結合VR與4DViews之恐怖元素概念短片創作研究 以「瘋狂心靈」為例

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摘要

　　恐懼，是人類最原始的本能，是人類面為了生存，在面對危險時採用防禦或逃跑手段的本能行為。除了人類天生而來恐懼，有些恐懼可能來自童年或是後天的生活經驗，盡管恐懼是強烈的負面情緒，但人們對於「恐怖」類型的題材卻情有獨鍾，而且廣泛的出現各種娛樂領域，例如電影、小說、遊戲、主題樂園…等。隨著 GPU 顯示晶片技術的大幅進步，連帶提升虛擬實境 VR 的效能與高解析畫質，提供更加逼真的畫面，而且價格也日趨合理並同步推動平民普及化，人們取得 VR 設備在家體驗已不再是遙不可及的夢想。因此筆者想研究如果人們在未來實現了多人連線的超擬真 VR 恐怖情境體驗，是否可以激盪出更多元的敘事方式，甚至促進未來遊戲類型的改變或進化。藉由「瘋狂心靈」概念短片來模擬想像中的情境，讓觀眾可以快速與直覺的理解筆者想要表達的概念，用以呈現恐怖元素結合台灣文化與元素，並且導入 VR 與 4DViews 技術，誕生的一種全新的恐怖感與娛樂體驗。

關鍵詞：恐怖、台灣文化、VR、4DViews、瘋狂心靈

Exploring the Potential of Combining Horror Elements, VR, and 4DViews Technology in Concept Short Films: "Mind of Madness" as a Case Study

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Abstract

　　This study examines the innate human instinct of "fear" and its various sources, including childhood experiences. Despite being a negative emotion, "horror" is a popular genre in entertainment, appearing in movies, novels, games, and theme parks. Advancements in GPU chip technology have improved VR's performance and high-resolution graphics, making it more accessible to the general public. The researcher is interested in exploring the potential of multiplayer immersive VR horror experiences with hyper-realistic simulations and diverse narrative techniques. The concept film "Mind of Madness" simulates the envisioned scenario, incorporating Taiwanese culture and elements with horror elements, VR, and 4DViews technology. This fusion promises an entirely new experience of terror and entertainment.

Keywords: Fear, Taiwanese culture, VR, 4DViews, Mind of Madness

I. Introduction

1. Research Motivation

"Fear" is a primal instinct in humans, which triggers discomfort and compels individuals to seek ways to escape it. However, interestingly, "fear" can also captivate and hold one's attention, making it difficult to let go or break free. In the realm of entertainment, there is an abundance of subject matter related to "fear" that can be found in various media such as movies, TV shows, novels, comics, and games. In recent years, with advancements in technology, works centered around horror elements have also started to evolve towards diversification. From the exploration and development of materials to narrative techniques or presentation styles, there has been a continuous stream of innovation. Through the dissemination of the Internet, it has sparked a global wave of communication, igniting diverse possibilities for the fusion of technology and horror themes. It is an area worth researching for the potential it holds.

From the wave of popularity surrounding horror themes, the unique "Cthulhu Mythology " stands out. Starting as an obscure and niche genre in novels a century ago, it has gradually been promoted by subsequent enthusiasts and has now become a highly anticipated and promising genre. The "Cthulhu Mythology" is an alternate mythological system based on the works of American writer H.P. Lovecraft. Its distinctive feature is an open-ended collaborative creation system, allowing any creator to reinterpret its worldviews and story elements. Quotations from the Cthulhu Mythos can be found extensively in various entertainment fields, including novels, tabletop games, video games, comic art design, television, and film. In terms of localizing and reimagining the Cthulhu Mythology, Japan has achieved remarkable success. For example, games like " The Song of Saya " and novels like " Haiyore! Nyaruko-san" are excellent commercial works that seamlessly blend Cthulhu elements with Japanese cultural references. Furthermore, it has even been adapted into live-action and animated films and TV series, providing rich world-building and setting frameworks for various entertainment media. Creators can draw inspiration from each other and develop a sizable creative market.

