

**STRANGE WORLD.
IMMERSIVE EXPERIENCE THROUGH
INTERACTION AND PROJECTION MAPPING**

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ABSTRACT

“Strange World: Immersive Experience Through Interaction and Projection Mapping” is an MFA Thesis Project that focuses on immersion through direct participation and explores possible expansions of affordances of projection mapping as an artistic medium. In this project, videos of personal experiences of isolation and gradual emergence of a sense of community in unknown environments with cultural differences are implemented in surrealistic style. These videos create a 180-degree projection mapping art, making multiple videos that reflect various personal experiences merged into one virtual space. This virtual space tries to convey the message that we need understanding and empathy for each other. The thesis project also includes experiments with interactive video aiming to engage the audience more actively. The thesis project explores options for implementing immersive experiences in a transitional period of digital innovation, where advanced technologies move into different fields and converge into new forms of expression.

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1. CHAPTER 1: INTRODUCTION

“Strange World” is an MFA thesis project developed as an immersive video experience based on interaction and projection mapping. There are two essential aspects to the thesis project: First, the project reflects my personal experiences when finding myself in a foreign world. Second, the overall project promotes understanding and empathy between different peoples and cultures. This project commits to these topics through video and animation used in a semicircular projection mapping as the primary medium for artistic expression.

In order to promote understanding and empathy among diverse peoples and cultures, the thesis project creates a virtual space that exposes motifs of alienation, adaptation, and integration between cultures. It is crucial to reduce the distance between the audience and the work so that the audience can easily enter the virtual space created by the work. In this sense, my research interest is directed toward problems of audience immersion. My idea of immersion in the exhibition starts from Oliver Grau's historical analysis of strategies for creating immersion through the Roman frescoes of Pompeii in his book *Virtual Art: From Illusion to Immersion*¹. Grau describes how the real space of the room seems to extend beyond the actual walls due to the illusion of space continuity created by the painted wall. He further explains that in the case of cinema, the screen provided a reality-like space that filled the audience's view. Moreover, the audience was immersed in the screen and could fall into the world drawn by the cinematic imagery. The MFA project develops these ideas by increasing the audience's immersion through 180-degree video projection mapping.

¹ Oliver Grau, *Virtual Art: From Illusion to Immersion*. (The MIT Press, 2003), 25.

In addition, the MFA project explores the affordance expansion of projection mapping. First, the thesis endeavors to solve passiveness by adding interaction. Video belongs to passive media when an audience accepts a message without question.² This thesis tries to expand projection mapping, one of the passive media, into active media by combining it with interaction and real-time mapping. My MFA thesis is not the only attempt to discuss how to combine interactions with projection mapping. However, the thesis explores possibilities and presents options for future research in this area.

² Stuart Hall et al., *Culture, Media, Language: Working Papers in Cultural Studies, 1972-79*. (London, UNITED KINGDOM: Taylor & Francis Group, 1991).

2. CHAPTER 2: BACKGROUND

2.1. My history

“It is life as it is lived by the people of the world, each one in a personal labyrinth.”

- The Synopsis of *In the Labyrinth*



Figure 1. Still image capture from the film *In the Labyrinth*³

Some may not agree, but the custom of my mother country is violent to me. Most of the minorities in Korea had to survive by putting on their social masks, which are suitable for their social roles and concealing factors that define them as minorities. In my beloved motherland, disabled people protest every day because they do not even have a ramp to climb the bus, and women purchase additional locks to install on the door to prevent someone from attempting to enter their homes. Children are mocked for their inexperienced rhetoric, and gender minorities

³ *In the Labyrinth*, directed by Roman Kroitor, Colin Low & Hugh O'Connor (1979; NATIONAL FILM BOARD OF CANADA), Film.

usually hide their identities in society to avoid hateful speech and violence. I always kept my complaints about these brutal social practices quiet inside, like a silent undersea volcano. It was not a sudden thing that I decided to study abroad. My desire to improve Korean society was gradually growing, so it was natural to look at solutions in other societies. However, after arriving in Canada, what I felt was daunting and vague instead of experiencing a sense of liberty. The differences between Korean and Canadian languages and cultures were a big problem, but above all, these differences made me feel frustrated and depressed because I was alone in a place where no one fully understood me. After the first semester, I examined the gap between the feelings which made me come to Canada and my feelings during the first semester of study here. Maybe coming here was a big mistake. We sympathize with others by recalling our own experiences because emotions are our own. So, fully understanding each other is impossible. Nevertheless, there are people in the world who try to understand others. Therefore, my thesis project attempts to express empathy and harmony in confusion, thinking of those who do not stop trying to understand each other even though it is difficult.

My graduate studies during the first semester had a significant influence when choosing the topics and the medium of my thesis project. While accustoming myself to the first months of graduate studies life and Canadian culture, setting the topic of the thesis project has been difficult for me. Before the thesis project was embarked on, I explored possible research topics. The research topic I have discovered was based on my first impressions of Lethbridge.

According to the Merriam-Webster dictionary, a documentary is a film genre objectively dealing with factual events.⁴ Due to the trait of film to record reality, many people believe that

⁴ Merriam-Webster.com Dictionary, s.v. “documentary,” Accessed January 25, 2023, <https://www.merriam-webster.com/dictionary/documentary>.

documentaries are truly objective. Nonetheless, it is impossible to create a perfectly objective documentary. For instance, can there be an objective camera position when deciding where to place the camera? Is it possible to objectively determine when to operate and stop the camera? Hence, film contains the personal interpretation and intention of the person filming the movie.



Figure 2. Still image captured from the movie *Tarnation*, 2003⁵

This subjectivity is particularly evident in Jonathan Caouette's movie titled “*Tarnation*.” The documentary depicts Caouette growing up with his mother, who has schizophrenia. In this

⁵ *Tarnation*, directed by Jonathan Caouette (United States: Wellspring Media Hope Runs High, 2003). DVD.

documentary, Caouette takes a video camera and shoots himself, playing a character with similar problems. He also refers to himself as a third person in this documentary, and he distances himself from his life. The audience would not think that this documentary is objective, even though Caouette shows the actual events that happened in his life, using recording devices to enable objective observation. Since the theme of the documentary is the love for his mother, the design of the video that expresses it makes the entire documentary extremely subjective. This way, unlike the general perception of a documentary film as being objective, a documentary may be subjective in how it presents recorded reality.

By considering the subjectivity and objectivity of the documentary as discussed above, I propose a form of “subjective documentary” about my personal experiences. The “subjective documentary” approach combines video recordings from reality with animation and visual effects to help project my internal reality. This approach received a comment from the committee that personal intentions in my work and the audience’s interpretations and impressions can be different, which greatly influenced the design of the thesis project. The author's intention and the audience’s interpretation may differ when conveyed through any artistic medium. However, new media art is more difficult to interpret intuitively compared to other media with a straightforward narrative, which can broaden the range of interpretations that my desire to improve Korean society can make. Therefore, the thesis project as abstract work is meant to lead the audience to interpret what the work means, making them contemplate and be more open to alternative views about the topics at hand. In addition, I assume that the interpretation of the video imagery will be expanded more widely through the process of ruminating and sympathizing with the conveyed experiences.

Before my MFA studies, I have studied practical design and, therefore, my overall design work was focused on function. In contrast, my MFA process is more focused towards the exploration of ideas through art. Through the thesis project, it was possible to redefine my existing thinking focused on functionality and practicality.

2.2. The Concept of “Stranger” in the Thesis

The MFA project concerns cultural differences and a sense of community in a foreign world. The most important concept of the project to represent this topic is the concept of “stranger.” According to the Merriam-Webster Dictionary, the first meaning of the word “stranger” defines one who does not belong to or is kept from the activities of a group. The second meaning, which is the more comprehensive meaning, of the word “stranger” defines one who is unacquainted with someone or something.⁶ This concept is used in the thesis project to express difficulties and feelings I have experienced in an unknown environment. The project visualizes alienated experiences in a foreign community, which for me was Lethbridge at the beginning of my graduate studies. However, even if it is not an experience related to a given community, people will all have experienced unfamiliar situations. In such situations, it will be temporarily possible to see them as strangers. In this regard, the concept of “stranger” is the most appropriate to define the project since it can be extended to novel interpretations from individual audiences while empathizing with the video work presented to them.

⁶ Merriam-Webster.com Dictionary, s.v. “stranger,” Accessed January 25, 2023, <https://www.merriam-webster.com/dictionary/stranger>.

Many films dealt with the concept of “stranger” before. The documentary *First Stories - Two Spirited*⁷, released in 2007, is about Rodney “Geeyo” Poucette fighting prejudice as a two-spirited person (gay, lesbian, bisexual, and transgender) within the Indigenous community. He revealed his gender identity within the indigenous community, but he was humiliated. This work, which depicts the isolation in the community and the process of overcoming it, is similar to the concept of “stranger.”

The same sentiment can be found in the movie *Minari*⁸, released in 2020. The protagonist and his family moved to Arkansas, USA. They went to a strange new community and tried to adapt, but it was not easy for them to integrate into society because they were “strangers” who did not understand the respective culture. The movie *Minari* depicts a common immigrant family, but all the audience who watched it sympathized with the contents of the movie and were reminded of their own experiences. Similarly, my work expresses personal experiences, but people will be able to relate with each experience.

2.3. Surrealism

Surrealism is an avant-garde cultural and artistic movement that originated from Dadaism, which attempted to destroy existing traditions and order after World War I.⁹ At the time of World War I, artists who thought that the traditional and authoritarian social system caused divisions leading to war, began to sublimate their criticism into artworks. This negative logic did

⁷ *First Stories - Two Spirited*, directed by Sharon A Desjarlais (2007; Canada), Film.

⁸ *Minari*, directed by Lee Isaac Chung (2020; United States: A24), Film.

⁹ Jae Yeon Park. "A Basic Study on the Effect of Surrealism on the Expression of Modern Art." [In Korean]. *Formative Art Symposium* 7, no. 1 (2007): 11-28.

not last long but paved the way for the emergence of the surrealist movement. Surrealism, unlike Dadaism, emphasized a world of fantasy and imagination that escapes reason due to unexpected juxtapositions of unrelated elements. Therefore, the topic of many surrealist works is mainly about a change of perspective, which is approached with the purpose to induce changes in society. In this sense, the visual style and thematic approach of the thesis project are inspired by surrealism. The experience of arriving in a new cultural region, destroying, and reassembling my understanding of the surrounding environment and behavior stereotypes can be viewed as the starting point for a change of perspective in the manner pursued by the surrealist movement. My project emphasizes emotions by expressing in abstract and metaphorical manner the strange experiences I went through in an unknown world. Furthermore, the surrealist modes of expression let the audience be reminded of their past by comparing images proposed by the artist with their own experiences. This may cause to change the perspectives on their own experience or events.

Many surrealist works have influenced me, and Rene Magritte's *Every Day* is one of them (see Figure 3). This painting shows extreme disharmony by placing mountains and face parts on one canvas. This juxtaposition is intentional. This painting demonstrates the changing of perspective on ordinary objects. Moreover, it inspired my approach to collage by including different graphic styles in the same movie.



Figure 3. Artist: Rene Magritte. Title: "Every Day," Medium: Oil on canvas. 1966¹⁰

In addition, my work was influenced by Yves Tanguy's work (see Figure 4). The irregular objects taken to express his childhood memories, dreams and fantasies create highly personal symbolism. It became a reference for my MFA approach when expressing my personal experience artistically.

¹⁰ Rene Magritte, *Every Day*, 1966, oil on canvas, 19¾ x 28 7/8 in, Alexandre Iolas Gallery, New York, <https://www.christies.com/en/lot/lot-5650371>.



Figure 4. Artist: Yves Tanguy. Title: "The Furniture of Time," Medium: Oil on canvas. 1939¹¹

¹¹ Yves Tanguy, *The Furniture of Time*, 1939, oil on canvas, 46 x 35 1/4" (116.7 x 89.4 cm), The Museum of Modern Art, New York, <https://www.moma.org/collection/works/80625>.

3. CHAPTER 3: PROJECTION MAPPING

Projection mapping is a digital media technique that is based on projecting images on objects and regular and irregular surfaces. It enables the implementation of a new mixed reality in the existing environment.¹² Through optical illusion, projection mapping can change the perception of known places which can be experienced in new ways. It has become a familiar medium for art for a few decades. Although the awareness of projection mapping has recently increased among the public while it has become commercialized, the technology has a more extended history. For example, one of the first public exhibitions using projection mapping was the Haunted Mansion at Disneyland in 1969.¹³ At the time, Disney's technical team made short-loop films of the singers' faces and projected them onto a bust, which gave the illusion that it appeared to be singing. Projection mapping is recognized as the technology used in the visual arts since the 1970s, referred to as the Madame Leota effect among other terms. Afterward, the development of computer technology between 1970 and the present enabled more advanced contemporary forms of projection mapping.¹⁴

However, projection mapping has some limitations because the basis of projection mapping is video without interaction, despite the evolution of the medium over a long time. The first limitation is that projection mapping and viewers are in a one-way relationship that cannot be changed. Projection mapping unilaterally provides visual information to viewers, but viewers cannot influence it. In other words, projection mapping is, by nature, prerecorded and passive. In

¹² Soujin Cho, Yoomi Choi. "A Study on the Extension of Virtual Reality Using 3d Projection Mapping -Focused on Immersion of Digital Storytelling." (paper presented at The Animation Society of Korea Conference, 2012), 2.

