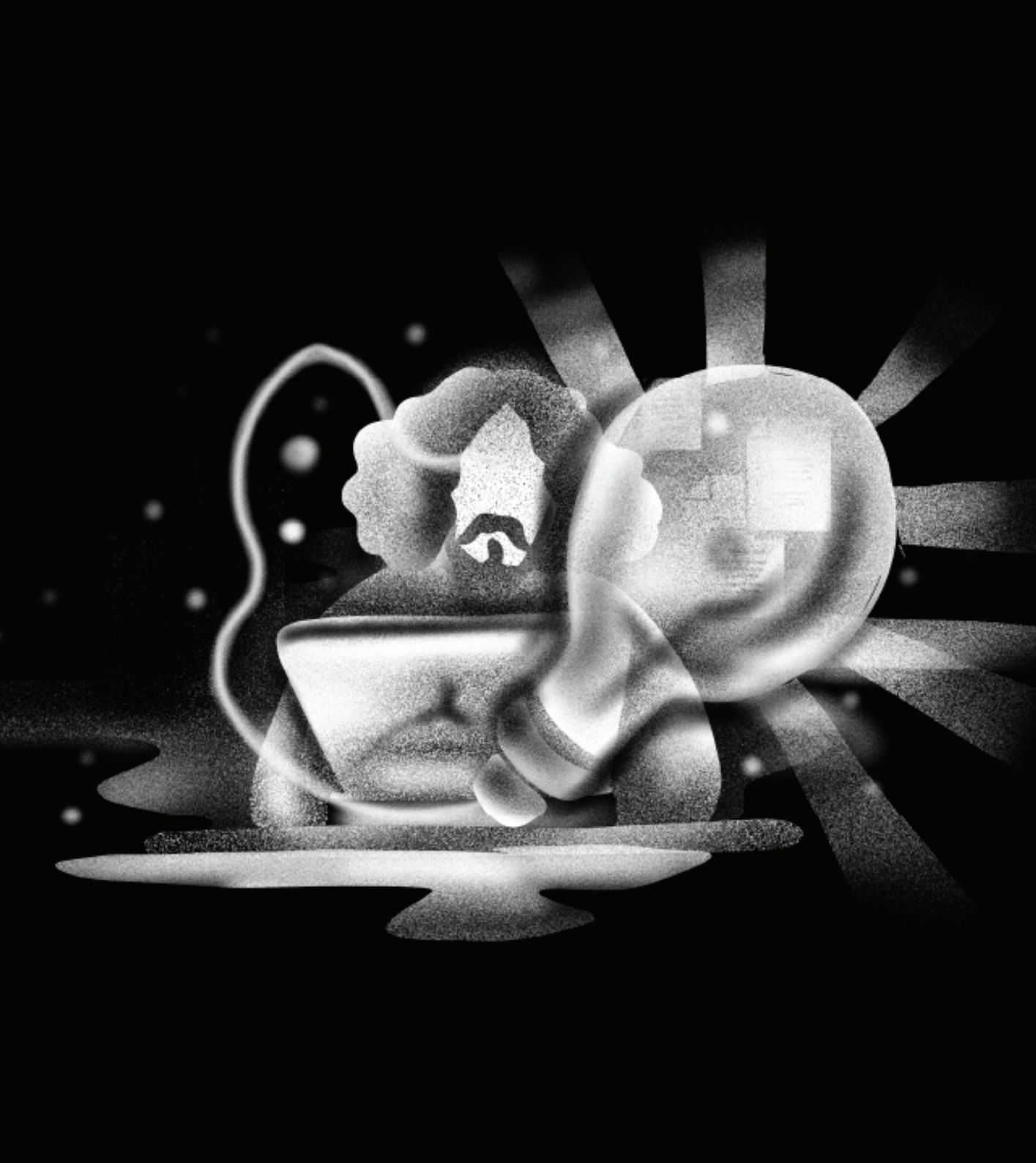
1.7 Project Pitch

The "PECULIAR WORLD OF CHARLES BON-
NET SYNDROME" isn't merely a 360-degree
VR film. It's an invitation to a journey—a
chance to step into the shoes of a 70-year-old
individual facing the intricate and bewildering
realm of Charles Bonnet Syndrome (CBS). The
pitch for this project is more than a proposal;
it's a call to action, a beckoning to explore
uncharted territories of the human mind.

1. An Unprecedented Perspective:

Imagine being inside the mind of someone facing CBS, witnessing the hallucinations, feeling the confusion, experiencing the awe and terror. This project offers that unique perspective, making it more than just a film, but a lived experience.

2. A Personal Connection:

Through a narrative-driven, personal-focused, retrospective voice-over, the film intimately connects the viewer with the subject. It's not about observing from afar; it's about immersing oneself in the story.

3. Cutting-Edge Technology:

Utilizing Twinmotion 2022 powered by Unreal Engine and 360 film editing with Da Vinci Studio, the film stands at the forefront of technological innovation. It's not just about telling a story; it's about creating a world.

4. A Call to Empathy and Understanding:

For families of CBS patients, medical professionals, and anyone interested in human psychology, this film serves as a pathway to deeper empathy and understanding. It's not about providing information; it's about evolving perceptions.

5. A Rare Exploration of a Rare Condition:

 CBS is not widely understood or recognized. This film takes an overlooked and mysterious condition and brings it to the forefront, offering insights, stirring curiosity, and making the unknown known.

6. A Bridge Between Art and Education:

Straddling the boundary between artistic expression and educational content, the film becomes a novel tool for learning, a new way to engage with complex medical phenomena, and a means to awaken minds.

7. An Opportunity for Collaboration and Growth:

The potential for partnerships with educational institutions, medical organizations, and technology companies opens doors for further research, exploration, and development. The project becomes a platform for growth and collaboration.

The "PECULIAR WORLD OF CHARLES BONNET SYNDROME" is more than a project; it's a vision. It's an exploration of what it means to be human, what it means to suffer, and what it means to understand. It's a challenge to look beyond the surface and dive into a world that's as real as it is surreal.
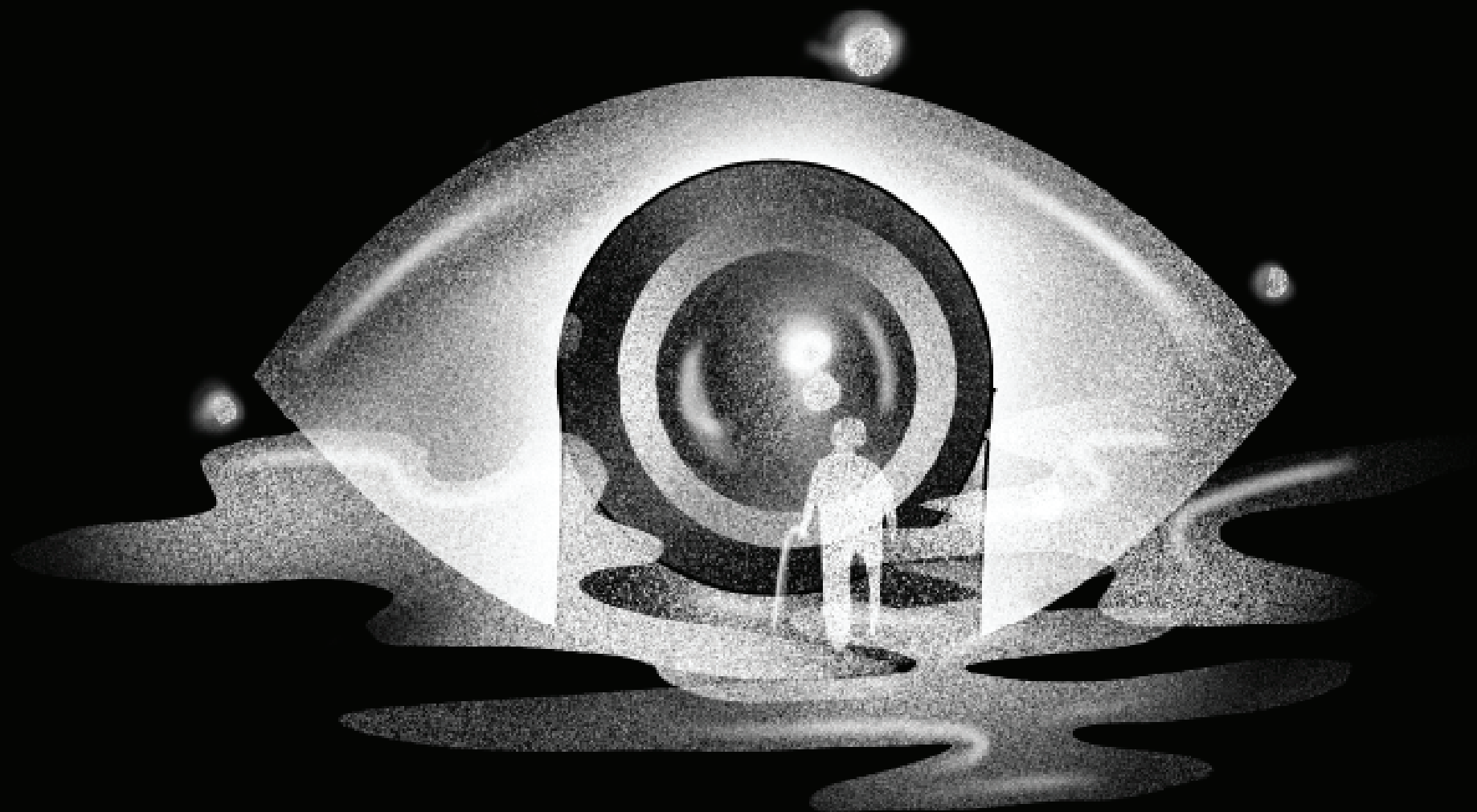
02

The Case: Charles Bonnet Syndrome

2.1 Understanding Charles Bonnet Syndrome (CBS):

CBS is a rare medical condition characterized by complex visual hallucinations in individuals with vision impairment. Often mistaken for mental illness or dementia, CBS can create a web of confusion and distress for both the sufferer and their family.

2.2 The Perspective of a 70-Year-Old CBS Patient:

Through the eyes of a 70-year-old man experiencing CBS, we delve into the intricate world of hallucinations. The experience is multifaceted, filled with vivid, sometimes terrifying imagery that can be both captivating and disorienting.

2.3 Hallucination Narratives:

What do the hallucinations look like? How do they evolve? What triggers them? These are the questions answered through the detailed narration of the hallucinations, recounting them to a medical professional. Each narrative brings a new revelation, a fresh insight into the unpredictable and peculiar world of CBS.

2.4 Impact on Mental Health:

CBS isn't just about visual phenomena; it's a mental and emotional journey. The film explores the profound impact on mental health, the challenges of differentiating between reality and hallucination, and the psychological strain it places on the individual and their loved ones.