In 2020, the TV series adaptation of the novel "Lovecraft Country" aired on HBO. Additionally, the Taiwanese independent game "Vigil: The Longest Night" released in the same year, exhibits a presentation style infused with elements from the Cthulhu Mythology. Recently, in Taiwan, books related to the Cthulhu Mythology have also been released one after another. In 2022, SCIFASAURUS Co., Ltd, published the first collection of horror stories based on the "Cthulhu Mythos" titled "Unexplainable, Fear, and the Disappearance of Cats". It combines Taiwan's current affairs and urban legends to create unique Taiwanese horror stories. Drawing inspiration from a line in Lovecraftian literature that states, "**When the stars align in their correct positions, Cthulhu shall rise from the depths of the sea**"[1] it seems to imply and validate that this particular timeframe is approaching an era of culmination for "fear."

In the future, with continuous advancements in GPU capabilities and widespread adoption of 5G, high-speed internet connectivity will allow everyone to easily access high-quality audiovisual content. Coupled with the advent of AI smart living and the immersive experiences and applications of VR/AR, this era holds great potential. "High-definition" "AI" and "AR/VR" will be the three major areas that consumers eagerly anticipate in the future. Taking advantage of this trend, the author wishes to explore and promote a greater diversity of cultural content through this research. By combining the Cthulhu Mythos with Taiwanese culture and incorporating relevant future technology applications, the author believes that this will be a key factor in the development and transformation of the cultural content industry in the future.

2. Research content

The author aims to combine Taiwanese local horror fiction with elements of virtual reality and the latest

4DViews volumetric capture system to create works that blend new media, innovative production techniques, and horror elements. The goal is to explore the development of next-generation horror games, develop more creative audiovisual storytelling techniques, and inspire a broader range of horror themes. Additionally, the author envisions leveraging matured technologies such as VR/AR, and AI to create a connected environment for multiplayer remote gaming experiences with specific thematic narratives. Through the use of new technologies and devices, the author aims to promote the allure of classic horror to a wider audience, facilitate the localization of Taiwanese horror works, and foster opportunities for the development of new horror intellectual properties (IPs).

The author plans to extend and adapt the horror novel collection "Unexplainable, Fear, and the Disappearance of Cats" based on the Cthulhu Mythos written by Taiwanese writer Cheng, Y. (2022) [2]. Taiwan, with its geography surrounded by the sea on all sides, is a typical island civilization that has often faced invasions from external powers. However, this has also provided opportunities for diverse cultural exchanges, as Taiwanese society embraces a highly inclusive attitude towards foreign cultures. Eastern and Western religions and multiculturalism can freely blend and develop here. Naturally, hidden beneath the surface of civilization, there may exist beliefs in and worship of insane and terrifying exotic deities by fanatical followers, along with lurking abominations such as alien tendrils and slimy monsters that defy description. The author believes that in the realm of fantasy creation, Taiwan, as a land, may inherently be a highly suitable environment for the development of horror themes.

There was a proverb in Taiwan that went: "Ten leave, six die, three stay, one looks back." It was circulated between Fujian and Taiwan in earlier times to describe the danger of ancient ancestors emigrating from mainland China to Taiwan, crossing the treacherous Taiwan Strait. Zhu, J. Y. (1958) [3] wrote in his "Notes from the Eastern Seas": "The area from Xiamen to Penghu is called the Great Ocean, and from Penghu to Luermen is called the Small Ocean. When leaving Dadao, the sea is deep blue, sometimes emerald green. The waters of Hongshuigou are slightly red, and those of Heishuigou are as dark as ink. Further in, the color turns light blue, and near Luermen, it gradually becomes white." The mentioned "Heishuigou" is often used to represent the Taiwan Strait. Strictly speaking, Heishuigou refers to a special elongated waterway within the Taiwan Strait. In Xue, Z. L. (2007) [4] "Continued Revision of the Taiwan County Annals," it was mentioned: " Heishuigou" is the boundary between Penghu and Xiamen, spanning about sixty to seventy miles, known for its treacherousness among the seas. It is unfathomably deep, with water as black as ink, violently turbulent, and appearing slightly shallow in nature. There are two Heishuigou: one located to the west of Penghu, spanning over eighty miles, serves as the boundary between Penghu and Xiamen. The water there is as black as ink, and it is known as the Great Ocean. The other Heishuigou is located to the east of Penghu, also spanning over eighty miles, serving as the boundary between Taiwan and Penghu. It is known as the Small Ocean. The water in the Small Ocean is even darker than the Great Ocean, unfathomably deep, and treacherous beyond the Great Ocean. It is not advisable to sail across the Small Ocean due to its extreme danger. This detailed clarification was not previously recorded in historical books. Heishuigou is depicted as a gloomy, mysterious, and perilous region.