¹³ Jeff Baham, "The Secret Tech Behind Disney's Haunted Mansion Illusions." Gizmodo, published October 31, 2015, <https://gizmodo.com/the-secret-tech-behind-disneys-haunted-mansion-illusion-1629630353>.

¹⁴ Steve Gibson et al., *Live Visuals: History, Theory, Practice*. (Milton: Taylor & Francis Group, 2022), 472.

addition, another disadvantage of projection mapping is that the often-limited resolution can hinder the feeling of immersion. This eventually leads to a stronger sense of distance between the work and the audience. That is why there have been many attempts to overcome this limitation before.



Figure 5. Artist: James Turrell. Title: "Afrum I (White)," Medium: projected light. 1967¹⁵

James Turrell has achieved the illusion of immersion in a way that tricks people's perceptions and enhances their immersion before the evolution of innovative computer technologies. The

¹⁵ James Turrell, *Afrum I (White)*, 1967, projected light, The Guggenheim Museums and Foundation, New York. <https://www.guggenheim.org/artwork/4084>.

Cross Corner Projection pieces, which started in 1967 with the Afrum I (White) (see Figure 5), and were produced in 1966–1967, blocked the external light and used the corners of the room, minimalist shapes, and the light from a projector. James Turrell's earlier work focused on the deprivation of the senses.¹⁶ He used to manipulate the perception of the audience using light. The light confuses the audience and makes a flat image look like something that exists in reality.

The trompe l'oeil technique, allows creating the illusion that painted objects appear real and this can be used to improve the feeling of immersion. This technique visually makes an illusion and delivers stimulation and shock. The technique is sometimes employed in the media art using projectors to overcome the limitations of a two-dimensional medium.¹⁷ For example, “The House I Grew Up In,” an advertisement produced in cooperation between Found Studio and the British insurer Hiscox, completely changed the exterior of an ordinary house using projection mapping.¹⁸ The house in the video gives the illusion that the audience looks inside the house from the outside.

The work of the art group teamLab (see Figure 6) includes installation art using projections. TeamLab frequently uses mirrors in exhibitions, which reflect the light from projectors and make shapes appear to spread infinitely, disturbing the audience's perception. The whole space is used to blur the boundary between the floor and the wall.

¹⁶ Nancy Spector, "Afrum I (White)." The Guggenheim Museums, Accessed February 24, 2023, <https://www.guggenheim.org/artwork/4084>.

¹⁷ Um Ki Joon and Lee Sanghwa "A Study on the Application of Trompe-L'oeil Method to Digital Design." [In Korean]. *Journal of Digital Design* 9 (2009): 155-64.

¹⁸ "The House I Grew up In," posted by Hiscox UK, October 13, 2014, video, 0:40, https://www.youtube.com/watch?v=3s8wF9_cpSo.



Figure 6. Author: teamLab. Title: "Ephemeral Solidified Light," Medium: interactive installation. 2021¹⁹

In addition to attempts to use expression techniques and the environment, there have been many technical attempts based on both software and hardware. John Underkoffler introduced a system based on a projector combined with a camera in 1999. He built his system from calculations dealing with field landmarks, such as the position of shadows, which allowed him to pioneer some of the early work in interactive projection mapping.²⁰ In 2005, Oliver Bimber explored the conversion of arbitrary existing surfaces, such as paper walls or curtains, to projection screens.²¹ By overlaying images on various surfaces, he implemented a mixed reality, which provides a new way of using projection mapping and enhancing audience immersion.

¹⁹ teamLab, *Ephemeral Solidified Light*, 2021, interactive installation, teamLab, https://www.teamlab.art/fr/w/ephemeral_solidified_light/.

²⁰ John Underkoffler and Hiroshi Ishii, "Urp: A Luminous-Tangible Workbench for Urban Planning and Design," (paper presented at Proceedings of the SIGCHI conference on Human Factors in Computing Systems, Pittsburgh, Pennsylvania, USA, 1999), 8.

²¹ O. Bimber, A. Emmerling and T. Klemmer. "Embedded Entertainment with Smart Projectors." *Computer* 38, no. 1 (January 2005): 48-55. <https://doi.org/10.1109/MC.2005.17>.

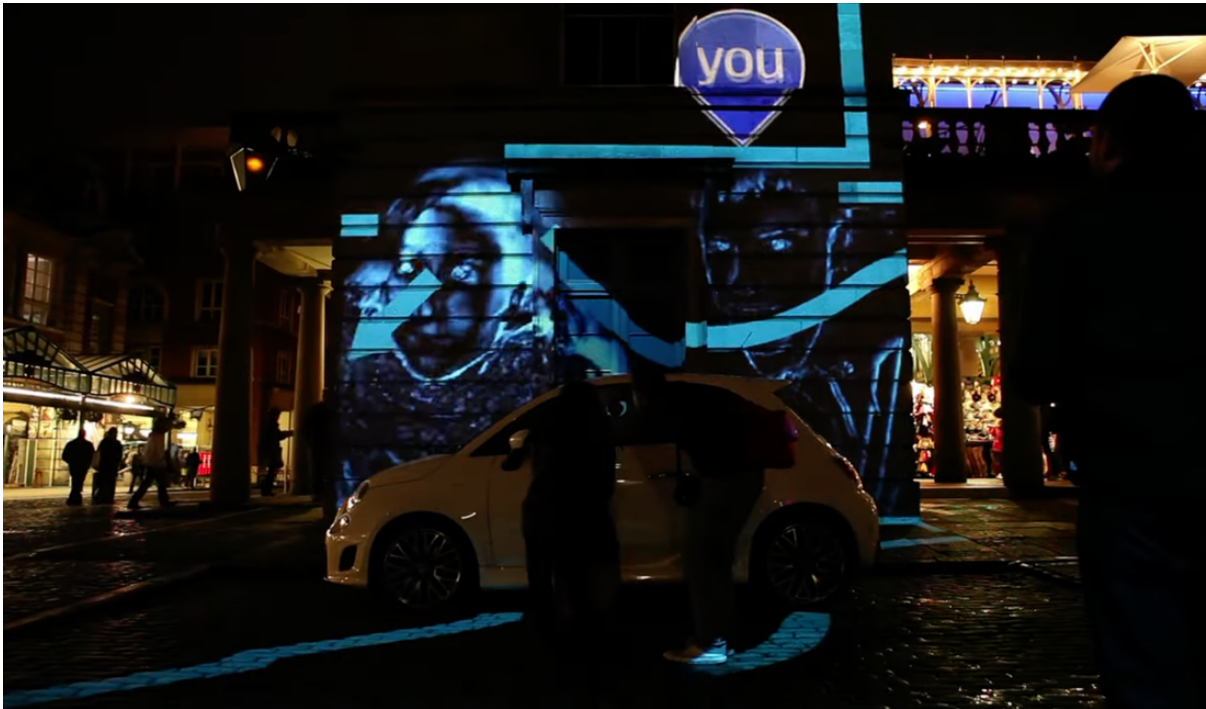


Figure 7. Author: seeper. Title: "Nokia Ovi Maps - Interactive Projection Mapping," Medium: interactive projection mapping. 2010²²

In 2010, Nokia introduced Interactive Projection Mapping, which recognizes and tracks motion and faces (Figure 7). This installation art allowed projection mapping to be an extended form of interaction rather than a unidirectional form of communication. Furthermore, there have been proposals for real-time projection mapping rendering techniques using toolkits such as VVVV²³ and game engines such as Unity²⁴.

²² "Nokia Ovi Maps - Interactive Projection Mapping," posted by seeper, April 27, 2010, video, 1:17, <https://youtu.be/cvSiKGVEzbs>.

²³ VVVV: A visual live-programming environment for easy prototyping and development. <https://vovv.org>.

²⁴ Jin Tae Kim, "A Study on the Implementation Method of Projection Mapping Using Real-Time Motion Graphics." (Master's thesis, Hansung University, 2018), <http://www.riss.kr/link?id=T14740166>.

Research on the usability expansion of projection mapping is increasing.²⁵ Exploring this direction is meaningful for this project. The technology related to projection mapping is still developing. Advanced technology is being combined and utilized in different fields employing new approaches. My project strives to be one of these attempts. The thesis focuses on expanding the affordances of projection mapping and real-time mapping to create immersion. This project provides the audience with an immersive experience based on 180-degree projection mapping. A 180-degree projection mapping that utilizes the entire interior space, as defined by its walls, can temporarily deceive the audience's perception, and facilitate immersion. This sort of immersion is spatial immersion and refers to the type of immersion triggered and maintained by the spatial qualities of the virtual environment.²⁶

²⁵ *Projection Mapping Market Size, Share & Trends Analysis Report by Dimension (2d, 3d, and 4d), by Throw Distance (Short Throw, Standard Throw), by Application (Events, Large Venue), by Region, and Segment Forecasts, 2022 – 2030*, Grand View Research, 2022.

²⁶ Chenyan Zhang, Andrew Perkis, and Sebastian Arndt, “Spatial Immersion Versus Emotional Immersion, Which Is More Immersive?” (paper presented at 9th International Conference on Quality of Multimedia Experience, Germany, June 2017), 7.

4. CHAPTER 4: RESEARCH PLATFORM

This chapter presents the equipment and software used for creating an immersive experience project through 180-degree projection mapping. This research platform includes two parts: (1) one section dedicated to filming and projecting images; (2) one section dedicated to digital content development: creating animation, visual effects, editing, and interactivity.

4.1. Filming and Projection Mapping

The equipment and software used for shooting and projection mapping include:

- A Canon 5D Mark III camera
- Several NEC P502HL projectors
- Vioso software from VIOSO GmbH

The camera Canon 5D Mark III was used for shooting on location. Since the projection's basic resolution is 1920 x 1080, the videos filmed are in this size or larger. Several NEC P502HL projectors have been used to experiment with projection mapping setups. The first projection mapping experiments were carried out in the Digital Imaging Lab (PE030). The intention was to create a 360-degree projection from multiple video streams using separate projectors. Synchronizing different videos projected through separate projectors is difficult and requires equipment and software that are not available for this thesis project. The limited available resources required the downsizing of the project to a 180-degree projection.

Another solution is to project one video, which incorporates several of my videos, in a very long aspect ratio and high-resolution video. Several synchronized projectors must be used to project this video with a very long aspect ratio. This project used the Vioso software from

VIOSO GmbH to ensure the continuity and synchronization of the video streams from multiple projectors.

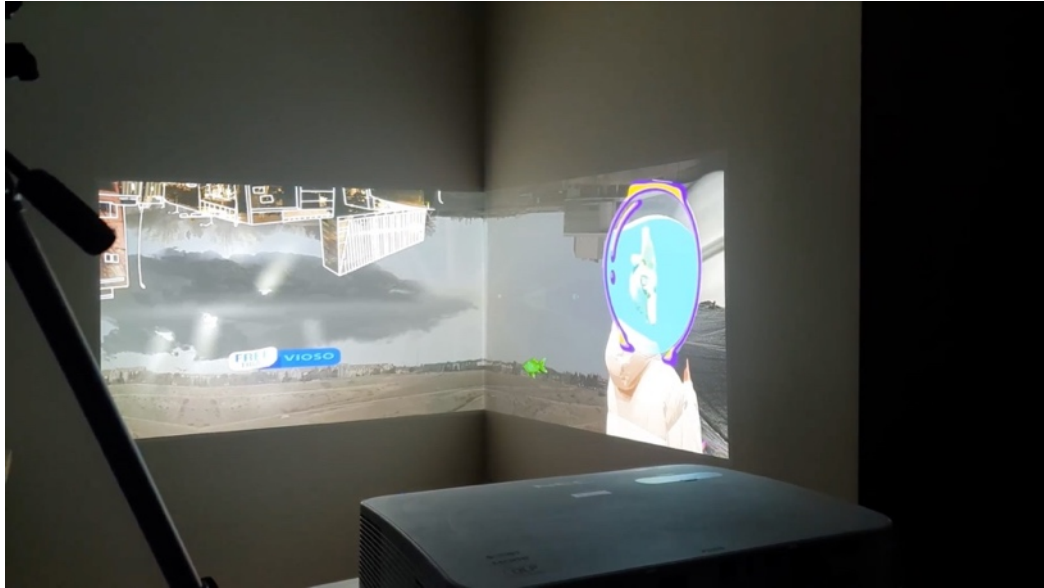


Figure 8. Artist: So Eun Moon. Title: "Strange World," intermediary version. Projection mapping test on an L-shaped wall using a 2-projector setup and Vioso software in the Graduate Students Lab (W512), February 2023

4.2. Digital Content Development

This section refers to the resources used for creating animation, visual effects, editing, and interactivity for the thesis project. The following resources were used:

- Adobe Creative Suite
- Processing programming language
- MacBook internal webcam
- Logitech B910-HD web cameras

Adobe After Effects was used for video editing, animation, and visual effects. Adobe Photoshop was used to edit photos and other visual resources, and to create vector based stylized animations incorporated into the live action videos. Adobe After Effects was used to blend images produced

with Adobe Photoshop and live action videos produced with Canon 5D Mark III, edit the blended footage appropriately, and add effects suitable for the theme of each scene in my videos. In addition, Adobe After Effects was used for colour grading. The Processing programming language was used for integrating videos in interactive applications that use live video capture. A MacBook internal webcam and Logitech B910-HD webcams were used for video live capture of the audience, which can then see the projection of themselves embedded in real-time in the interactive video application.