2.5 Personal Encounters & Scenarios:

The film doesn't just describe the condition; it tells a story. It takes the viewer through various real-life scenarios, situations, and personal encounters that the 70-year-old man has experienced. This narrative approach breathes life into the condition, making it relatable and tangible.

2.6 A Pathway to Empathy:

By portraying CBS from the inside out, the film builds a bridge of empathy, allowing viewers to feel, to a degree, what it's like to live with CBS. It fosters understanding, compassion, and a connection that transcends the clinical description of the condition.

2.7 Aiding Medical and Social Understanding

:Beyond the personal realm, the film serves as a tool for medical professionals and society at large to understand CBS in depth. It opens doors to new research possibilities, awareness campaigns, and educational modules that can reshape how CBS is approached and managed.

In the "PECULIAR WORLD OF CHARLES BONNET SYNDROME," the obscure becomes tangible, the misunderstood becomes clear, and the unknown becomes a journey worth exploring. It's not just about displaying a condition; it's about narrating a life, unfolding a mystery, and building a connection that can change how we view CBS and those who live with it.
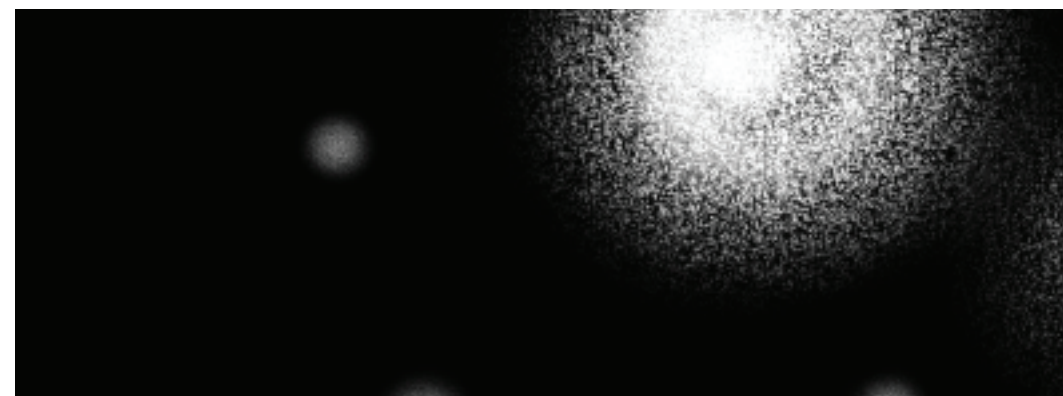
Understanding Charles Bonnet Syndrome

 The visual hallucinations brought on by the brain while adjusting to considerable vision loss are known as Charles Bonnet syndrome. And it is elderly people who are more prone towards having CBS than any other age group. As they are more likely to experience eye problems that can cause vision impairment, such as age related macular degeneration.

  And it is when a person have lost over 60% of their vision, they may experience complex, visual hallucinations. Any eye disease, eye cancer, stroke, eye injury, diabetes, multiple sclerosis or other disorders thaharms the optic nerve can result in vision loss. And CBS is solely brought on by sight loss, and it is not a mental health issue. Not all people with impaired vision experience it, and as of now, it is impossible to anticipate who would be affected by this rare condition. The hallucinatory experiences which one would expeprience because of CBS can range from simple lines and dots, coloured blobs and geometrical repeta tive patterns to more sophisticated hallucinations of faces which are often deformed or gargoyle-like figures and people who could be real-sized or tiny or gigantic, they can young or old, often in period costume,or entire scenes shift hallucination

around the on —are all common forms of hallucinations experi enced in case of CBS patients. It is only the vision, out of the five senses which is affected by these hallucinations. It is not CBS if any of the other senses as hearing, tasting, smelling, or touching are engaged.

The world's foremost expert on CBS is Professor Dominic Fytche, explains what takes place in the brain to produce the visual disturbances. The nerve cells in the retina send a steady stream of impulses along the visual pathways as soon as we open our eyes, which are then transmitted to the visual sections of the brain. This stream of impulses lessens if the retina is injured or even if you cover your eyes. The brain paradoxically responds by increasing cell activity rather than decreasing it, and it is this increase that results in visual hallucinations.

Depending on the location of the rise, you may experience hallucinations. If it's in the part of the brain responsible for colours, you'll see a colour in your head; if it's responsible for faces, you'll see a face; and so on. Though not all people should take some medications, they can be helpful. Some drugs used to treat other disorders have visual hallucinations as a side effect, which exacerbates CBS. Coping techniques can be beneficial. However disturbing and upsetting it may be, CBS should not be mistaken for any form of mental illness.

2.8 Coping Strategies for
Charles Bonnet Syndrome

- As for the treatment of CBS, there no right medication in the practice as of now, and in order to manage the CBS hallucinatory episodes its prefered to practice the coping strategies listed to the side.

- Reach out towards the hallucination, try and touch it or sweep your hand to brush away the image.

- Shine a torch upwards from below your chin in front of your eyes.

- If sitting, try standing up and walking round the room. If standing, try sitting.Walk into another room or another part of the room

- Turn your head slowly to one side and then the other. Dip your head to each shoulder in turn.

- Stare straight at the hallucination.

- Change whatever it is you are doing at that moment – turn off/turn on the television/radio/music.

- Change the light level in the room. It might be the dim light that is causing the hallucinations. If so, turn on a brighter light – or vice versa.

- Clap your hands or click your fingers, Sing or whistle At night, try wearing a thick eye mask. Blink your eyes slowly once or twice.
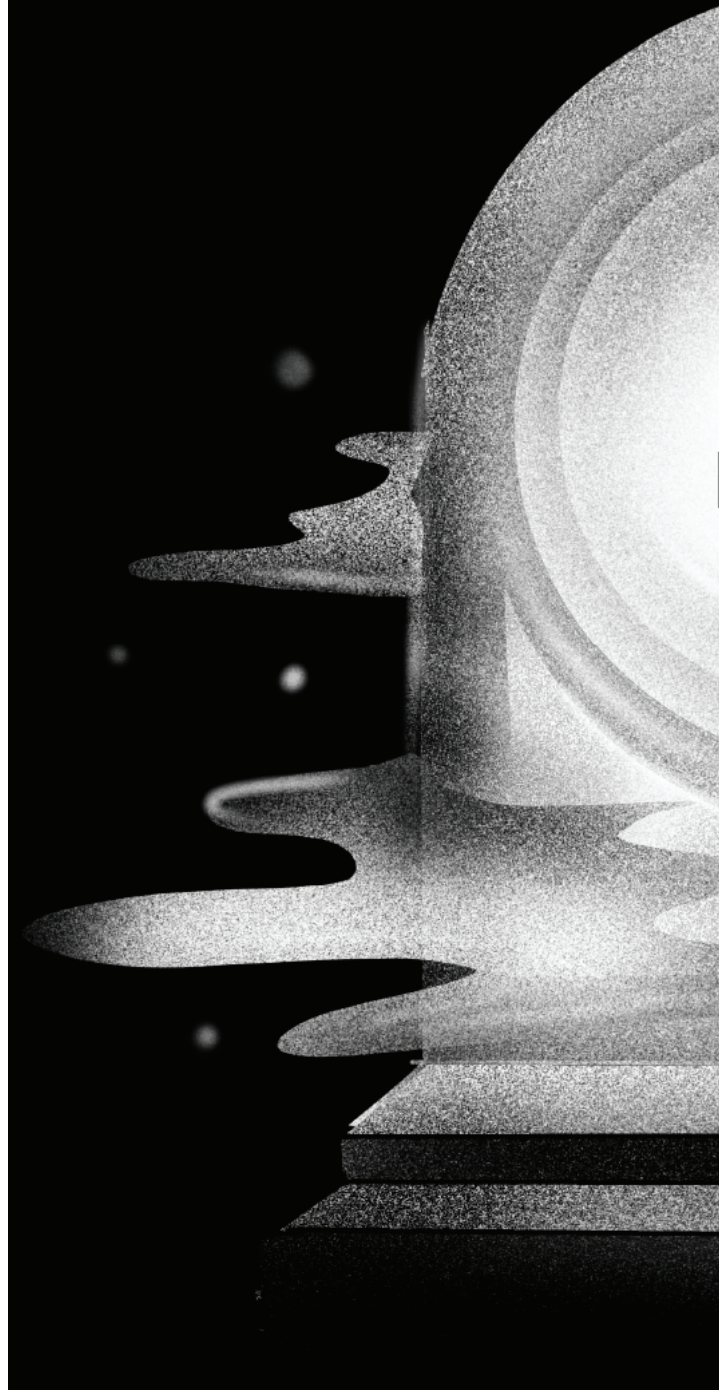
03

VR Implementation: A New Frontier in Understanding CBS

3.1 The Power of VR in Education and Awareness:

VR's ability to create lifelike simulations offers a revolutionary way to educate people about complex subjects like CBS. The viewers are not just told about CBS; they experience it, leading to a more profound understanding.

3.2 Design and Development Process:

Creating a VR experience is a complex task that involves extensive planning, script-writing, modeling, rendering, and post-production. The adaptation of the AI-generated graphic novel script into a 360-degree VR experience represents an innovation in storytelling and design.
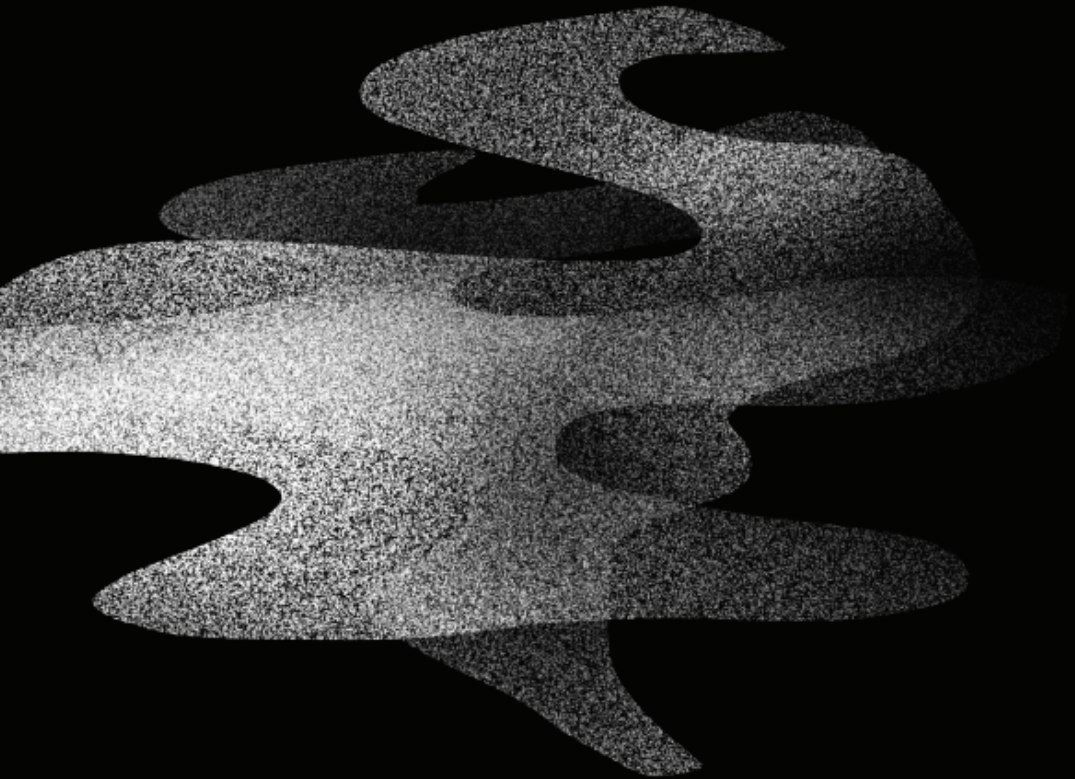
3.3 Tools and Technology:

Utilizing Twinmotion 2022 and Da Vinci Studio, the team transformed the narrative into a visually captivating experience. These cutting-edge tools allowed the creators to craft detailed environments, realistic characters, and seamless transitions between scenes.