In the Cthulhu Mythos, there is a species known as the Deep Ones, a marine humanoid race with fish-like characteristics. They worship and serve the malevolent deity Cthulhu, who lies buried in the depths of the sea. The Deep Ones first appeared in H.P. Lovecraft's short story "The Shadow over Innsmouth", and have since become a significant element within the Cthulhu Mythos [5]. They construct underwater cities with enormous cyclopean cylinders, known as Deep One cities, distributed throughout various oceanic regions worldwide. The three most renowned Deep One cities are: Y'ha-Nthle near the town of Innsmouth on the Massachusetts coast, Ahu-Y'hloa near the Cornwall coast in England, and G'll-Hoo off the volcanic island of Surtsey in the North Sea.

The author attempts to link the enigmatic Heishuigou in the Taiwan Strait with the Deep One cities, envisioning a colossal and terrifying ancient deity lurking at the bottom of Heishuigou. This malevolent entity exerts sinister control over and torments the creatures on Taiwan Island, gradually dragging them into the abyss of darkness. Through this narrative, the Cthulhu Mythos is cleverly intertwined with the geographical features of Taiwan, creating a compelling fusion of fiction and reality.

II.　Relevant Research

1. Fear and Pleasure

Feng (2005) mentioned that fear, happiness, anger, and sadness are classified as "primitive emotions." Fear is considered a fundamental and instinctive emotional response that arises in the presence of threats, triggering a flight or fight response and serving as a mechanism to protect one's life safety [6]. Human fear responses can generally be divided into two types: innate and acquired. Innate fears are instinctual responses to things that may cause harm or pose a threat to oneself or one's life, such as fear of heights, darkness, or fire. These fears have their origins in the primitive state of human society and reflect instinctual reactions to adapt to the natural environment [7].

The other type is acquired fear, which is developed through learning and is experienced in response to specific dangers such as blades or poisons. However, in the twenty-first century, with advancements in technology and medicine, many threats to humanity have been overcome, and we live in a relatively safe era. Nevertheless, it seems that modern individuals experience an increase rather than a decrease in psychological fear. Gardner (2008) pointed out, "We live in the healthiest, longest-living, and most prosperous era in history, yet fear is not decreasing; in fact, it is increasing. This is the greatest paradox of our generation. "Therefore, fear, like humans, grows and changes. It can dissipate over time and give birth to new fears. Throughout history, humans have constantly sought ways to resolve or diminish fear. Religion, medicine, and science, for example, have served as means to address fear. While the awe-inspiring power of nature has significantly diminished, human fears have gradually shifted from external threats to psychological symptoms. As a result, the presence of fear cannot be completely eradicated; rather, it serves as an inherent balancing force in human existence [8].

People afraid "fear" itself, yet they also enjoy engaging in extreme sports and watching horror movies to seek thrills. Psychologist Zillmann (1978) proposed the "excitation transfer theory," which suggests that when faced with different stimuli, individuals experience multiple emotions. Furthermore, our response to one stimulus can amplify our perception of another stimulus [9].

Bakery (2018) stated in a research report published in Scientific American that fear triggers the release of adrenaline in the human body, which prepares the body for fighting or fleeing. At the same time, fear also triggers the release of dopamine, which stimulates the pleasure centers in the brain. In the brain, there is an area called the "reward system" where dopamine is released whenever it is stimulated, creating a sense of desire or transmitting internal messages to coordinate the transmission of impulses between cells. Due to individual variations in the human body's sensory receptors, when facing fear, if dopamine transmission is faster than adrenaline or if a large amount of dopamine is released, the human brain can experience happiness [10].

More importantly, the key factor that truly generates happiness lies in having sufficient "sense of safety." Psychologist Rozin (2013) proposed the theory of "benign masochism," which explains why people often engage in activities that cause discomfort, such as eating spicy food, listening to breakup music, or watching horror movies [11]. It suggests that if individuals can understand that the fear they experience in the present moment poses no actual harm or threat to themselves and if they develop enough "sense of safety," they can transform this emotion into an additional sense of satisfaction and happiness.