5. CHAPTER 5: PROJECT DEVELOPMENT

5.1. Project Conceptualization

This MFA project focuses on the personal feelings I have felt while adapting to a foreign environment where the language and culture are unfamiliar to me. This project reflects how I have experienced cultural differences and an absence of community. The overall project promotes understanding and empathy between different peoples and cultures. Specifically, this project aims to express personal feelings I experienced during the adaptation process in a new world. These feelings are communicated through several abstract themes: strangeness, newness, loneliness, confusion, and adaptation. Each theme has a dedicated video. Several videos are simultaneously projected to create a virtual world in a 180-degree surround projection mapping. Other videos are developed as standalone interactive applications meant to engage the audience more actively.

5.1.1. The Strangeness Theme

The first theme, strangeness (Figure 9), is developed around the first emotion I felt after arriving in a new environment, which was the city of Lethbridge. This is about the psychological impact on someone in an unfamiliar world. This video is expressing feelings developed in a place where even my basic common sense makes no sense due to cultural differences. This is visually expressed through a virtual space that includes a normal world clashing with an upside-down world overlapping with graphical and stylized elements. There are symbolic motifs, such as the landscape drawn atop the sky and overlapping unrealistic graphics. The landscape drawn atop the sky signifies missing my mother country in a foreign

environment. The colourful unrealistic graphics convey the strangeness someone is experiencing in new place.



Figure 9. Artist: So Eun Moon. Title: "Strange World," Still image captured from the video dedicated to the Strangeness theme. 2023

5.1.2. The Newness Theme

The theme of newness (Figure 10) is conveyed in a video about new experiences in an unfamiliar world. This theme expresses myself trapped in my old stereotypes from my country of origin while being alone in a world where my common sense, which I formed back home, loses its meaning. The newness theme is expressed through symbolic motifs such as fishes and waterfall, fishbowl, lightning, and explosion. This video includes fish flying through the sky and waterfalls flowing backwards. The fishbowl over my head or replacing my head is expressing the

idea of getting stuck in a frame, in a stereotype. I expressed the shock of accepting new things through lightning and explosion.



Figure 10. Artist: So Eun Moon. Title: "Strange World," Still image captured from the video dedicated to the Newness theme. 2023

5.1.3. The Loneliness Theme

The loneliness theme (Figure 11) is used to express a feeling of isolation and disconnection between reality and my inner world. The symbolic motifs to express the loneliness theme are a cosmic background, a door, a door-knocking animation, and a pizza box. The cosmic background of low saturation symbolizes loneliness and emptiness. The door to reality is firmly closed, indicating that I am isolated in my mind alone. By adding a knocking animation, I expressed the contacts with my family and acquaintances on the other side from my inner world. Pizza is usually eaten together, so the pizza box as visual motif means a sign that isolation has

been broken as the door opens and connects me with others. In terms of colour design, the high saturation of the pizza box shows a lively connection to reality.



Figure 11. Artist: So Eun Moon. Title: "Strange World," Still image captured from the video dedicated to the Loneliness theme. 2023

5.1.4. The Confusion Theme

The theme of confusion (Figure 12) is expressed by the divergence between my ideals and reality. This theme incorporates symbolic visual motifs like: glasses, televisions, mirrors, pointing fingers, eyes and broken glasses. Glasses are a medium interposed between the actual object and the naked eye, indicating disconnection from reality through stereotypes. By transmitting the visual information once filtered through the medium of glasses, this visual information can be distorted and be seen as different from reality. The glasses have a similar meaning as the visual motifs of televisions and mirrors, meaning that they can distort reality by

reflecting only a part of the actual object, not the whole. These glasses are worn from a first-person's point of view in the video. Wearing glasses is meant to show that I was the person who saw through the glasses and interpreted all the images projected through them. The broken glasses mean that the distortions in my perceived image of the world are broken.



Figure 12. Artist: So Eun Moon. Title: "Strange World," Still image captured from the video dedicated to the Confusion theme. 2023

5.1.5. The Adaptation Theme

The theme of adaptation (Figure 13) is about a sense of relief coming from the elements of my daily life. Also, this theme depicts the idea of getting accustomed to strange and new things while expressing a little stability after the confusion has calmed down. This theme is using as visual motifs some elements of my daily life, which suggest a way of reducing self-criticism and maintaining normality. The most significant motifs are everyday objects that create my personal

space like: window, curtains, cat, black tea, door, and road. Televisions fall into the tea like sugar cubes, which means trying to reduce the attitude of blaming myself. The curtains shake along the wind, and the creamy soft cat is on top of the tea.



Figure 13. Artist: So Eun Moon. Title: "Strange World," Still image captured from the video dedicated to the Adaptation theme. 2023

The feelings conveyed through these images are highly personal. At the same time, the video conveys experiences that anyone can relate to. While the audience may not live the exact same experiences, they can sympathize and understand through indirect and similar experiences. This leads to the broader theme of the project, the need for understanding and empathy for each other

5.2. Correlation Between the Medium and Ideas

Each video dedicated to a theme is designed as a loop that starts and ends with the same scene. All videos were planned to be configured into a 180-degree surround projection mapping. The vast loop of images occupying the walls of the projection room create continuity in which the beginning and end of all videos are not apparent to the audience. This circular structure expresses the idea of a repeating chain reaction of feelings felt in the unfamiliar environment.

To draw the audience into the virtual space, there is an installation which includes interaction through live video capture as means of helping the audience engage and better understand me.

The audience can comprehend the project's themes through immersion in the virtual space created through projection mapping within the exhibition. In addition, through the direct experience of the audience, and by contemplating the meaning of the work, a new interpretation can be made by themselves, leading to more interesting appreciation of ideas that I intend to communicate.

5.3. Project Development

The project phases include planning, filming, creating the video composites, equipment testing, animation, and creating interaction. The planning stage includes the draft sketching for each scene and creating the storyboard. The objects used as visual motifs and metaphors are determined based on the theme of each video. Through these, the audience can recognize the theme of each video by expressing abstract emotions (that are difficult to express and are often ambiguous) in concrete shapes and situations. Once the overall graphic configuration was determined, I drew a storyboard for the corresponding animations. The storyboard was used to

organize the video sequences. This allows evaluating in more detail whether the overall visual balance and pacing of the video are appropriate, and what graphics should be used to create interactivity.



Figure 14. Artist: So Eun Moon. Title: "Strange World," Concept sketch for the 180- degree video projection. Digital vector drawing. 2022

The following step is filming live action video on location. Drawing the storyboard allowed planning what video footage is needed, so I listed the necessary footage by referring to the storyboard. Then, I wrote down the date, place, and equipment to be used for each shooting session. The video shooting encountered many obstacles and variables, such as changing weather and carrying equipment.

The next step after the shooting was video editing in accordance with the storyboard. Then animation and visual effects were created and blended with the live action footage.

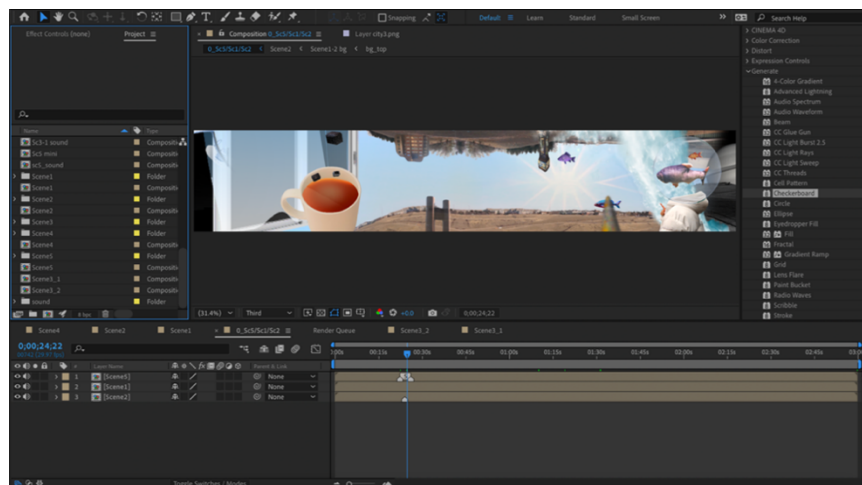


Figure 15. Artist: So Eun Moon. Title: "Strange World," Screen capture from the video editing and visual effects development process using Adobe After Effects software. 2022

Creating visual effects and animation was an extensive process. In this process, ensuring the continuity of loop animations was one of the most challenging aspects. The loop animation sequences were often too short and preserving the visual style of the overall video required an iterative process of corrections and adjustments. The revised version usually increased the length of the overall video due to added effects and animations, which were needed to give the desired dynamic to the final video. Additional colour grading was needed if some objects did not match with surrounding objects in the video or if the colour difference between scenes was significant as the continuity collapsed.

6. CHAPTER 6: THESIS EXHIBITION

This chapter presents the MFA thesis exhibition and its setup, which are planned for the Penny Gallery, University of Lethbridge.

The exhibition includes a 180-degree surround projection planned for the Circular Projection Room in the Penny Gallery. Some standalone interactive installations are configured and planned for the standard space outside the Circular Projection Room in the gallery. Each of the five themes in the thesis project will be presented on a dedicated computer station, adding four stations to the 180-degree projection.

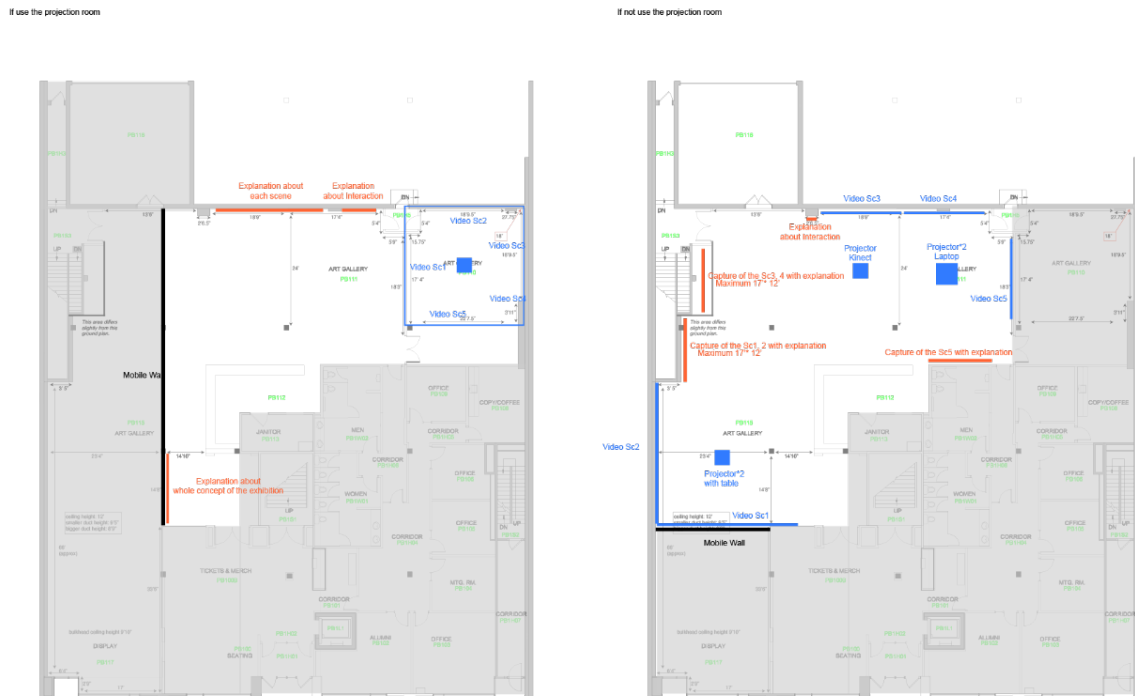


Figure 16. Space plan for the MFA Exhibition in the Penny Gallery

6.1. The 180-degree Projection Mapping and the Overall Exhibition

The equipment and environment were established for the 180-degree after finishing the video production. This projection mapping utilizes the Circular Projection Room of the Penny Gallery. In this room, the walls are rounded at the corners, ensuring a smooth transition of the video projection from one wall to another.