3.4 Research and Authenticity:

To make the experience authentic, the project relied on extensive research, consultations with medical professionals, and real-life case studies. This due diligence ensures that the experience is not just visually stunning but also medically accurate.

3.5 Personal-Focused Retrospective Voice-Over:

The narrative-driven voice-over adds a layer of personal connection, guiding the viewer through the story with the wisdom and emotion of someone who has lived through it.

3.6 Collaborations and Challenges:

The development of such a project requires collaboration across various domains, including medical experts, 3D artists, scriptwriters, and more. Challenges such as maintaining narrative coherence in a 360-degree space, ensuring medical accuracy, and meeting technological demands were tackled through iterative design and teamwork.

3.7 Impact and Future Applications:

This VR project sets a precedent for using immersive technologies in medical education and empathy-building. It's not just a one-off film but a step towards a new way of understanding, communicating, and connecting.

3.8 Conclusion:

The implementation of VR in this project symbolizes the convergence of technology, art, and empathy. It demonstrates how a tool often associated with entertainment can be harnessed to make a meaningful difference in the way we understand complex medical conditions.
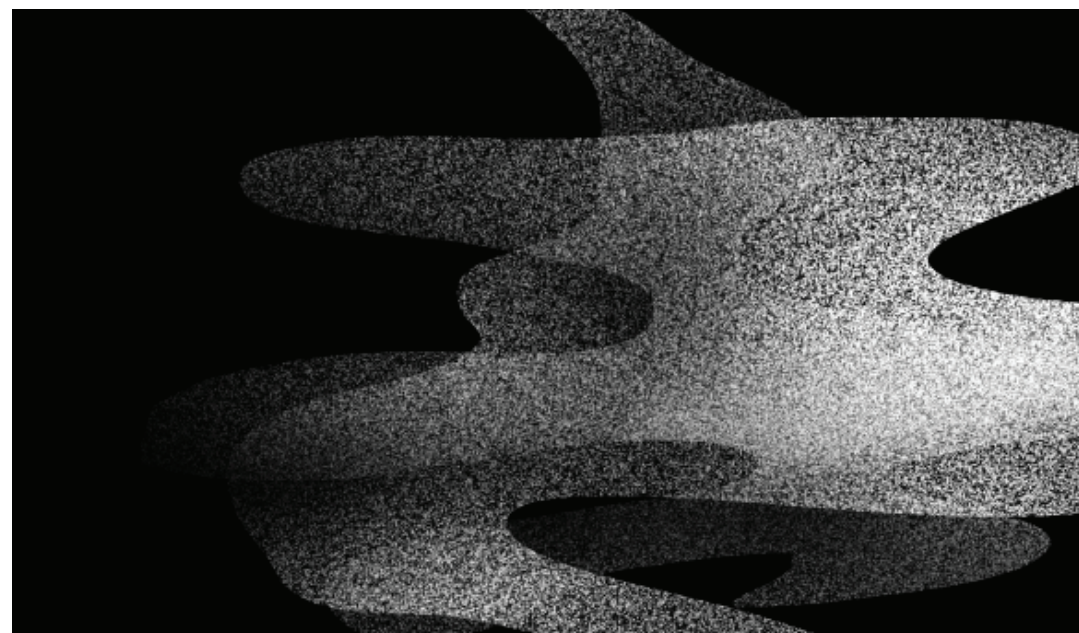
Virtual Reality: A Portal to Extraordinary Learning

Have you ever stepped into a portal to another world? That's what Virtual Reality brings to the table - a window to immersive, extraordinary learning experiences. We'll explore the magical realm of VR in this section, understanding how this technology has been a game-changer in education and training. It's like the magic wand in our story, and we'll reveal why it was the chosen tool for our mission.

Virtual Reality Training

Virtual Reality Training is the digital simulation of lifelike scenarios for training purposes. Trainees enter a 360°, active learning environment, experiencing sights and sounds that dissolve the barrier between virtual and actual reality. Using the headset and controllers, trainees look, speak, and move about freely in a 3D virtual setting, interacting with simulated real-world tools, machinery, and other trainees and instructors. Critically, with Virtual Reality, workplace scenarios that were once too difficult, expensive, or dangerous to train for, (such as emergency protocols and disaster preparedness, hazardous material spills, realistic heights training, etc.), become vastly more practical, cost-effective, and safe in an immersive simulation. When combined with story narratives and learning curriculum developed by subject matter experts, the result is trainees learning in the best way possible — through personal experience — significantly improving learning retention, job performance, team collaboration, workplace safety, and cost

Effectiveness of VR Training

The effectiveness of Virtual Reality Training (or any training, for that matter), depends on the quality of the training being offered. Research shows four critical things are needed for any successful training experience, virtual or otherwise: realistic practice, spaced repetitions, contextualized scenarios, and critical feedback.

Realistic Practice

Spaced Repetitions

Contextualized Scenarios

Critical Feedback.

Virtual reality training of lucid dreaming

The study "Virtual Reality Training of Lucid Dreaming" investigates how virtual reality (VR) might help people have lucid dreams, where they are aware they're dreaming while in the dream. Most of the time, we aren't aware of our thoughts and mental state when we're dreaming. Lucid dreaming is quite rare, but certain types of training can increase how often it happens.

This training usually involves people regularly asking themselves if what they're experiencing is real or a dream. The researchers tested if using VR, especially dream-like VR, could boost this training. They had volunteers go through four weeks of either VR-assisted lucid dreaming training, regular lucid dreaming training, or no training. Their findings showed that VR-assisted training led to a much bigger increase in lucid dreaming than no training at all. They used eye signals during sleep studies to confirm when the volunteers were having lucid dreams, which supported their results. The researchers suggested that the dream-like VR experiences, the use of VR content as cues in dream images, and the possible effect of VR sessions on later experiences might explain why VR helped increase lucid dreaming.

Virtual reality training of lucid dreaming

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(2020, August). Virtual reality training compared with apprenticeship training in laparoscopic surgery: a meta-analysis. Pubmed. Retrieved May 20, 2023, from https://pubmed.ncbi.nlm.nih.gov/32820649/

Takeaway from Study

Immersion and realism:
This research suggests that VR can create immersive, dream-like experiences that mirror reality. For AXB 1344, incorporating a realistic and immersive VR environment could enable users to fully experience and understand the sequence of events leading to the Air India 1344 accident.

Memory cues:
The study indicates that VR content can serve as memory cues within dreams. This finding could be utilized in the AXB 1344 VR experience by embedding key evidences or event sequences that the investigators need to remember and understand.

Enhanced awareness and cognition:
The research shows that VR-assisted training significantly boosts lucid dreaming, which is a state of heightened awareness. This insight could be helpful in AXB 1344's design to promote increased awareness and cognition among users while investigating the aviation accident.

Repeated training:
The study used repeated VR sessions over four weeks to enhance lucid dreaming. Similarly, the AXB 1344 VR experience could incorporate repeated VR sessions to ensure thorough understanding of the accident scenario and better skill development in aviation investigation.

Testing and validation:
The use of polysomnography for eye signal-verified lucid dreams in this study illustrates the importance of testing and validation. Incorporating mechanisms for user performance validation in the AXB 1344 VR experience might help gauge the effectiveness of the training and enable continuous improvement.

Dissociative effects of VR:
The study discusses the potential of extended dissociative effects of VR on subsequent experiences. While creating AXB 1344, considering the impact of VR sessions on users' perceptions and behaviors might help in achieving desired learning outcomes.

Virtual Reality Training To Enhance Behavior And Cognitive Function Among Children With ADHD

This study was all about helping kids who have Attention-Deficit/Hyper-activity Disorder (ADHD). The researchers thought of a new way to help them improve their behavior, thinking skills, and ability to do two things at once, using a mix of exercise and video game-like virtual reality (VR). 14 kids with ADHD, none of whom were on medication, were asked to walk on a treadmill while also dealing with virtual obstacles. They did this training 18 times over six weeks.

The results were pretty cool. The parents of the kids said that their children improved in how they interacted with others and how they dealt with problems that affected their minds and bodies. Their memory and decision-making skills improved, too, but there wasn't any change in their attention. When the kids were asked to walk and do something else at the same time, they did better after the training. Six weeks after the training ended, their memory and decision-making skills were still better than before the training. This shows that using a treadmill and VR might be a good way to help children with ADHD improve their skills and behavior.

Virtual reality training of lucid dreaming

Jarrod Gott,[1,†] Leonore Bovy,[1,†] Emma Peters,[1] Sofia Tzioridou,[1,2] Stefano Meo,[1] Çağatay Demirel,[1] Mahdad Jafarzadeh Esfahani,[1] Pedro Reis Oliveira,[1] Thomas Houweling,[3] Alessandro Orticoni,[4] Anke Rademaker,[1] Diede Booltink,[1] Rathiga Varatheeswaran,[5] Carmen van Hooijdonk,[6,7] Mahmoud Chaabou,[7] Anastasia Mangiaruga,[8] Erik van den Berge,[9] Frederik D. Weber,[1] Simone Ritter,[10] and Martin Dresler[1]

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Shema-Shiratzky S, Brozgol M, Cornejo-Thumm P, Geva-Dayan K, Rotstein M, Leitner Y, Hausdorff JM, Mirelman A. Virtual reality training to enhance behavior and cognitive function among children with attention-deficit/hyperactivity disorder: brief report. Dev Neurorehabil. 2019 Aug;22(6):431-436. doi: 10.1080/17518423.2018.1476602. Epub 2018 May 17. PMID: 29771624.