2. Cthulhu mythology and Fear

Lovecraft (1928) once said, "***The oldest and strongest emotion of mankind is fear, and the oldest and strongest fear is the fear of the unknown.*** [12] The fictional mythological framework was organized and created by Derleth A. W., a journalist and contemporary disciple of Lovecraft, along with other authors. They compiled and developed the settings and concepts of Lovecraft and other writers to form this speculative mythological system. The name "Cthulhu" originates from Lovecraft's short story "The Call of Cthulhu" first published in the magazine "Weird Tales" in 1928.

Lovecraft's life experiences were marked by a profound sense of tragedy. He was an outsider of his time, with only a few appreciating his works, which were often regarded as vulgar. As Joshi (2000) aptly put it, "***Life is a frightful thing, hinting at demonic truths behind all we know, sometimes rendering it a thousandfold more terrifying.***"[13]

Lovecraft (2014) also wrote, "***The cosmos doesn't care about mankind, and the world itself is never humane but indifferent to the human species. The greatest contradiction is that this feeling of indifference is merely an emotion of humans. By perceiving the cosmos as indifferent, humans are projecting their own emotions onto the universe.***" As a result, he began to believe that compared to the vastness and indifference of the universe, the human race was so insignificant and insignificant. He imagined that if there were gods, humans would be like ants. The deities in Lovecraft's writings lack a fixed form. However, in the work "The King in Yellow," Robert Chambers (2017) mentions the term "unspeakable" and believes that true terror arises from the fear humans experience when confronted with unknown entities or phenomena that are beyond comprehension [14].

After Lovecraft's death, Derleth A. W. took on the task of organizing his works and materials, and he inherited Lovecraft's creative ideas. Through continuous interactions with other authors and the publication of related works, Derleth expanded the "Cthulhu Mythos" by incorporating the elements of "wind, fire, water, and earth" and the concept of "Good versus Evil." He also introduced more vividly depicted deities and aimed to popularize the "Cthulhu Mythos" in a more accessible manner. With his relentless efforts, he attracted a larger community of enthusiasts and creators who embraced the Cthulhu style, collaborating to further develop and expand the mythos.

The "Cthulhu Mythos" is a fantastical creation collectively crafted by a group of authors. It has always been regarded as an immature and non-mainstream subject in the academic field. However, in recent years, with the advent of internet communication, creators from all over the world have collaborated diligently to study and shape the "Cthulhu Mythos" into a world that encompasses both profound philosophical concepts and distinctive aesthetics. Furthermore, as a theme that combines elements of science fiction, horror, suspense, and more, it offers a wealth of speculation on people's fascination with the universe, the deep sea, other dimensions, and unknown life forms. It offers a wealth of free and unrestricted creative elements and space. Furthermore, with advancements in technology and the birth of new media, it has given rise to a plethora of derivative works. These extend beyond written creations and encompass a wider range of entertainment mediums such as film, television, video games, and tabletop games.

3. VR Immersion and Fear strengthen

Virtual Reality, abbreviated as VR, refers to the simulation of a three-dimensional virtual world using computers or other electronic computing devices. It utilizes a head-mounted display to present realistic 3D visual signals and sound, effectively blocking the user's sensory connection to the outside world, and providing a fully immersive experience.

The term "Virtual Reality" was coined in 1989 by Jaron Lanier, the Chairman of VPL Research Inc. in the

United States. It was used to describe a vivid and immersive simulated world within the computer information space. This concept originated from the idea of the "Ultimate Display" proposed by Professor Ivan E. Sutherland in 1965. The Ultimate Display aimed to present three-dimensional spatial images using computers, with the hope of allowing people to enter a virtual wonderland like Alice's dream and experience a sense of being in a real environment [15].

Psychologist Csikszentmihalyi (1990) proposed that when individuals become deeply absorbed in a particular activity or task, they experience a heightened sense of focus and complete immersion in the present moment. This state of immersion involves filtering out irrelevant thoughts and is commonly referred to as the state of flow. When people enter a state of immersion, they exhibit a common pattern of experience. In this mode, individuals filter out all irrelevant sensations and thoughts, and they lose a sense of self-awareness. As mentioned above, while the state of immersion can induce a sense of pleasure, it can also influence other sensory experiences, such as intensifying feelings of fear. Excessive immersion can lead individuals to lose themselves completely, resulting in a loss of rationality [16].