I designed a floor plan to see how various parts of the project can be assigned in the gallery space. According to the exhibition plan, there will be a passage to the Circular Projection Room using mobile walls. Plate for the project description, a guide plate informing the viewing method, and a PC station for viewing each project theme will be set up. This leads to a total of 6 viewing stations in the standard exhibition space.



Figure 17. Artist: So Eun Moon. Title: "Strange World," 180-degree video projection. Vioso test with a 4-projector setup in Circular Projection Room, Penny Gallery. April 2023

One of the most difficult aspects is the setup of the 180-degrees projection mapping. Although this was tested many times, the process is new every time due to slight changes in the position and orientation of the calibration camera and projectors. This requires system recalibration and testing all over again.

Repeated experiments were needed to prevent problematic situations and to see how projections would be shown in the exhibition space (see Figures 16 and 17). However, since it is difficult to test a multiple projectors setup at the exhibition location, I experimented with partial video projections setups in the Digital Imaging Lab (PE30) at the University of Lethbridge. In the final phases of the experiments, the multiple projectors setups were tested at the Penny Gallery in the Circular Projection Room because the setup had to be checked using the actual exhibition environment.

The synchronization between multiple projectors for video continuity was made using the Vioso software. As I mentioned earlier, Vioso is a software solution for multi-projector configurations, ensuring the alignment of multiple videos on non-linear walls and other surfaces. It allows wrapping or blending images to set up projects such as panoramic screens, dome projections, and projection mapping. First, the projectors and the computer were placed in a certain spatial arrangement as required by the given room and its projection surface in the Penny Circular Projection Room. The following step was the placement of the camera used for system calibration. This camera must be positioned at an angle that includes the entire screen. Following this, I set the brightness, threshold, dot size and interval to recognize each projector via the camera. When selecting the dot size, a green circle appears on the Vioso setting screen, which should be set to the brightest colour while not exceeding 3.0 size. After repeating this procedure for each projector, the overlapping parts were masked. The setting is completed when it masks

one side direction so that the size of each screen is uniform. One thing to keep in mind here is the aspect ratio of the videos. Vioso is software that plays a single video using multiple projectors. The final video for the multiple projector configuration was generated by combining the separate theme videos of the thesis project into one video with a very long landscape aspect ratio. This way, the projection mapping creates a virtual surrounding space that simultaneously projects themes of strangeness, loneliness, adaptation, and newness as intended for my thesis project.



Figure 18. Artist: So Eun Moon. Title: "Strange World," 180-degree video projection. Still images captured from Vioso tests, including visitors for size comparison. 4-projector setup in Circular Projection Room, Penny Gallery. April 2023

The projector arrangement test helped determine the projectors' placement for the MFA thesis exhibition. For the test, the final composite video with a very long aspect ratio was projected through the multiple-projector setup on the curved wall projection surface in the Circular Projection Room in the Penny Gallery (see Figures 17 and 18). The physical size of the video reflected on the wall may vary depending on the distance between the projectors and the wall. In our case, the size of the Circular Projection Room in the Penny Gallery is limited, and the projectors' positions are confined to a very restricted range. Considering these restrictions, covering the entire curved wall projection surface as intended is difficult.

6.2. Interaction Space

The interaction was added using the Processing programming language. The interaction scenes are added to the project sections dedicated to the Confusion theme. The scene interaction is based on live camera capture through a webcam. The interactions implemented in the Confusion theme are based on a live camera capture using a MacBook internal webcam and HD Webcams (see Figure 19). Images taken through the webcams were screened in real-time and incorporated into the Confusion theme videos. In addition, through Processing, different effects were applied to each webcam screen in the videos. When the audience passes in front of the webcam, they can see real-time videos of themselves integrated into the Confusion section of the application.



Figure 19. Artist: So Eun Moon. Title: "Strange World," Still image captured from interactive Processing application dedicated to the Confusion theme. 2023

The installation of the interactions was in the middle of the Penny Gallery exhibition hall. It is called a Niche, and it is built with mobile walls. It prevents the gaze from turning to a place other than the space, and at the same time, it leads the audience to immersion using interactive installations to engage the audience.

The Appendix provides the visual documentation of the content prepared for the MFA exhibition.

7. CHAPTER 7: Conclusion

Projection mapping has been developed through various artistic techniques and technologies. Among them, this MFA project began with an attempt to project to an audience and expand on some personal experiences from a period of transition in my life. As a way to share my experiences, the thesis project has been developed to explore interaction and real-time video mixing. I produced a “subjective documentary” and noticed that the audience could reinterpret my personal experiences in many different ways. This led me to expanding the project to combine animation, video, and visual effects with technology that improves the audience's immersion experience.

People living in today's technologic era have been exposed to a variety of digital media. Even the word analog is treated like an old word these days. Advanced technology is being combined and utilized in different fields in many ways. In the current era of digital innovation, projection mapping is also being developed in various directions. The thesis project tries to expand the language of projection mapping during such a transition period and present new options for those who want to explore immersive experiences in real spaces manipulated through visuals and soundscapes.

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Appendix 1: MFA Exhibition - Preparatory Material

This appendix provides visual documentation of the material prepared for the MFA thesis exhibition. This includes:

- Still images captured from the video series prepared for the MFA Graduation Exhibition.
- Photos from the 180-projection experiments in the Circular Projection Room, Penny Gallery.



Plate 1. Artist: So Eun Moon, Title: "Strange World," Still images captured from the video dedicated to the Strangeness theme prepared for the MFA Graduation Exhibition. 2023.

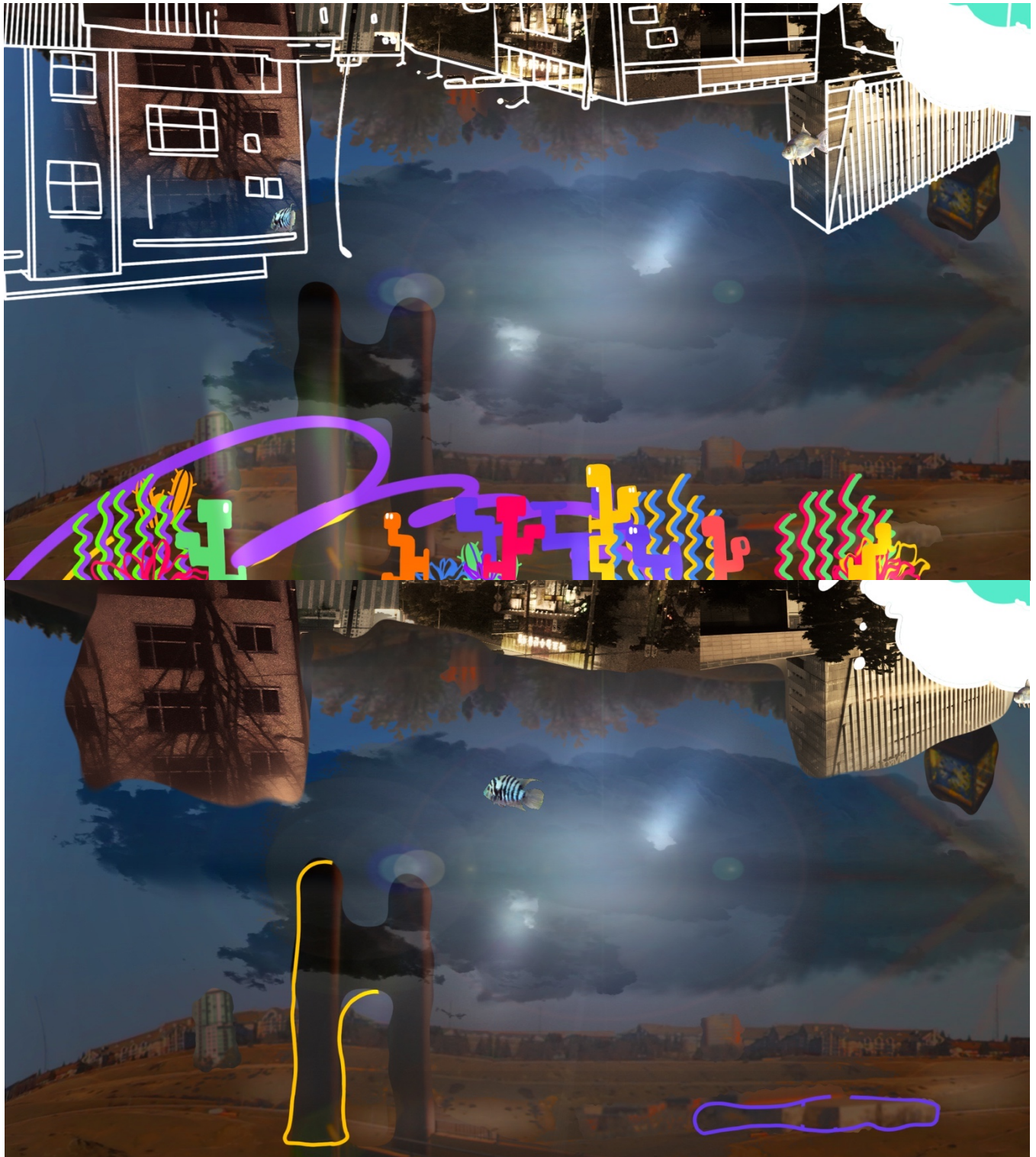


Plate 2. Artist: So Eun Moon, Title: "Strange World," Still images captured from the video dedicated to the Strangeness theme prepared for the MFA Graduation Exhibition. 2023.



Plate 3. Artist: So Eun Moon, Title: "Strange World," Still image captured from the video dedicated to the Strangeness theme prepared for the MFA Graduation Exhibition. 2023.



Plate 4. Artist: So Eun Moon, Title: "Strange World," Still image captured from the video dedicated to the Newness theme prepared for the MFA Graduation Exhibition. 2023.



Plate 5. Artist: So Eun Moon, Title: "Strange World," Still images captured from the video dedicated to the Newness theme prepared for the MFA Graduation Exhibition. 2023.



Plate 6. Artist: So Eun Moon, Title: "Strange World," Still images captured from the video dedicated to the Newness theme prepared for the MFA Graduation Exhibition. 2023.