Takeaway from Study

Combining physical and cognitive tasks:
The study's use of a treadmill with VR could inspire the AXB 1344 project to incorporate physical tasks (like cockpit operations) with cognitive tasks (like decision making under stress) for a more comprehensive training experience.

Engagement:
The fact that the children with ADHD were engaged in the VR training suggests that VR can be a powerful tool for keeping users interested and motivated. This can be an essential design consideration for AXB 1344.

Repeated sessions: The study showed improvement after repeated sessions over a period. For AXB 1344, the investigators should be encouraged to run through the VR simulation multiple times to fully grasp the situation.

Dual-tasking: The improvement in dual-tasking ability suggests that VR can be effectively used to train for situations where multiple simultaneous tasks are necessary, which is a common occurrence in aviation situations.

Long-term effects: The study showed that improvements persisted even after six weeks. This suggests that VR training can have a lasting impact, a positive sign for the AXB 1344 project's goals of long-term learning.

Tracking improvements: The study tracked improvements in participants over time, showing the potential for a built-in system in AXB 1344 to track users' progress and areas for improvement over time.

04

Project Design
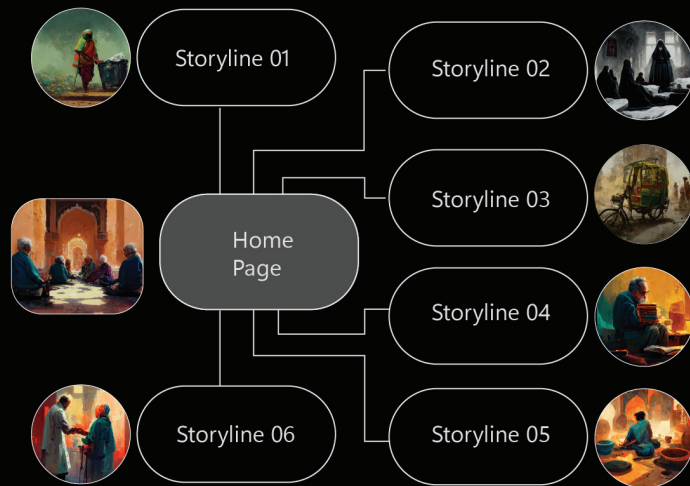
4.1 Conceptual Framework

The creation of "PECULIAR WORLD OF CHARLES BONNET SYN-DROME" began with a comprehensive understanding of the medical condition, Charles Bonnet Syndrome (CBS), and the human experience associated with it. Building a conceptual framework involved deep research, patient interviews, and empathy-driven design thinking. The focus was to craft an immersive VR experience that would resonate with the affected individuals and provide educational insights to their families.

4.2 Stakeholder Analysis

In developing the project, stakeholders such as medical professionals, CBS patients, and family members were identified. Their needs and perspectives were carefully analyzed to ensure that the VR experience was both medically accurate and emotionally impactful. The collaboration with healthcare experts ensured authenticity, while input from patients helped in creating a vivid portrayal of the CBS experience.

4.3 Risk Assessment

Producing a 360-degree VR film posed several risks and challenges. These included technical issues, ensuring accurate representation of CBS, and managing the emotional sensitivities associated with the condition. A systematic risk assessment was performed to identify potential problems and develop strategies to mitigate them.

4.4 Scope & Limitations

The project was scoped to a five-minute long 360-degree experience, focusing on the perspective and inner thoughts of a 70-year-old person with CBS. The limitations included technological constraints, budget considerations, and the complexity of authentically representing a rare medical condition.

4.5 Initial Content Ideation

The content ideation phase involved brainstorming and developing initial ideas for the narrative. This included creating storylines based on CBS patients, exploring different visual representations, and considering the unique possibilities offered by the 360-degree format.

4.6 Design Process

The design process underwent several iterations. Beginning with an AI-generated graphic novel, the concept evolved through multiple stages to ultimately take the form of a VR film. The process included script writing, graphical design, and storyboarding, all guided by continuous feedback and collaboration.

Narrative Synopsis 01

Old Writer in His Eighties

The tale of an age-old writer who was in his shell for his entire life busy writing his books, and at the age of 84 he gets the recognition he wished for his entire life but creeping old age makes him nervous about the very same things which he wished for. His anxiety and nervousness grew as the day of award ceremony came closer along came the hallucinations. The intensity and frequency of hallucinations increased day after day and on the day of award ceremony he had a mental meltdown and its through the doctor's diagnosis he came to realise it was all linked with vision impairment and he got the right reasoning for his hallucinations and he started to live in terms with those hallucinations

Narrative
Synopsis 02

Old potter and his granddaughter

The story of a 81-year old pottery maker, and in his old age when he the became sole breadwinner as his only son passed away. and to fulfill his granddaughters wish to learn to make pottery he took the spinning wheel again back into hand but things took an unexpected turn as he started to experience hallucinations. Those hallucinations broke his flow several times and along with the old age pulled him to a pit of depressive anxious thoughts haunting his life. It was an eve ning talk with an ngo worker opened his eyes to the real problem of Charles bonnet syndrome and slowly was in acceptance with his situation and luckily his hallucination episodes didnt last long they faded away over a span of 2 months and he got back to his full fledged pottery making with his granddaughter sitting by the side

Christian
nun in convent

The life took a turn for the 82-year-old nun who lived her entire life in the confinement of convent walls when she started to experience hallucinations. She took these hallucinations as a test of purity from the god almighty, but as the days passed, she couldn't account for reasons or the pattern of these hallucinations. She started to question herself as the values which she upholds seems to crumble away with these hallucinations.

crumble away with these hallucinations. The constant battle of the good and evil in her subconscious trying to reason for the hallucinations is how the story progresses. As days, weeks and month passed her salvation came in the form a young nun who was her caregiver looked into her accounts and gave her the reasoning for these hallucinations as a Charles bonnet syndrome, a rare medical condition.

Narrative Synopsis 04

Cycle rickshaw Driver in his 70s

A 74-year-old cycle rickshaw driver met with a serious accident on the busy streets of Old Delhi. And story progresses in a psychological retrospective narrative from the rickshaw drivers' point of view where he talks about the underlying reason behind the accident. As the mystery unravels through a flash back of his memories about the gradual increase of hallucinations and the mental conflicts which accompanied. Yet he himself couldn't account why he was experiencing those. And it was in the diagnosis after the accident he himself got the closure about the reasons why he was experiencing the hallucinations and it turns out to be a rare medical condition known as Charles Bonnet Syndrome. And towards the end of the story, he finds a way around to live in terms with hallucinations and gradually fully get over with the hallucinations.

Muncipality cleaning worker

The narrative flowing through the inner mind wandering of a 58-year-old municipality waste collection worker as he was facing a disciplinary action in his office for the irresponsible work behaviour as he repeated the instance of spillage of waste in inappropriate spaces. He was in the verge of loosing his job he had to in the verge of loosing his job he had to clear his side and when started telling his side of the story. The authorities were taken on a puzzling road filled with complex hallucinations and intricate confusions. And further enquiry led to the underlying cause of CBS

Doctor and his CBS self diagnosis

The story of a doctor who had self diagnosed the charles bonnet syndrome hallucinations and his ways of crafting measures and coping mechanisms on the treatment of charles bonnet syndrome. The story progresses through the doctor clinical trial journal entry and the story also spans through the initative of creating a support group for people experiencing this syndrome. He also formed a support group where they all meet once in everymonth to share the new hallucinations and hardships they all face. And with like people sharing like hardships they all developed a sense of understanding for each other as well as about their medical condition of charles bonnet syndrome.
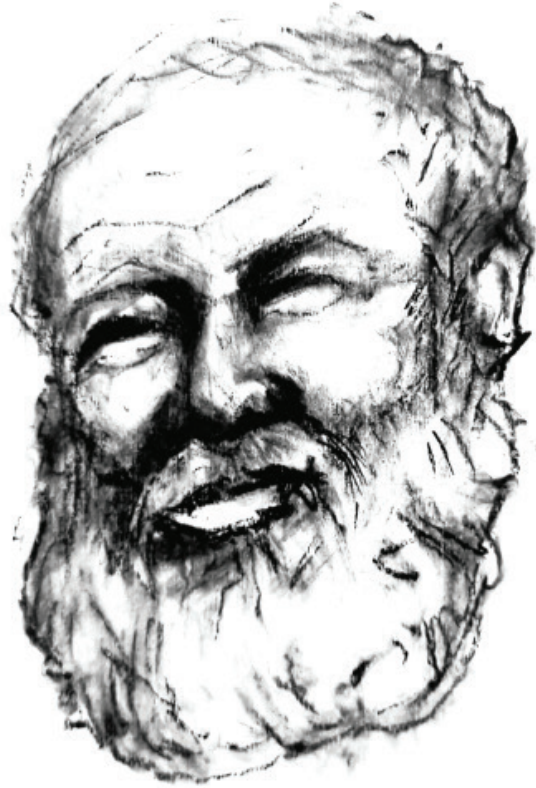
Initial Character Ideation Sketches

The initial story brainstorming approach followed was through a workflow of having sribble sketches

Graphic Storyboarding
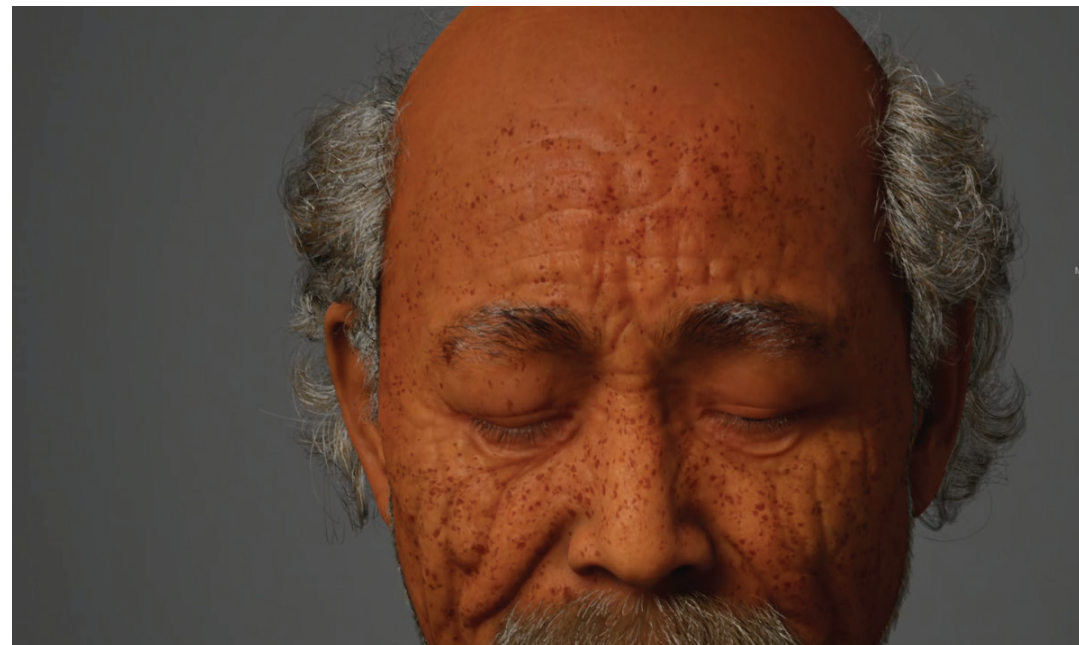
Initial Graphic Novel Illustration Style

Character Design

For the refernce and creation of consistent character illustration a digital avatar for the character was created using unreal engine poered metehuman.