According to the data released by the Bureau of Audiovisual and Music Industry Development under the Ministry of Culture in 2020, the box office revenue of fantasy, horror, and suspense films accounted for 27.43% of the total annual domestic film market. Therefore, regardless of time, culture, or medium, whether it's literature or film, horror movies are an undeniable and enduring genre. With a stable audience base, horror films have consistently held a significant position in the film market over the years. According to the research conducted by Global Market Insights, a global market insights and analytics firm, on the trends in content creation for VR, AR, and 360-degree videos, the report indicates that "the global VR market is projected to achieve a compound annual growth rate (CAGR) of 81% from 2016 to 2024. Additionally, it has been found that VR content evokes deeper emotions and higher engagement compared to traditional visual content." Hence, the fusion of VR and horror is a perfect match, and it represents a future trend in the evolution of horror genre-related entertainment experiences.

4. 4DViews Volumetric Capture System and Uncanny Valley

4DViews is a technology that captures dynamic volumetric image information. It utilizes a technique called Volumetric Capture, which involves setting up an array of cameras in a green screen environment from all directions to capture the movements of the subject in the center. Each camera captures a different angle, and the captured pixel information is detected and matched using Photometric Stereo. The computer then processes this data to generate 3D volumetric polygonal data and textures. With 4DViews, it is possible to capture at a maximum frame rate of 60 frames per second and generate a set of dynamic sequence 3D model files [17] (Figure 1).
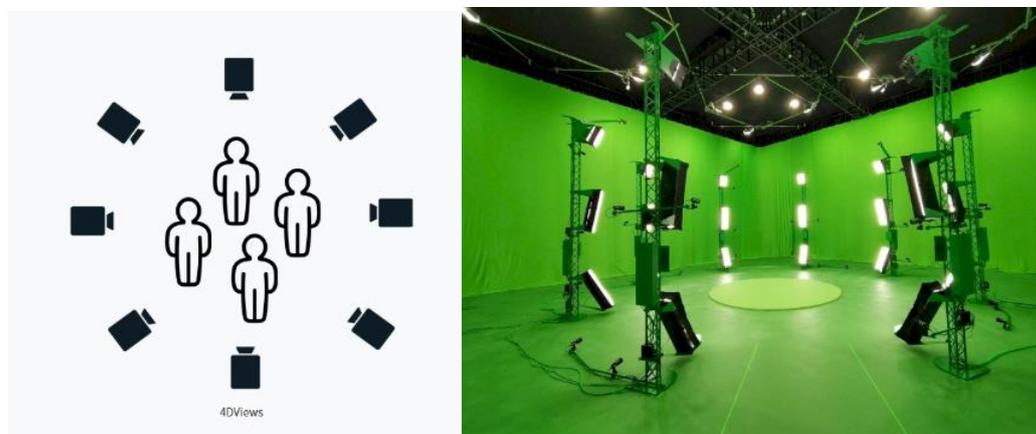

Fig.1 *4Dviews Studio Environment*

The 4DViews volumetric capture system allows for the recording of the appearance and movements of real-life actors in a three-dimensional space, including their hair, accessories, and clothing, in a digitalized form. In essence, it involves using an array of cameras positioned around the subject to capture their dynamic performance from various angles. Through computer processing, high-quality dynamic 3D models that closely resemble real humans can be obtained. The obtained 3D models exhibit extremely high realism and accurately reproduce lifelike movements, making them a true representation of what is seen. Compared to the traditional manual process of 3D modeling, UV unwrapping, texture painting, rendering, and skeleton rigging, followed by motion capture for animation production, the workflow efficiency of 4DViews can be increased by up to 5 to 10 times. It can greatly simplify the digital content production process and lower the production barrier for many content producers. It can be applied to various purposes such as music videos, advertisements, stage performances, and digital character archives. It is particularly well-suited for designing immersive interactive experiences in fields such as VR, AR, MR, and XR.[18]