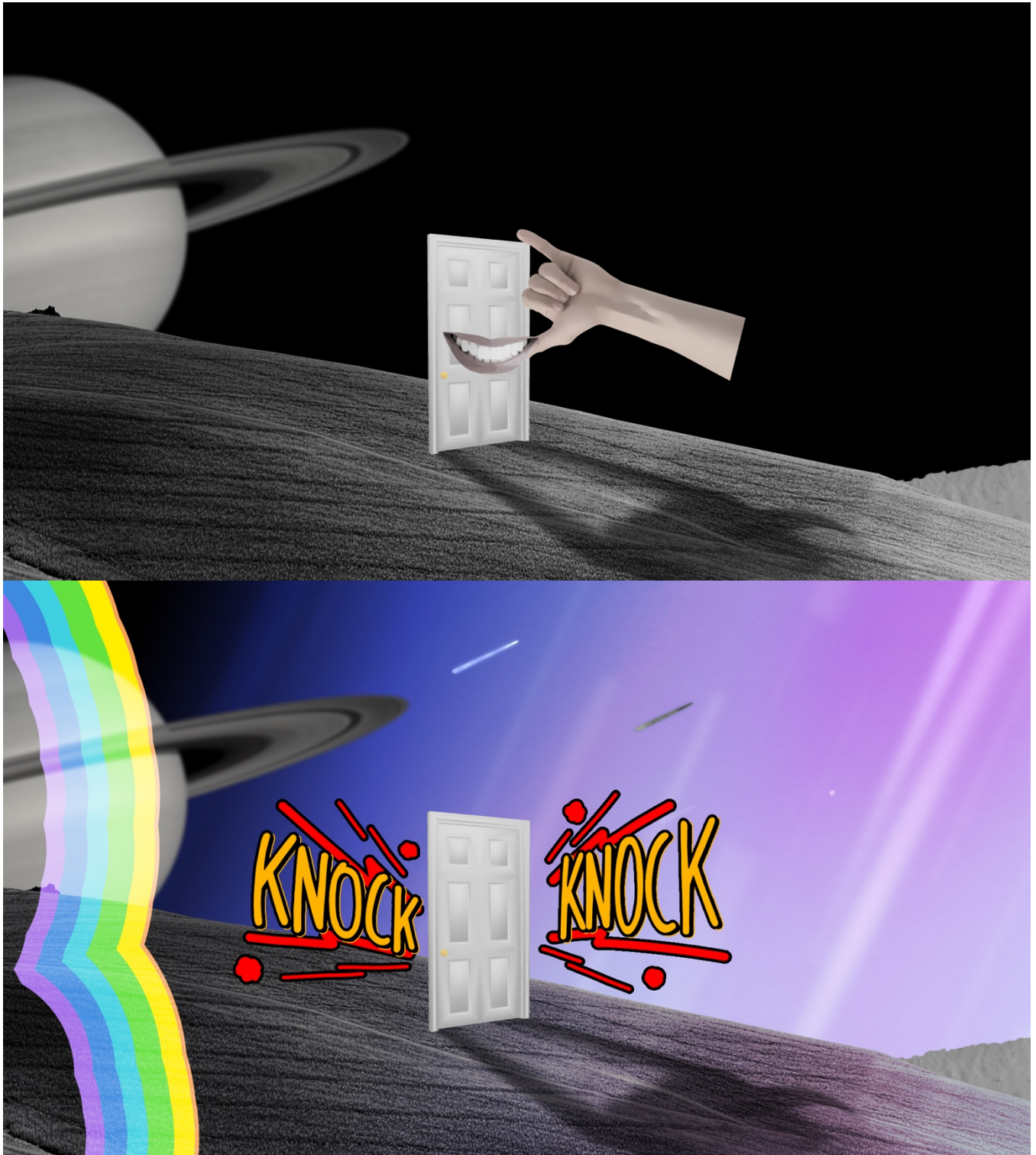


Plate 7. Artist: So Eun Moon, Title: "Strange World," Still images captured from the video dedicated to the Loneliness theme prepared for the MFA Graduation Exhibition. 2023.

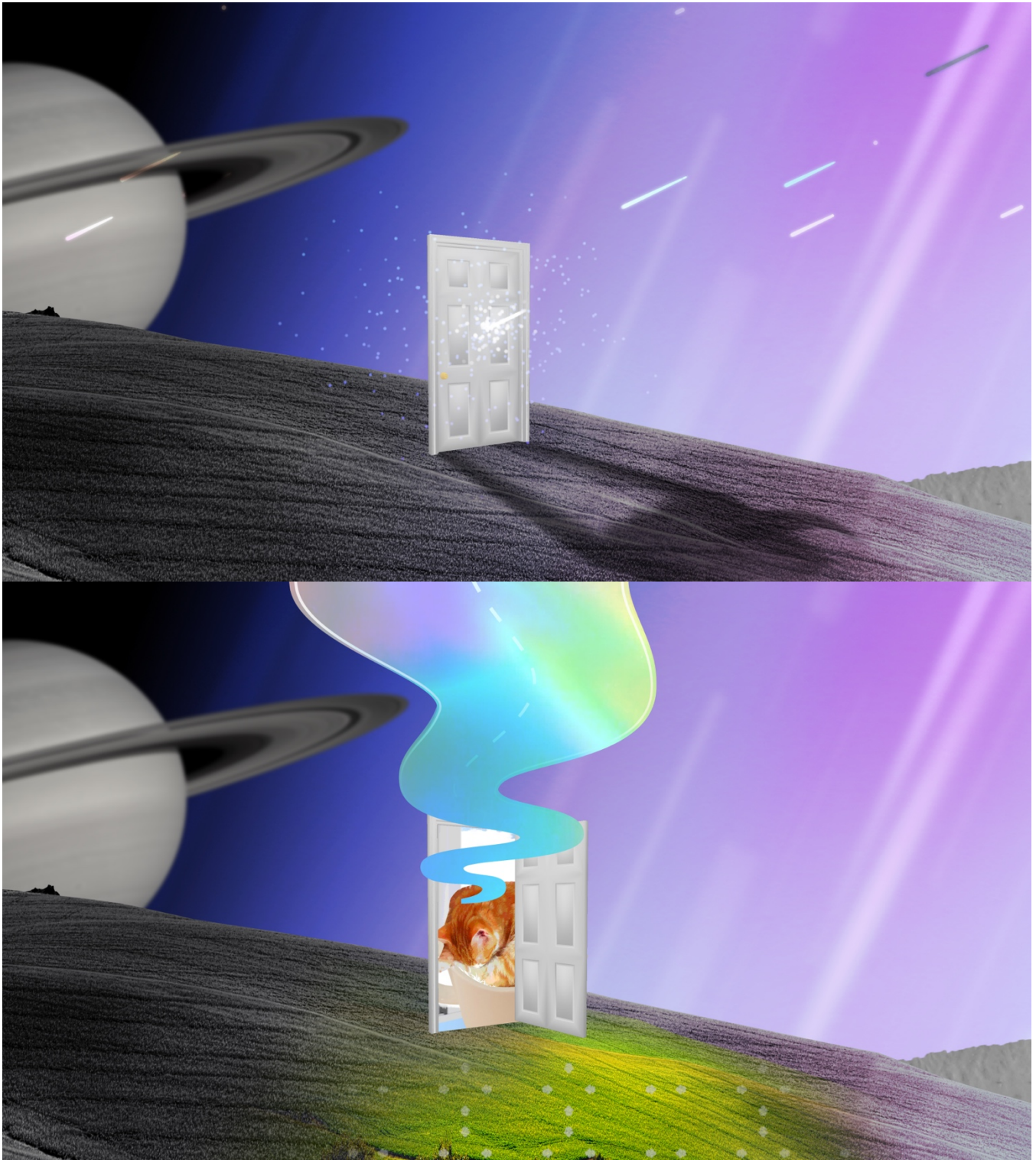


Plate 8. Artist: So Eun Moon, Title: "Strange World," Still images captured from the video dedicated to the Loneliness theme prepared for the MFA Graduation Exhibition. 2023.

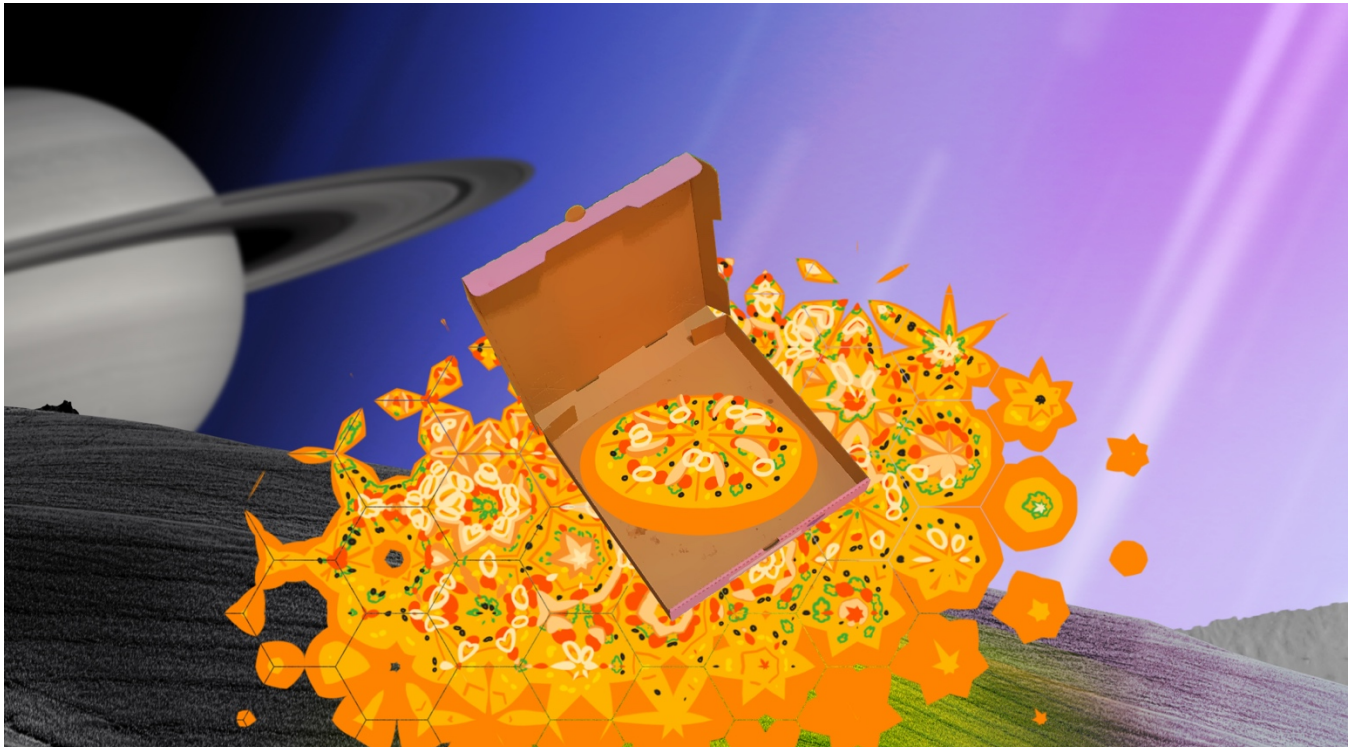


Plate 9. Artist: So Eun Moon, Title: "Strange World," Still image captured from the video dedicated to the Loneliness theme prepared for the MFA Graduation Exhibition. 2023.

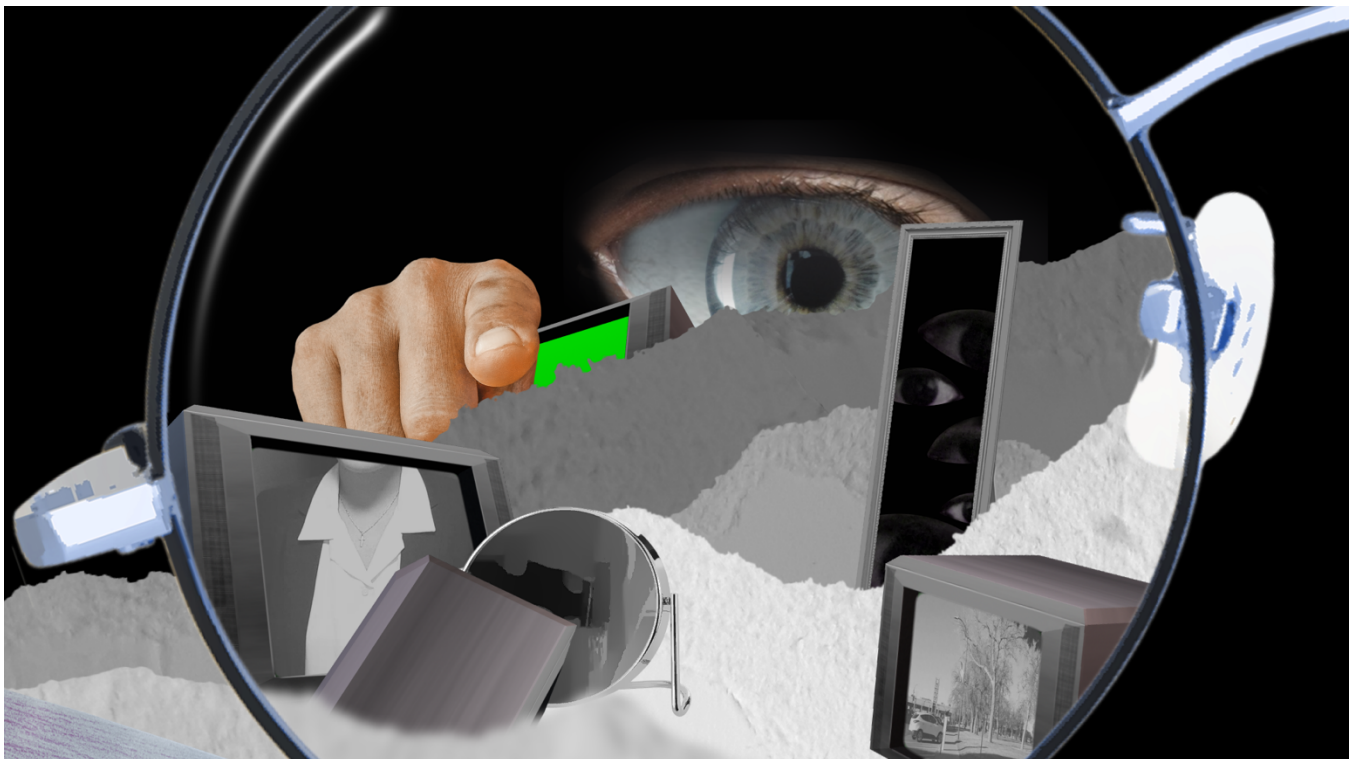


Plate 10. Artist: So Eun Moon, Title: "Strange World," Still image captured from the video dedicated to the Confusion theme prepared for the MFA Graduation Exhibition. 2023.