4.8 Design Iteration 01

The first iteration of the design involved refining the visual aesthetics, fine-tuning the narrative, and implementing the feedback from stakeholders. It marked a critical step in aligning the project with its intended impact and educational goals.
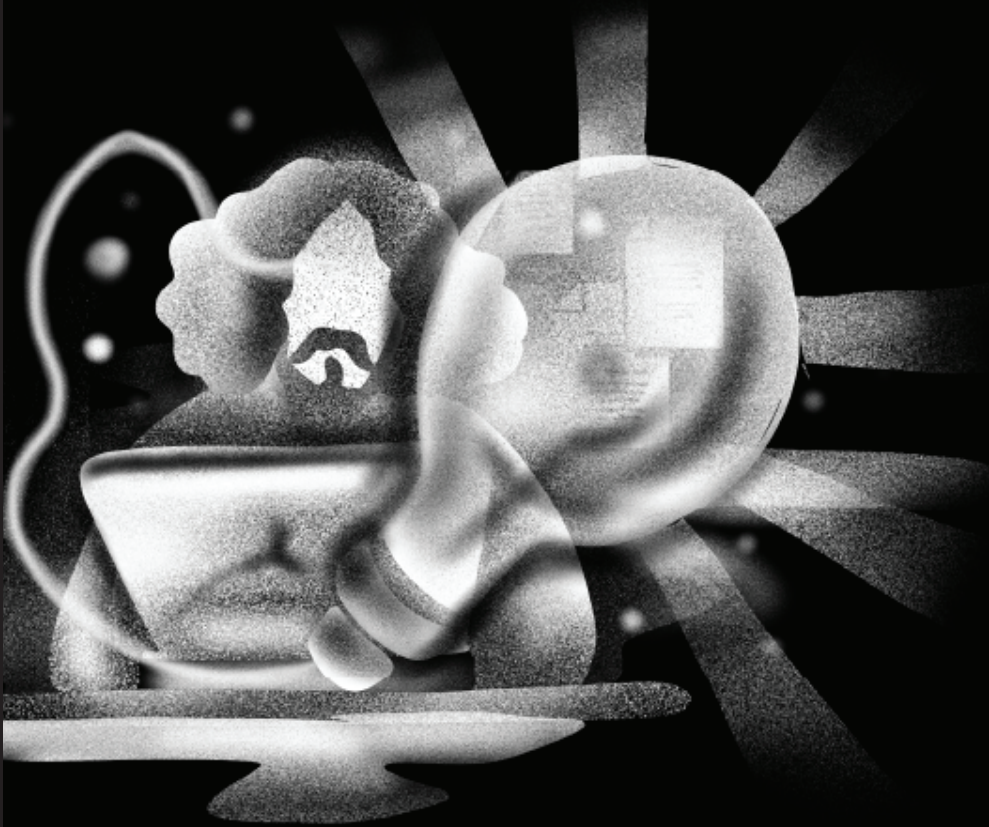
4.9 Design Iteration 02

The final iteration saw the convergence of all elements into a cohesive and powerful VR experience. Editing was done using Da Vinci Studio, and a retrospective voice-over was adapted to drive the narrative. The film was polished to meet the expectations of the target audience, focusing on empathy, education, and engagement.
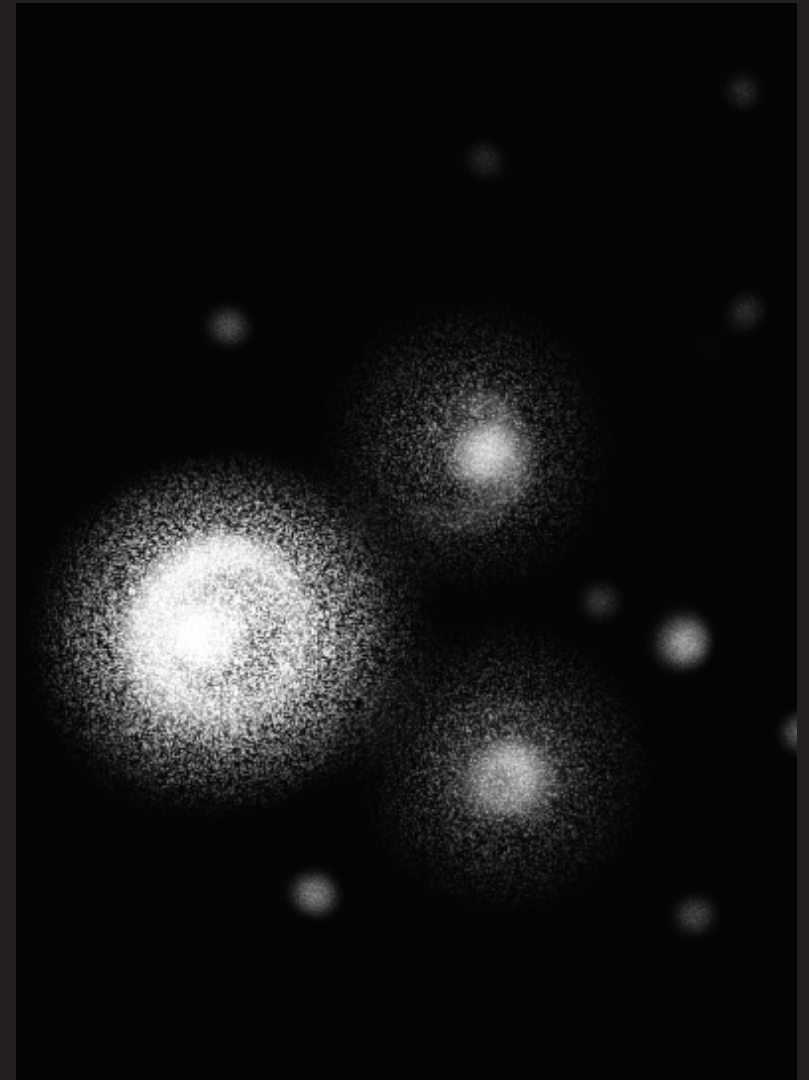
05

Production

5.1 Filming and Directing

Filming and directing the 360-degree VR experience required a unique blend of traditional film techniques and advanced virtual reality methods. Utilizing Twinmotion 2022 powered by Unreal Engine, the team orchestrated intricate scenes, guiding the user through the visual and emotional journey of CBS. Every frame was meticulously planned to create an immersive and cohesive narrative experience.

5.2 Voice-over and Narrative Design

The voice-over, performed from a retrospective perspective, was a vital component in conveying the personal story. Scriptwriters and sound designers collaborated to create a narrative that was both informative and emotionally resonant. The personal-focused voice-over added a layer of intimacy, allowing viewers to connect more deeply with the CBS patient's experience.

5.3 Level Design

The VR film's level design was structured to reflect various stages of the CBS experience. From medical consultations to personal reflections on mental health, each "level" or scene was visually and narratively distinct. Through careful design and artistic visualization, the levels seamlessly guided the viewer through a captivating exploration of CBS.

5.4 Film Editing using Da Vinci Studio

Editing played a pivotal role in shaping the final product. Using Da Vinci Studio, the team stitched together 360-degree footage, enhancing visual fidelity and ensuring smooth transitions between scenes. The editing process involved careful consideration of pacing, visual effects, and overall storytelling, culminating in an impactful and engaging film.

5.5 Visual Effects and Polishing

Visual effects added depth and realism to the virtual environment. Artists fine-tuned textures, lighting, and animations, adding polish to create a visually stunning experience. The attention to detail in visual effects contributed to the believability and immersion of the film.

5.6 Testing, Feedback, and Reiterations

Continuous testing and gathering feedback were essential in the post-production stage. Multiple iterations and refinements were made based on user feedback, ensuring that the experience was both engaging and enlightening. This iterative process was key to achieving the final, polished product.
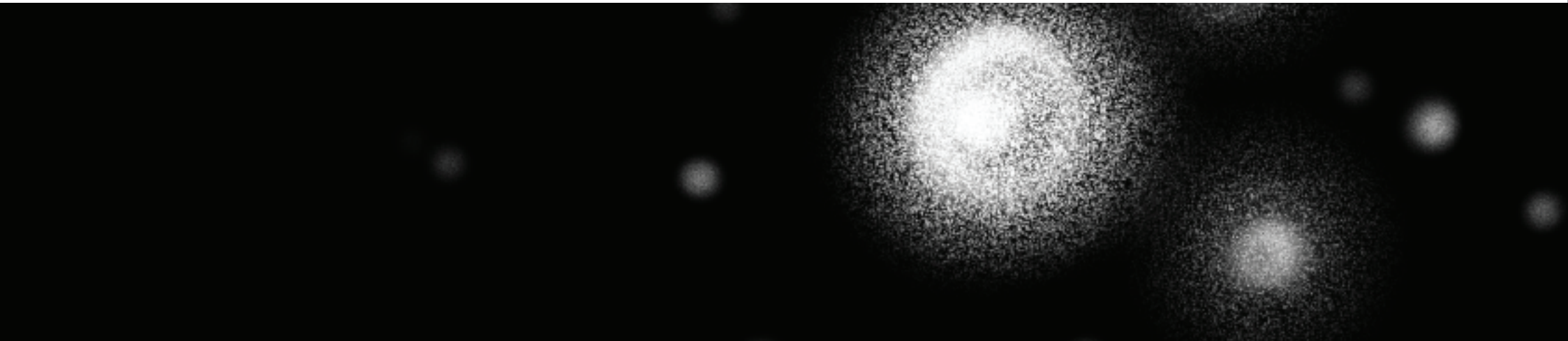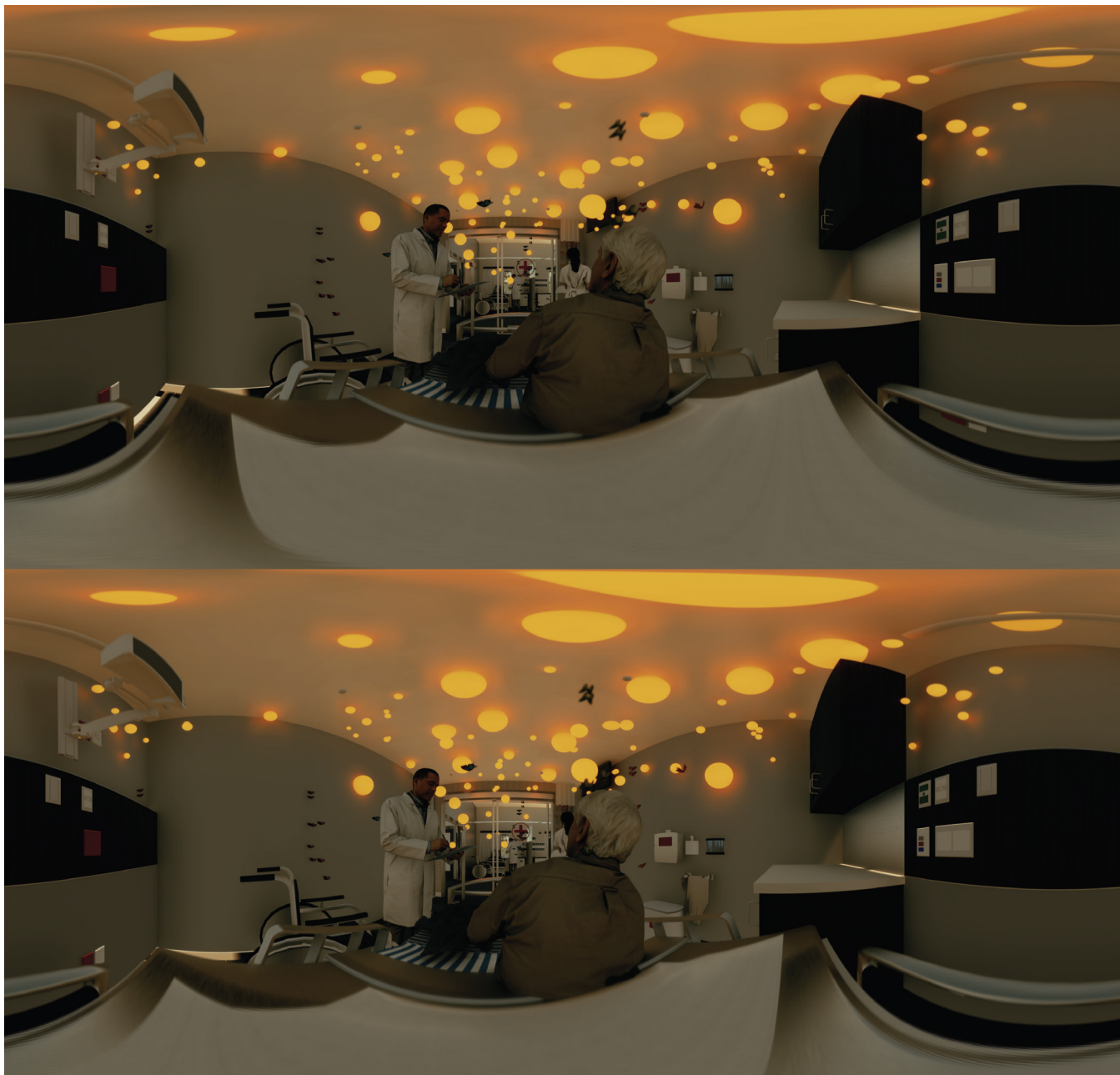
Panoramic 360 Hospital Scene

panoramic 360 renders which took the shape of the backbone for the VR film
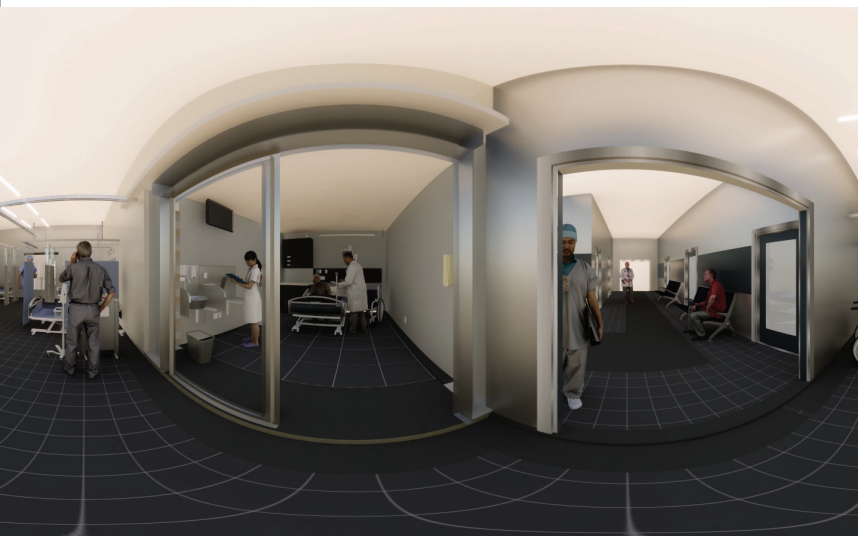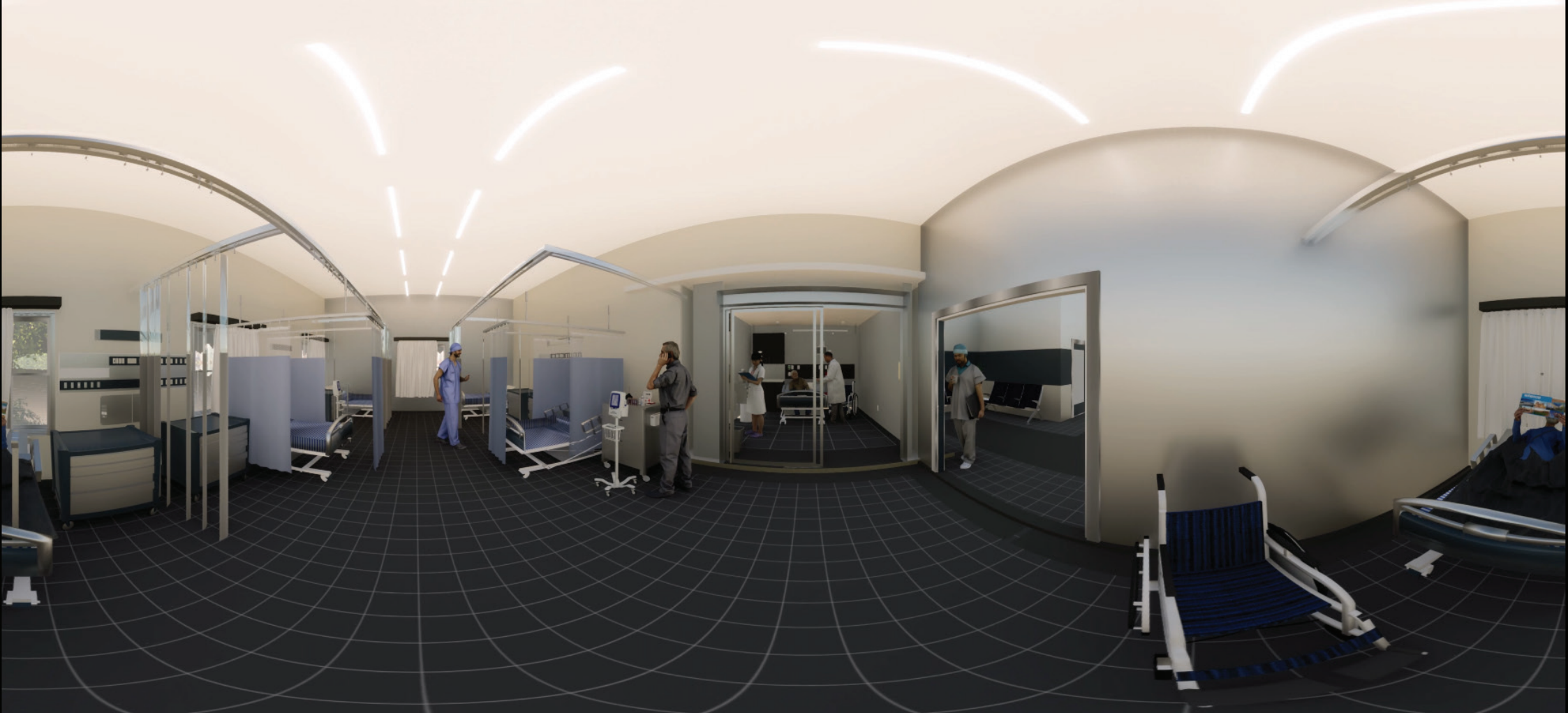
Home Interior Level design