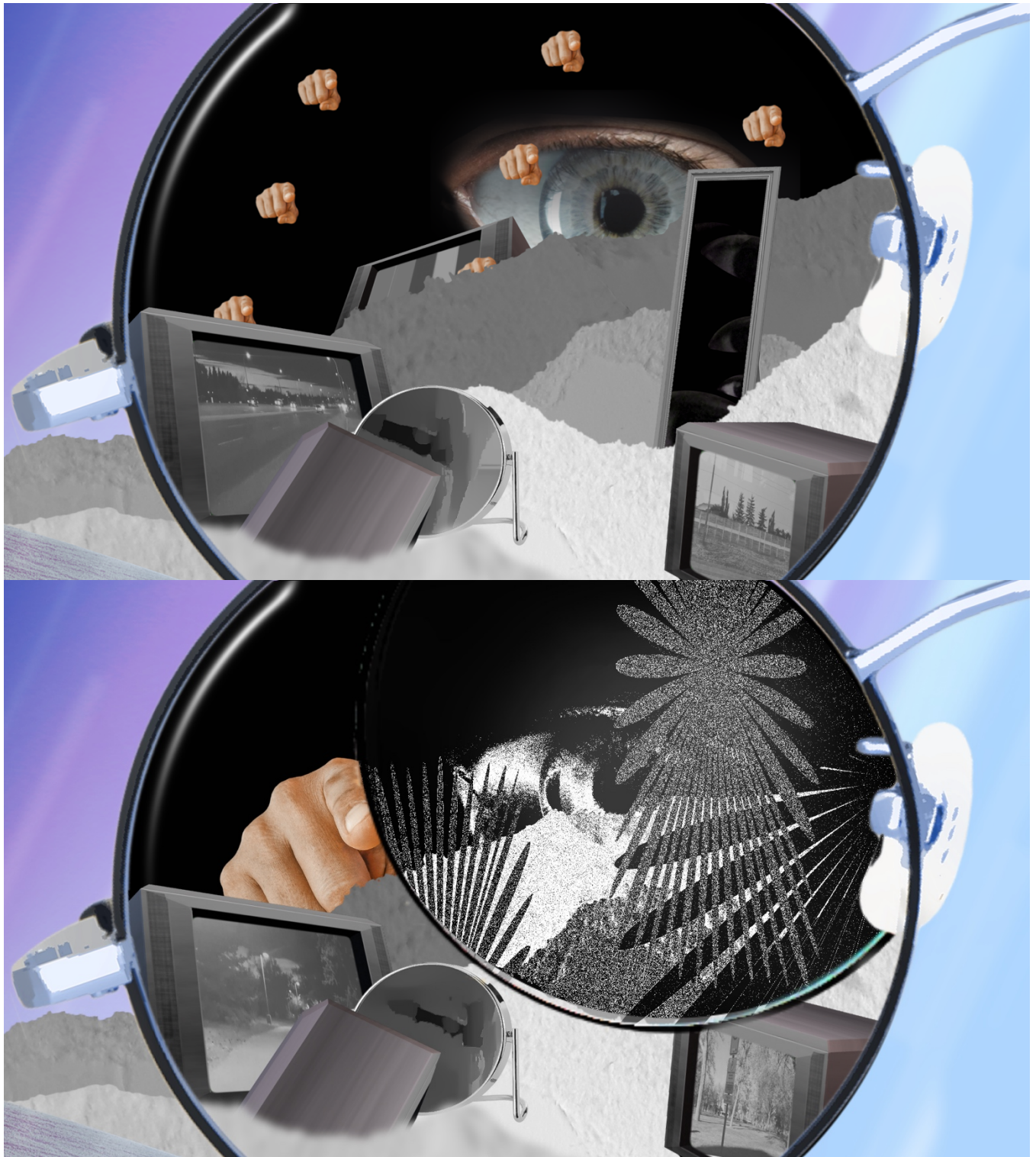


Plate 11. Artist: So Eun Moon, Title: "Strange World," Still images captured from the video dedicated to the Confusion theme prepared for the MFA Graduation Exhibition. 2023.

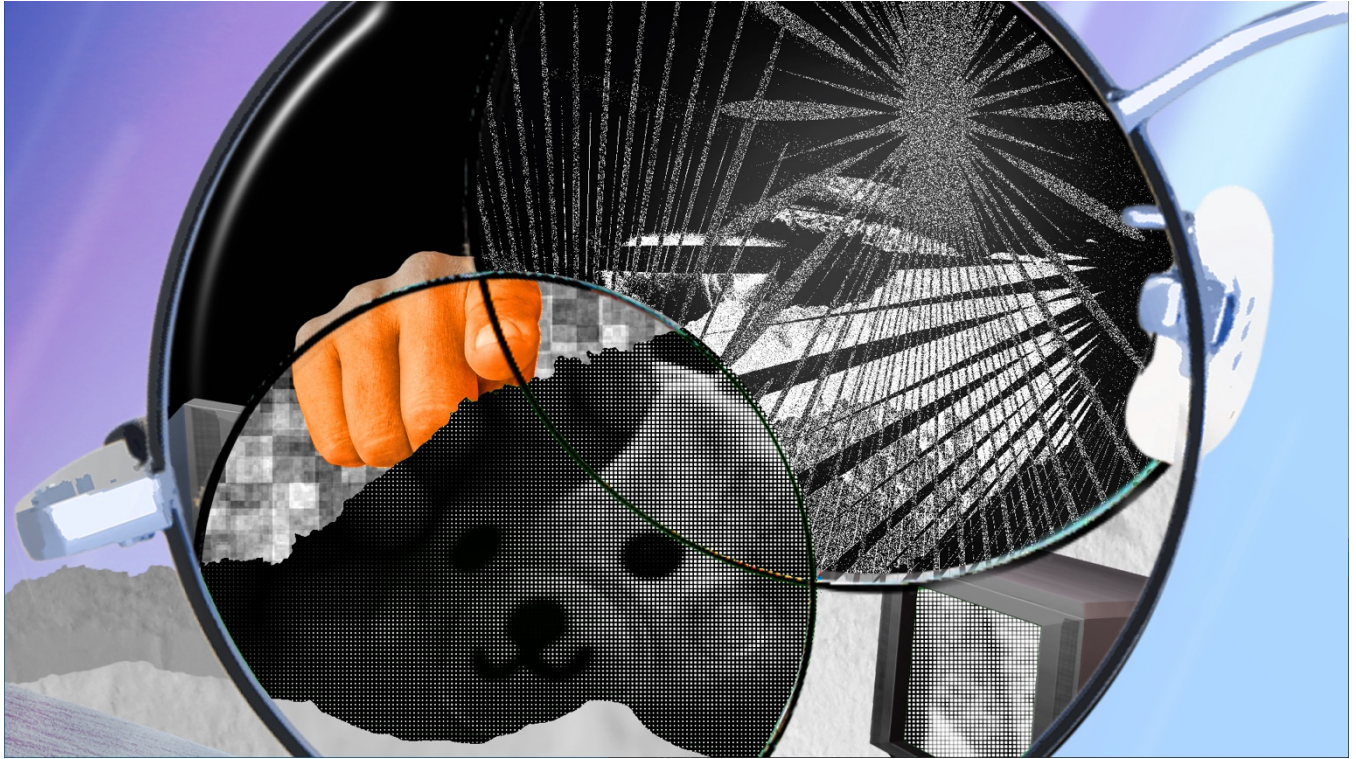


Plate 12. Artist: So Eun Moon, Title: "Strange World," Still image captured from the Interactive installation using live video capture dedicated to the Confusion theme prepared for the MFA Graduation Exhibition. 2023.

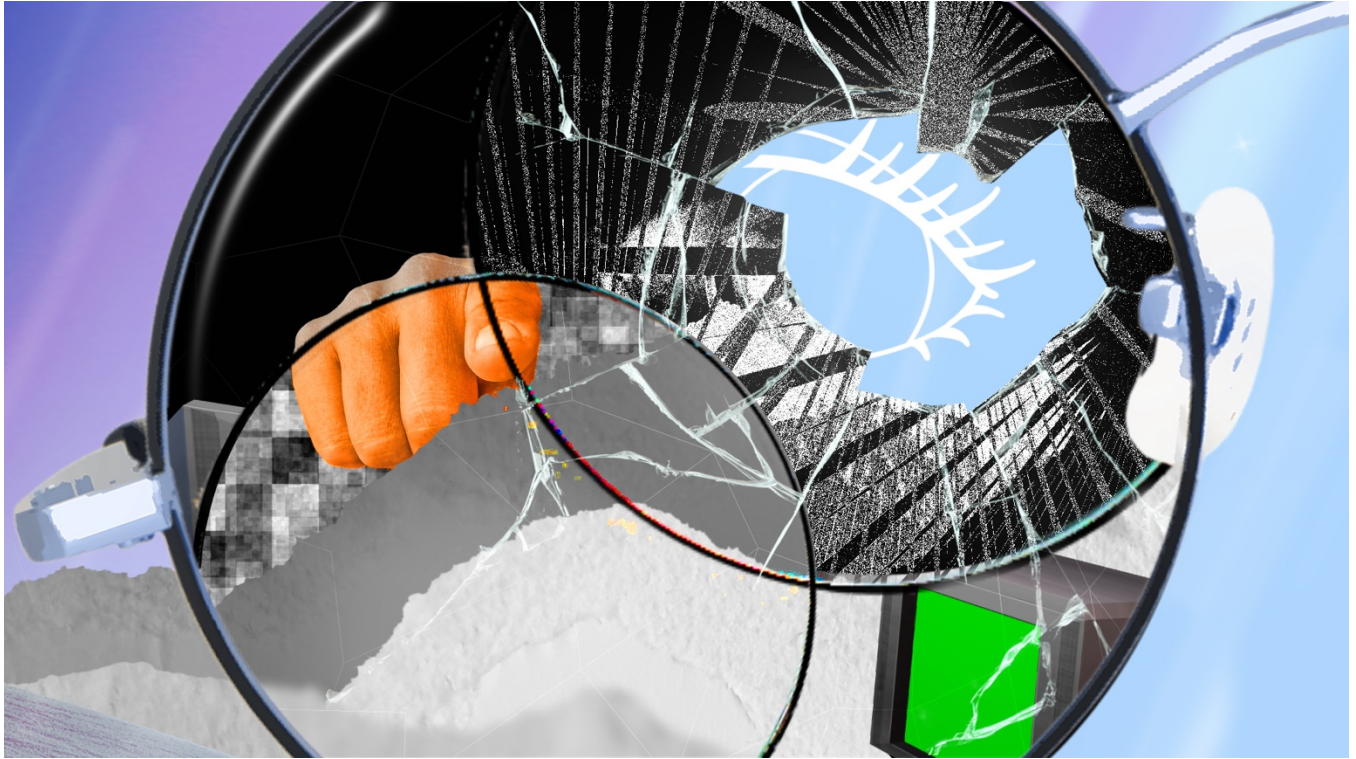


Plate 13. Artist: So Eun Moon, Title: "Strange World," Still image captured from the video dedicated to the Confusion theme prepared for the MFA Graduation Exhibition. 2023.



Plate 14. Artist: So Eun Moon, Title: "Strange World," Still images captured from the video dedicated to the Adaptation theme prepared for the MFA Graduation Exhibition. 2023.



Plate 15. Artist: So Eun Moon, Title: "Strange World," Still images captured from the video dedicated to the Adaptation theme prepared for the MFA Graduation Exhibition. 2023.

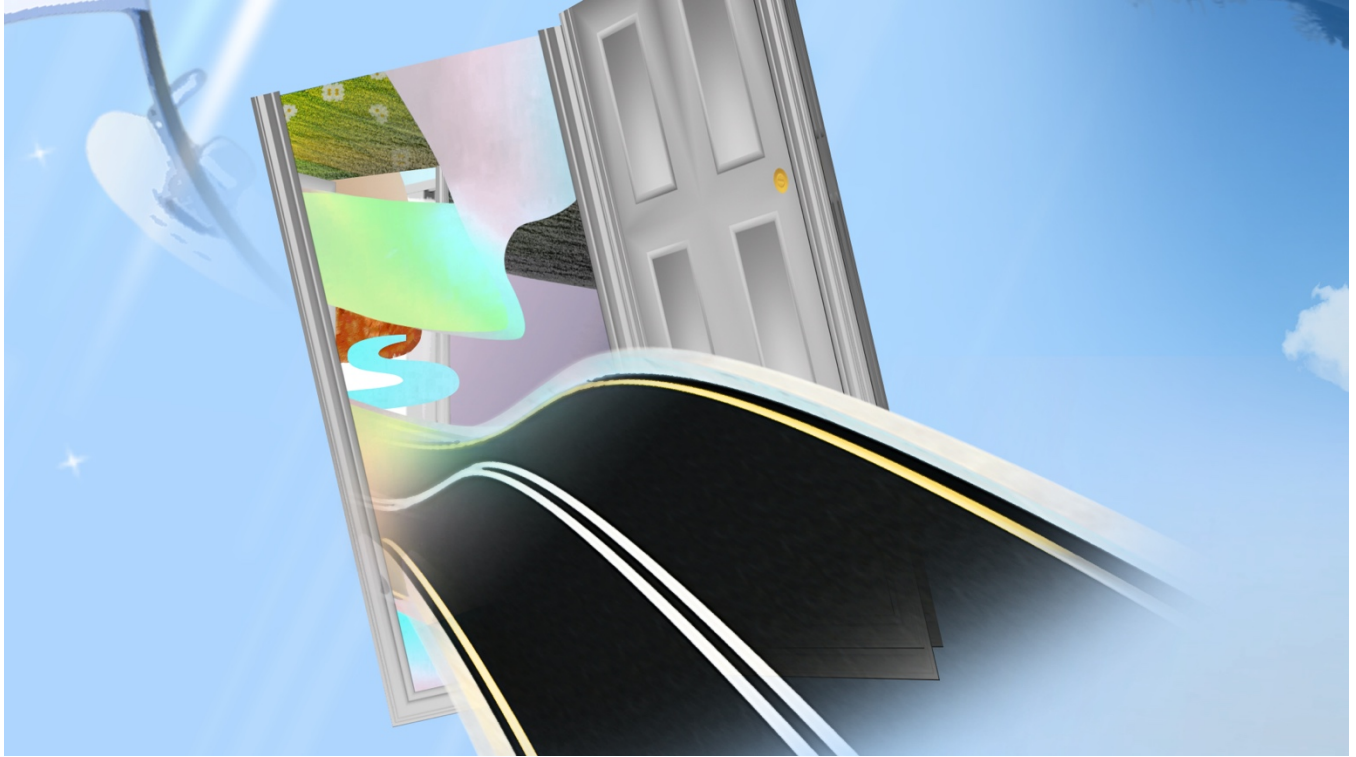


Plate 16. Artist: So Eun Moon, Title: "Strange World," Still image captured from the video dedicated to the Adaptation theme prepared for the MFA Graduation Exhibition. 2023.



Plate 17. Artist: So Eun Moon, 180-degree video projection, a 4-projector setup in the Circular Projection Room, Penny Gallery. April 2023.

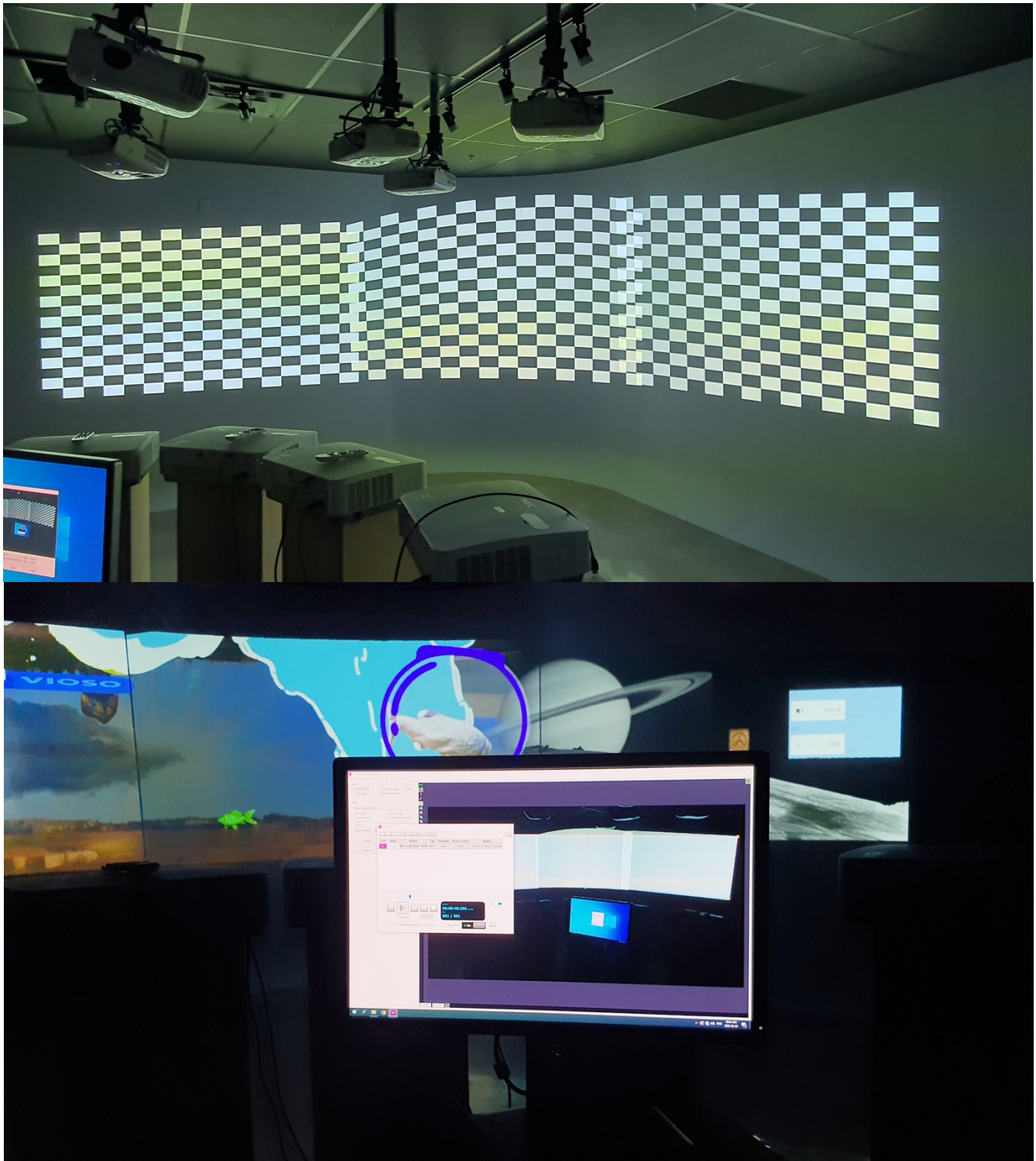


Plate 18. Artist: So Eun Moon, 180-degree video projection, Vioso test 1 with a 4-projector setup in the Circular Projection Room, Penny Gallery. April 2023.



Plate 19. Artist: So Eun Moon, 180-degree video projection, Vioso tests, including visitors for size comparison. 4-projector setup in the Circular Projection Room, Penny Gallery. April 2023.



Plate 20. Artist: So Eun Moon, 180-degree video projection, Vioso test 2 with a 4-projector setup in the Circular Projection Room, Penny Gallery. April 2023.

Appendix 2: Documentation of the MFA Live Exhibition in the Penny Gallery

This appendix provides the visual documentation of the MFA live exhibition. This includes:

- A series of photos documenting the five themes of the thesis project, which are presented through five separate sections in the exhibition. Each section includes a digital station and a set of dedicated prints of still images captured from the theme video.
- A set of photos presenting the interactive portion of the thesis project in a dedicated niche, which was built using mobile walls and the back wall of the gallery space.
- Photos and videos from the 180-projection in the Circular Projection Room, Penny Gallery.
- The exhibition walk-through video from the MFA exhibition will be submitted with the thesis.

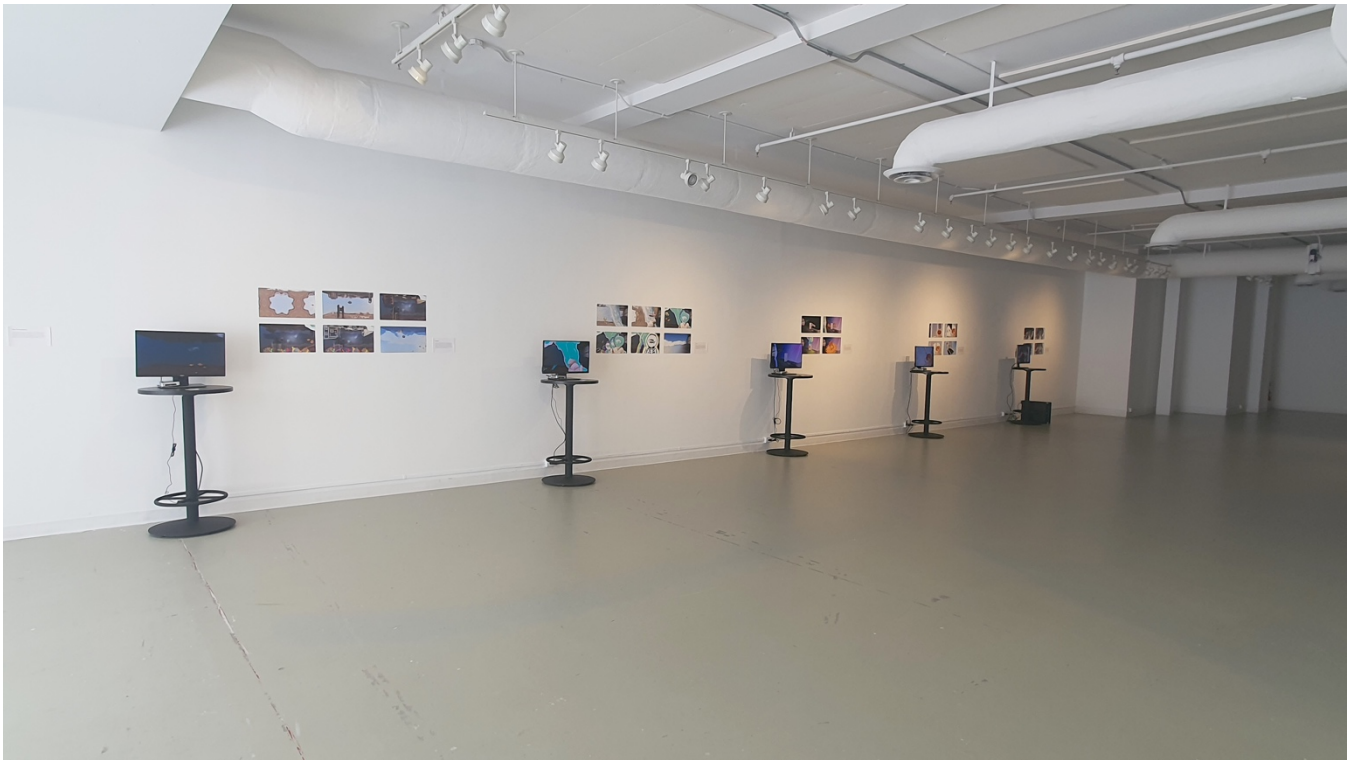


Plate 21. Artist: So Eun Moon, Title: "Strange World," A full view with all 5 theme-dedicated stations in the MFA exhibition. August 2023.



Plate 22. Artist: So Eun Moon, Title: "Strange World," Exhibition presentation of the Strangeness theme. August 2023.



Plate 23. Artist: So Eun Moon, Title: "Strange World," Detail from the exhibition presentation of the Strangeness theme. August 2023.



Plate 24. Artist: So Eun Moon, Title: "Strange World," Exhibition Presentation of the Strangeness theme. Detail. August 2023.