Panoramic 360 Home Interior shot

panoramic 360 renders which took the shape of the backbone for the VR film

Intro Shot of Peculiar Eyes

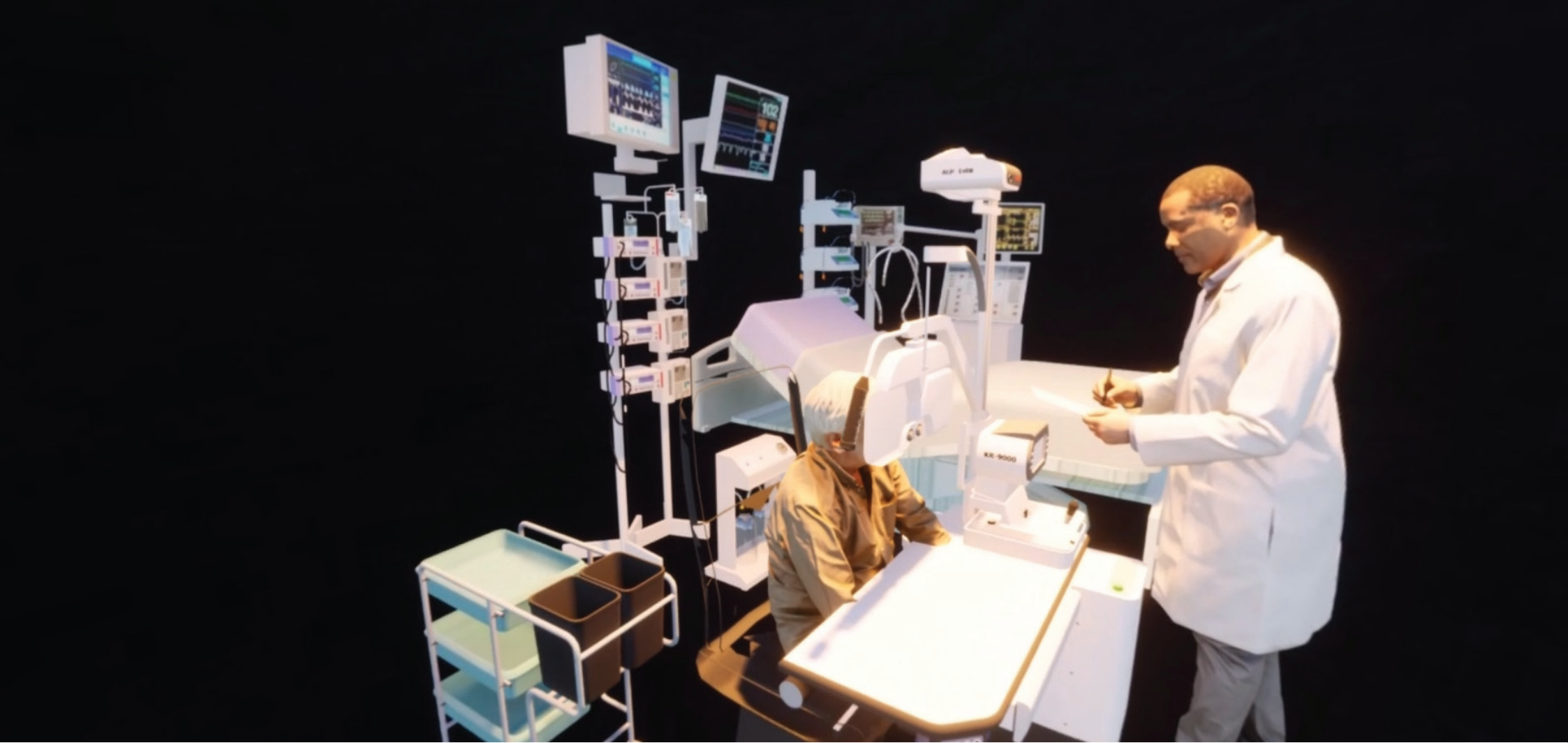**Panoramic 360
Hospital shot**

CHARLES BONNET SYNDROME
This condition is likely caused by the brain continuning to interpret images, even in their absence. Underlying condition of vision loss assosciated with CBS are diverse including conditions such as macular degeneration and stroke and may affet the eye, the optic nerve or thebrain. And this condition can induce simple to complex hallucinations.

06

Educational Impact and Application

6.1 Effectiveness of VR in Education

Virtual reality offers unparalleled immersive experiences, making it a powerful tool in education. The VR format of "PECULIAR WORLD OF CHARLES BONNET SYNDROME" allows users to step into the shoes of a CBS patient, gaining a profound understanding of the condition. Research has shown that VR can enhance empathy, retention, and engagement, making it an ideal medium for this educational project.

6.2 Impact on CBS Patients and Families

The VR film serves as a groundbreaking way for CBS patients and their families to articulate and understand this rare medical condition. By visualizing the patient's hallucinations and experiences, it bridges the communication gap, fostering understanding and empathy. The experience also provides insight into managing the condition, offering support to those affected.

6.3 Case Studies and Real-life Implementations

Several case studies have been integrated into the project to provide real-life context. By highlighting individual experiences with CBS, the film enhances authenticity and relevance. These narratives reinforce the film's educational purpose and provide valuable lessons for medical practitioners, caregivers, and educators.

6.4 Future Prospects

The innovative approach taken in this project paves the way for further exploration of VR in healthcare and education. By demonstrating the potential of VR to convey complex medical conditions, it opens doors for future projects that can leverage this technology for training, therapy, and support.

07

Conclusion

7.1 Project Summary

"PECULIAR WORLD OF CHARLES BONNET SYNDROME" stands as a milestone in educational filmmaking. It combines art, technology, and empathy to create an immersive 360-degree VR experience that enlightens and engages. The project's success lies in its innovative approach, heartfelt storytelling, and dedication to raising awareness about CBS.

7.2 Lessons Learned

The journey of creating this film taught invaluable lessons in collaboration, innovation, and empathy-driven design. It highlighted the power of VR in storytelling and education, and the importance of an iterative, user-centered approach.
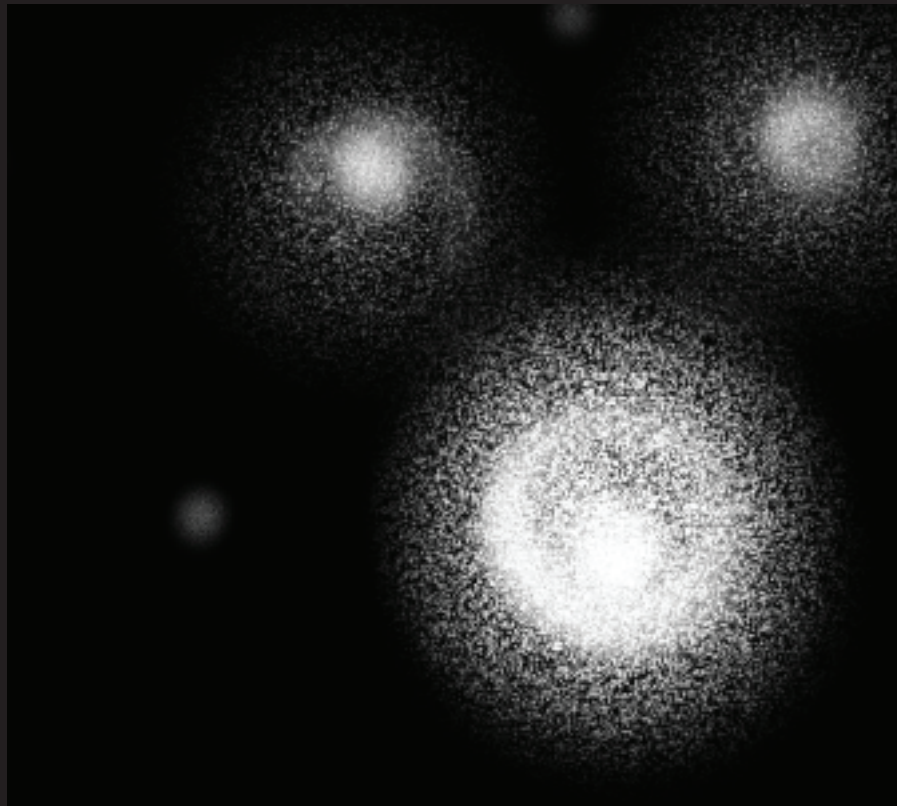
7.3 Future Directions

The project's impact extends beyond the film itself, laying the groundwork for future explorations in VR and medical education. It serves as a blueprint for utilizing immersive technologies to create meaningful educational content, with vast potential for future applications.
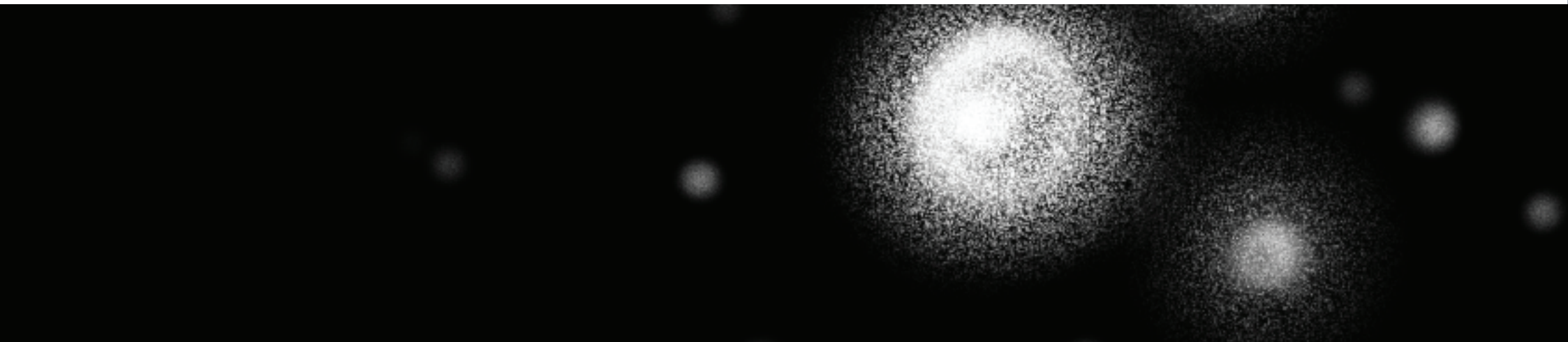
08

Appendices

As the CBS is a rare medical condition and stigma assosciated with the condition make the people to stay silent about their experiences and the CBS support group - Charles Bonnet Syndrome Foundation (Australia) is a great resource to read through the personal experiences of CBS patients.

Ms A:

'My name is Audrey, I am 86 years old, legally blind and I experience CBS and have done so for several years. As my eyesight deteriorated about 15 years ago, I noticed what I thought were specs of dust floating across my vision. My general practitioner (GP) said the condition was called floaters and flashes.

Over time these floaters and flashes became other things such as miniature chessboards and wedding rings. These images were at first black and white, but as my sight worsened the images appeared in technicolour. On telling my GP he said, "Aren't you lucky!" I was rather shocked by his flippant retort.'

'Eventually I was diagnosed with age-related macular degeneration (ARMD). Sometime after this I was told about a talk being given on ARMD and on attending, I learned about the Charles Bonnet Syndrome. My mind was put at rest that I had a real condition and that I should not be afraid. Nowadays, having had hallucinations such as a huge snake and a Chinese lady in full Chinese costume, both of which disappeared when I blinked, I now know when I see things that aren't really there they are all part of the syndrome.'

'These days I have a carer who helps me, and like myself, spreads the word about CBS wherever we go and whenever the opportunity arises. We have informed a lot of people, including doctors, who otherwise did not know of this condition. Nowadays, knowing about and experiencing CBS I have learned to live with it and not be afraid.'

Ms B:

'My name is Bernadette and I have CBS. But I didn't always know that. In fact, it was only after two years of having lived with the condition that I could finally put a name to it. For the two years before then, I had been through Heaven, Hell and Purgatory. A most troublesome time.' First there was the wee green image and the beautiful 'out of this world colours'. This was the Heaven part. I then experienced faces, everywhere only faces with no body.

The faces were Caucasian, in their forties and more males than females. Sitting outside on my first floor unit one day, I observed the single faces everywhere: in the frangipani tree, on buildings, roofs, on the washing line. I saw them at night too, eyes open or closed did not matter, they were there. I also saw different images, this is the

crazy part, as if the previous scenario was not crazy either. I would observe an old man and a much younger woman, so happy to see each other, and
they would kiss, by cheek to cheek. Then the old man would turn into the young woman and vice versa. Different faces... the old woman cheek to cheek with the much younger man. This was the Hell part.' 'I saw cartoon figures moving along my bedroom wall. I saw beautiful colouredimages that turned into faces.

That was bloody frightening as I was not expecting that at all. I even had a different encounter once from my usual experiences when I awoke in the darkness and an old man came in with a basin to wash my feet. Then I saw a movie super 8 machine with sections pertaining to the second world war. In particular, I

saw two soldiers in a trench wearing circular metal hats. I saw two old men sleeping on right side floor of my room. Large as life in the next vision in the same area, I saw a brown horse sleeping followed by two fawn coloured Labrador dogs also sleeping. That was in October 2020 and I was in purgatory then. My purgatory state was the not knowing and looking for answers.

I knew that I was not going through any mental disorder but I could not discuss this with anyone, except my twin sister Margaret, who listened to me. When seeing my eye surgeon, the closest I could say to him about my phantom imageswas that I thought I had a brain tumour. 'My redemption came on Dec 31, 2020 when I googled 'rare eye conditions' and Charles Bonnet syndrome came in at number five. My awakening was connecting with others in the CBS community.

Mr B:
'I often see big cats like tigers and panthers...sometimes inside the house but also outdoors. The images used to be scary for me especially as they would appear out of nowhere but now I can at least account for them.'

Mr L:
'Everywhere I look I see brickwork. When I look at my wife, her face is embedded in the bricks.

Ms W:
'My walls are covered in these purple flowers. Even when I go outside, the lawns and pathways are a sea of these same purple flowers.

Ms S:
'In June of 2018, I was diagnosed with a primary psychotic illness. This illness comes with its fair share of visual hallucinations. During my second psychotic episode, I was chasing rats

on the hospital floor. While I have no recollection of that time, my doctor informed me that I believed it to be real. Fast forward to January 30th 2020, when I had a hemorrhagic stroke whilst I was in a coma. This stroke damaged mainly my occipital lobe. This damage resulted in hemianopic vision loss which led me to have Charles Bonnet Syndrome (CBS).'

'I have learned how to distinguish between these two types of visual hallucinations. With CBS, my visions are much more detailed and do not take a life form. They are non-responsive to the environment around me, and often take the shape of patterns or distorted figures. With my psychotic hallucinations, however, the first thing that comes to mind when I see them is that they are real and impose an imminent danger to myself. With CBS, they serve mostly as a distraction; however, some images can be frightening. The main difference I have come to understand between the two is my emotional response to the hallucinations. The primary emotion I feel during my psychotic hallucination is fear. With CBS, it's bothersome. With CBS it's life interrupted, with psychosis it's life fractured. Life with a visual impairment has its own set of challenges, but it is "a life worth living".

Ms W:
'My walls are covered in these purple flowers. Even when I go outside, the lawns and pathways are a sea of these same purple flowers.'
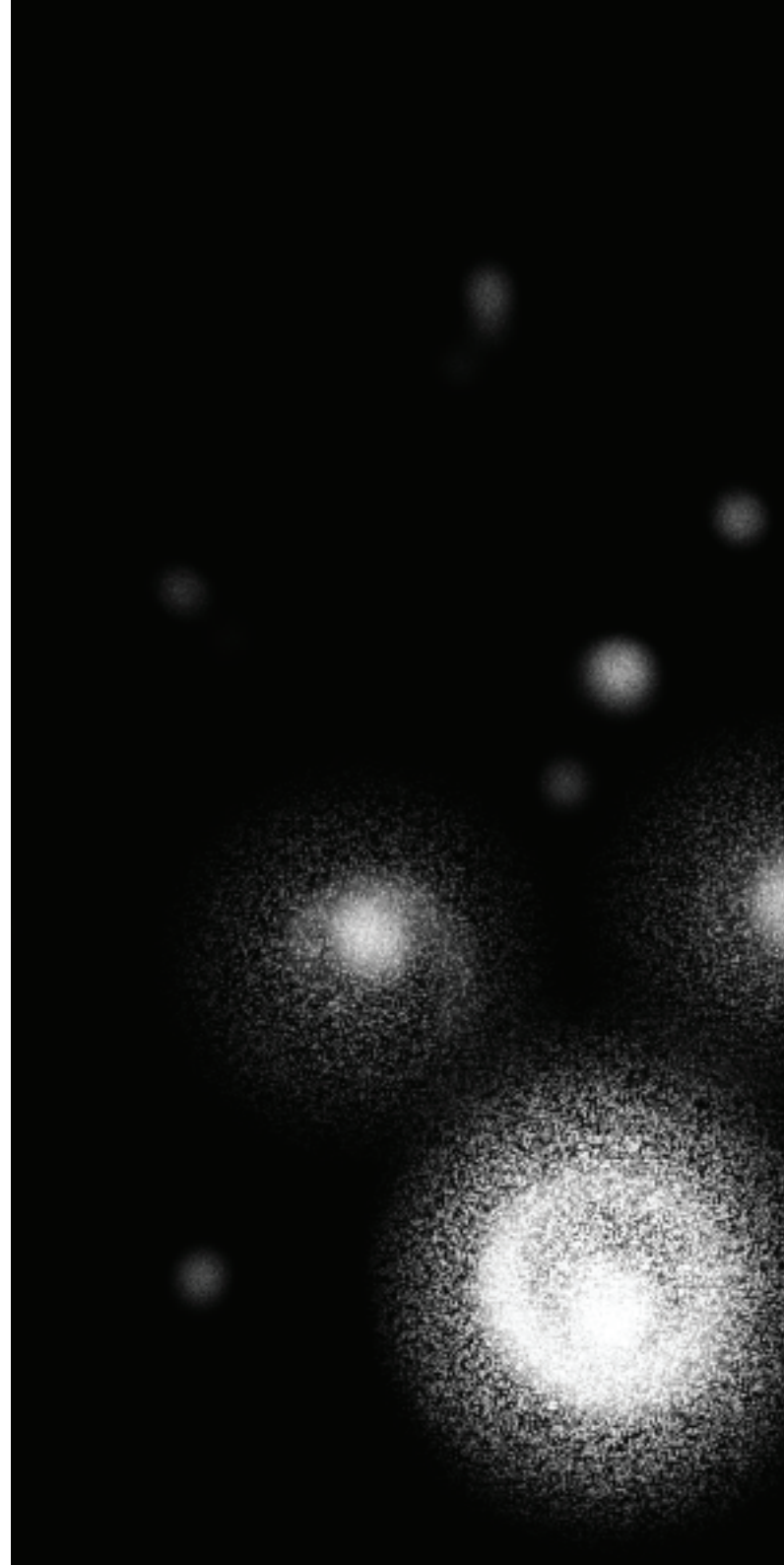
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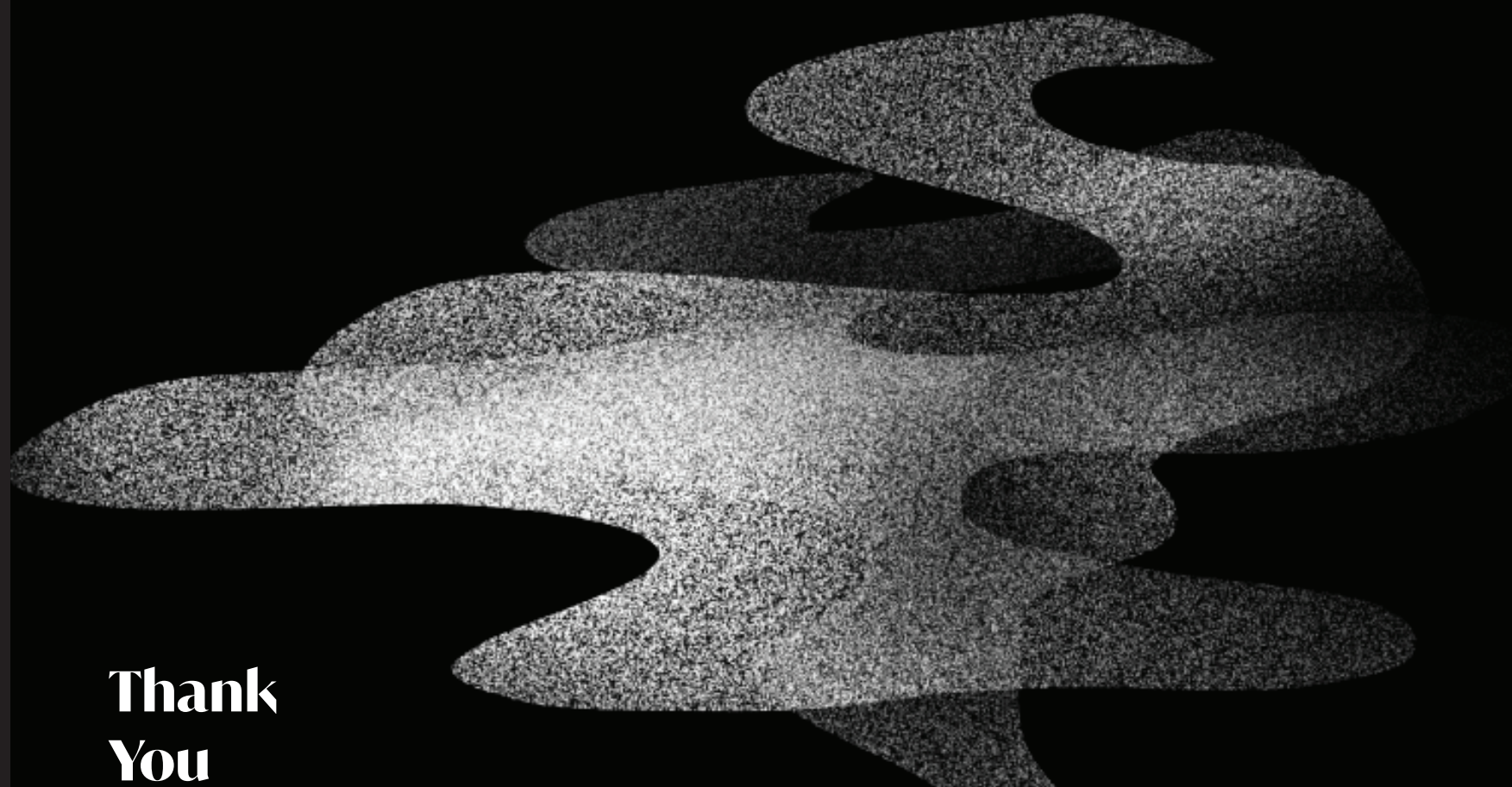
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Thank
You