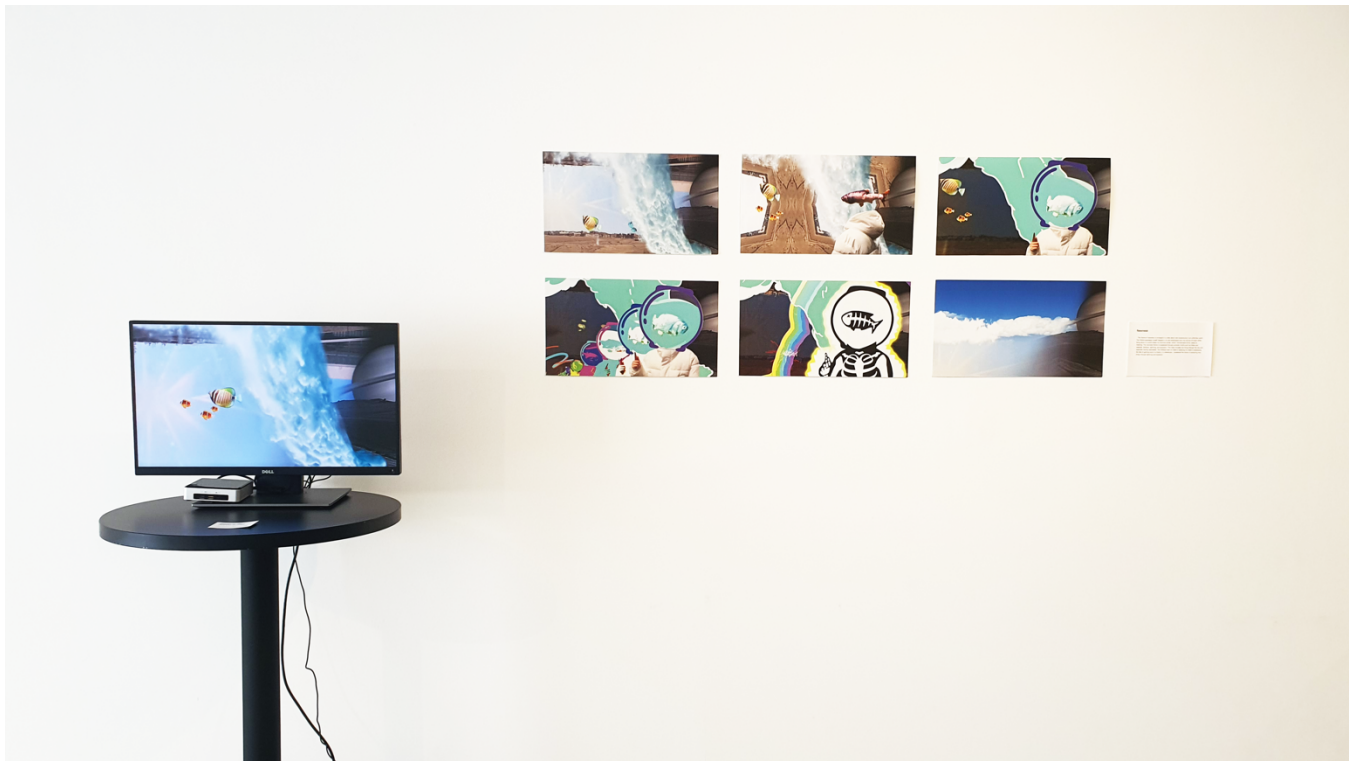


Plate 25. Artist: So Eun Moon, Title: "Strange World," Exhibition presentation of the Newness theme. August 2023.



Plate 26. Artist: So Eun Moon, Title: "Strange World," Detail from the exhibition presentation of the Newness theme. August 2023.



Plate 27. Artist: So Eun Moon, Title: "Strange World," Exhibition Presentation of the Newness theme. Detail. August 2023.



Plate 28. Artist: So Eun Moon, Title: "Strange World," Exhibition presentation of the Loneliness theme. August 2023.



Plate 29. Artist: So Eun Moon, Title: "Strange World," Detail from the exhibition presentation of the Loneliness theme. August 2023.



Plate 30. Artist: So Eun Moon, Title: "Strange World," Exhibition Presentation of the Loneliness theme. Detail. August 2023.



Plate 31. Artist: So Eun Moon, Title: "Strange World," Exhibition presentation of the Confusion theme. August 2023.



Plate 32. Artist: So Eun Moon, Title: "Strange World," Detail from the exhibition presentation of the Confusion theme. August 2023.



Plate 33. Artist: So Eun Moon, Title: "Strange World," Exhibition Presentation of the Confusion theme. Detail. August 2023.



Plate 34. Artist: So Eun Moon, Title: "Strange World," Exhibition presentation of the Adaptation theme. August 2023.



Plate 35. Artist: So Eun Moon, Title: "Strange World," Detail from the exhibition presentation of the Adaptation theme. August 2023.



Plate 36. Artist: So Eun Moon, Title: "Strange World," Exhibition Presentation of the Adaptation theme. Detail. August 2023.



Plate 37. Artist: So Eun Moon, Title: "Strange World," The Niche: Interactive Installation with Live Cameras 1. August 2023.



Plate 38. Artist: So Eun Moon, Title: "Strange World," The Niche: Interactive Installation with Live Cameras 2. August 2023.



Plate 39. Artist: So Eun Moon, Title: "Strange World," The Niche: Interactive Installation with Live Cameras 3. August 2023.



Plate 40. Artist: So Eun Moon, Title: "Strange World," Exhibition presentation of the 180-degree video projection, including visitors for size comparison, in the Circular Projection Room, Penny Gallery. August 2023.



Plate 41. Artist: So Eun Moon, Title: "Strange World," Exhibition presentation 1 of the 180-degree video projection in the Circular Projection Room, Penny Gallery. August 2023.



Plate 42. Artist: So Eun Moon, Title: "Strange World," Exhibition presentation 2 of the 180-degree video projection in the Circular Projection Room, Penny Gallery. August 2023.

Appendix 3: Credits

The majority of the thesis project was developed by So Eun Moon. Some external resources are also integrated into the thesis project. All credits are provided in this appendix.

The thesis content developed by So Eun Moon includes:

- Research: field research, library research, online research.
- Narrative development.
- Film directing.
- Visual concept development.
- Visual design.
- Cinematography.
- Digital image manipulation.
- Digital photo manipulation.
- Photo shooting in the field.
- Video recording in the field.
- Video editing.
- Visual effects and visual effects animation for video.
- 2D animation.
- 3D animation.
- 3D scene design and development.
- Digital collage.
- Integration of external resources (see credits below) into the thesis project.
- Music and sound manipulation.
- Interaction design and development with the Processing programming language.
- Projection mapping design and calibration with Vioso software.

- Interactive installation design.
- Exhibition design.

Below are listed the credits for the third-party resources used in the thesis project:

- Arm Png – Hand and arm transparent background png, Pngfind, Personal Use Only, https://www.pngfind.com/mpng/oJxxTT_arm-png-hand-and-arm-transparent-background-png/
- Bent highway stock photo, Auris, Standard license (Purchased), <https://www.istockphoto.com/photo/bent-highway-gm91692677-6040415>
- BROKENGLASS0048, textures.com, Personal and Commercial use, <https://www.textures.com/download/BrokenGlass0048/76387>
- Eye, 3534379, Creative Commons Public Domain, <https://pixabay.com/photos/eye-iris-macro-natural-girl-2340806/>
- Eye Face Human, Slightly_different, Creative Commons Public Domain, <https://pixabay.com/photos/eye-face-human-green-blue-2154384/>
- Free Download Torn Paper Vol 2 - PNG File, FREEJET.net, Personal and Commercial use, <https://www.freeject.net/2020/03/free-download-torn-paper-vol-2-png-file.html>
- Glasses, PNGEGG, Personal Use Only, <https://www.pngegg.com/ko/png-wzwh>
- Green field, Pixabay, Creative Commons Public Domain, <https://www.pexels.com/ko-kr/photo/259280/>
- Lips Png Transparent Photo - Smiling Mouth Png, Png Download, Stephane Nino, Personal Use Only, https://www.pngitem.com/middle/moJiR_lips-png-transparent-photo-smiling-mouth-png-png/
- Mirror, 588ku, PRF authorization (Purchased), https://pngtree.com/freepng/cartoon-home-mirror-free-illustration_4494412.html
- Mirror, TopPNG, Personal Use Only, https://toppng.com/free-image/mirror-PNG-free-PNG-Images_15584
- Mouth smile, Mouth smile png, PNGEGG, Personal Use Only, <https://www.pngegg.com/en/png-wnysq>
- Pointing finger, truthseeker08, Personal Use Only, <https://pixabay.com/photos/pointing-finger-hand-pointing-1922074/>

- Road | High Way, PurePNG, Personal Use Only, <https://purepng.com/photo/25831/clipart-road-high-way>
- Saturn during Equinox, NASA, Creative Commons Public Domain, <http://photojournal.jpl.nasa.gov/catalog/PIA11141>
- Smiling mouth png sticker, happy lips, transparent background, PLOYPLOY, Creative Commons Public Domain, <https://www.rawpixel.com/image/6086748/png-sticker-collage-element>
- Transparent Fish Bowl Png - Circle, Png Download, One Airport, Personal Use Only, https://www.pngitem.com/middle/whTxwb_transparent-fish-bowl-png-circle-png-download/
- White Flower Png, Tanni, PRF authorization (Purchased), https://pngtree.com/freepng/white-flower-png_6595948.html?sol=downref&id=bef
- Window Cartoon, Naidoo, Personal Use Only, <https://www.cleanpng.com/png-window-3d-computer-graphics-autodesk-3ds-max-three-7114108/>
- Cloud Brushes Photoshop, PhotoshopSupply, Personal and Commercial use, <https://www.photoshopsupply.com/brushes/cloud-brushes-photoshop>
- Piping Bag Filled with Frosting PNG & PSD, 3d_molier International, Personal and Commercial use (Purchased), <https://www.pixelsquid.com/png/piping-bag-filled-with-frosting-2806675198533703571?image=H07>
- Fish (Low Poly) 3D model, kaangvl, Personal use only, <https://free3d.com/3d-model/3d-fish-model-low-poly-63627.html>
- Fish V1 3D model, printable_models, Personal use only, <https://free3d.com/3d-model/fish-v1--996288.html>
- Interior Door Free 3D Model, modeldeziign, Personal use only, <https://c4ddownload.com/interior-door-free-3d-model/>
- Tropical Fish Pack Model 3D, Personal and Commercial use, ZivixLLC, <https://www.turbosquid.com/pl/3d-models/free-tropical-fish-pack-3d-model/652729>
- River water drop fx effects green screen, Saya Tech Tv, Creative Commons Public Domain, <https://youtu.be/ENUGqZ6G6b8>
- 160170_wind blowing curtain_OWI, Pixabay, Creative Commons Public Domain, <https://pixabay.com/sound-effects/160170-wind-blowing-curtain-owi-102398/>
- Birds chirping 04, Pixabay, Creative Commons Public Domain, <https://pixabay.com/sound-effects/birds-chirping-04-6771/>

- Bubble sound effects, ALL SOUND EFFECT, Creative Commons Public Domain, <https://www.youtube.com/watch?v=KNB52YgEx4g>
- Cat purr, Pixabay, Creative Commons Public Domain, <https://pixabay.com/sound-effects/cat-purr-6164/>
- Chimes, Pixabay, Creative Commons Public Domain, <https://pixabay.com/sound-effects/chimes-7035/>
- Concentration, Mewpot, Subscription (Purchased), <https://www.mewpot.com/sound-effects/2233>
- Drawing on paper with charcoal, Youtube audio library, Creative Commons Public Domain
- Drowning, Pixabay, Creative Commons Public Domain, <https://pixabay.com/sound-effects/drowning-75755/>
- Firecracker explosion sound effect, topsoundeffect, Personal use only, <http://topsoundeffect.com/en/firecracker-explosion-sound-effect>
- Flipping through a book, Pixabay, Creative Commons Public Domain, <https://pixabay.com/sound-effects/flipping-through-a-bookmp3-14415/>
- Hit Boom, Johan Hynynen, Subscription (Purchased), <https://www.epidemicsound.com/track/ivPrzhi3m1/>
- Knocking on Door, Pixabay, Creative Commons Public Domain, <https://pixabay.com/sound-effects/knocking-on-door-6022/>
- Office_phone ring_medium loud.aif, Pixabay, Creative Commons Public Domain, <https://pixabay.com/sound-effects/office-phone-ring-medium-loudaif-14604/>
- Pencil, Pixabay, Creative Commons Public Domain, <https://pixabay.com/sound-effects/pencil-29272/>
- Phone Ringing, Pixabay, Creative Commons Public Domain, <https://pixabay.com/sound-effects/phone-ringing-6805/>
- Pouring coffee, Pixabay, Creative Commons Public Domain, <https://pixabay.com/sound-effects/pouring-coffee-6743/>
- Success Fanfare Trumpets, Pixabay, Creative Commons Public Domain, <https://pixabay.com/sound-effects/success-fanfare-trumpets-6185/>
- Swoosh, Pixabay, Creative Commons Public Domain, <https://pixabay.com/sound-effects/swoosh-6428/>

- Thunder sound effects, Free sound storage, Creative Commons Public Domain, <https://pgtd.tistory.com/220>
- Vision Transition 5, SFX Producer, Subscription (Purchased), <https://www.epidemicsound.com/track/y1wnkQEsl/>
- Water drops, Pixabay, Creative Commons Public Domain, <https://pixabay.com/sound-effects/water-drops-26638/>
- Water drop Pop sound effect 28, beetpro, Creative Commons Public Domain, <https://pixabay.com/sound-effects/water-drop-pop-sound-effect-28-11509/>
- Xylophone Tip Toe Scale Up, Youtube audio library, Creative Commons Public Domain
- Airy Dreamy Meditation Ethereal Hypnotic Music, REDProductions, Creative Commons Public Domain, <https://pixabay.com/music/meditationspiritual-airy-dreamy-meditation-ethereal-hypnotic-music-20843/>