German psychiatrist Ernst Jentsch (1906) proposed the term "Uncanny Valley."[19] Japanese roboticist Mori (1970) further developed the theory of the Uncanny Valley. The theory of the Uncanny Valley describes that as humans encounter objects that resemble themselves (humans) more, the likability or affinity towards those objects increases. However, when the appearance of the object is almost identical to humans but exhibits subtle "non-human" features, the likability sharply decreases, plunging into the valley depicted in the graph (Figure2). The likability or affinity reaches its highest point only when the object is identical to humans (or indistinguishable from humans) [20].
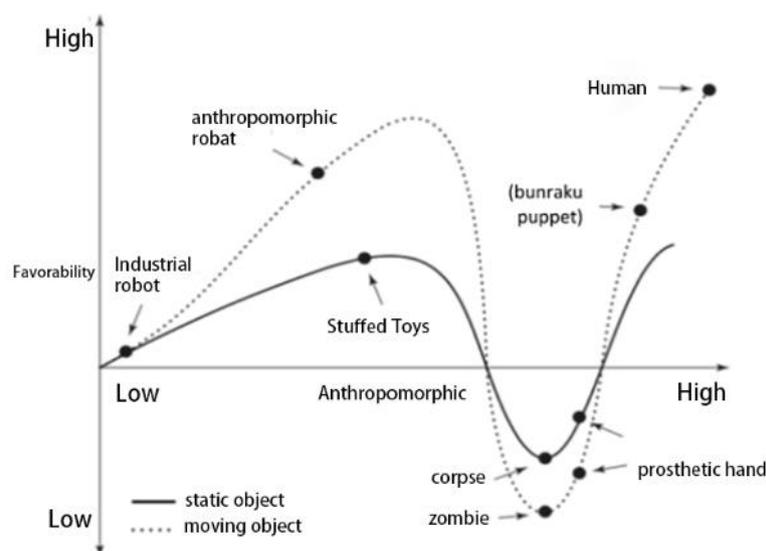
Fig.2　*Uncanny Valley" schematic diagram*

4DViews' distinctive feature lies in its ability to quickly obtain highly realistic 3D models. However, the efficiency gains come at the cost of limiting the quality of the materials. The provided material resolution is 2K, which makes it suitable for capturing characters in panoramic or wider shots. Getting too close to the camera may result in inadequate resolution or a noticeable digital appearance, creating an uncanny valley effect where the subject appears human-like yet not quite human. Mori (1970) himself believes that this "uncanny" feeling evokes a sense of "danger" in our survival instincts[20]. However, it is also this aspect that makes it suitable for unique horror visual effects, as seen in TV series like " Demonic "[21] (Figure3).

**Fig.3** *TV series "Demonic"*

III. Creation method

The author intends to combine elements of "Taiwanese culture," "Cthulhu Mythos," "VR/AR," and "4DViews" to create a new form of horror storytelling. The purpose is to explore whether such an experiential approach can generate interest among viewers. And will utilize an online survey to gather relevant information for analysis.

In the first phase, the author plans to proceed with the production by shooting a concept short film. To ensure better audience understanding, the author intends to use a narrative-driven film to depict the unfolding of a horror story. The short film will incorporate futuristic VR and 4DViews technology, along with elements of Lovecraftian horror and familiar local elements from Taiwan, to create a novel and unique thematic style and experience. The film is planned to have a duration of approximately 10 minutes and will be in Full HD 1080p resolution. The production will include the development of a complete script, writing of actor dialogues, visual art design, and the composition and design of sound effects and music. Technically, the concept short film will combine live-action footage, 3D animation effects, 4DViews volumetric capture system, and real-time rendering using game engines. The research aims to share the assets created during the production, such as 3D character models and 3D scene models, to enhance the efficiency of future development and expansion. This integration of 3D animation, 4DViews volumetric capture system, and real-time rendering with game engines is intended to streamline the production process.

In the second phase, after watching the concept short film, the audience will be invited to fill out a survey designed by the author to gather their thoughts and feedback on the research. This feedback will provide valuable data for the development of various aspects related to the subject matter, such as IP management, VR interactive game development, AR exhibitions, and even physical merchandise research and sales. Below is the schematic diagram (Figure 4) of the research framework.

1. Script design

The concept short film is called "Mind of Madness". The content describes a police investigator Fang Pak Kai, who is tracking down a case of the disappearance of an Internet celebrity, and the well-known Internet celebrity "AK" played a VR game called "Mind of Madness" live on a live broadcast program, but unexpectedly disappeared mysteriously during the game. Investigator Fang Pak Kai followed the line and experienced the game " Mind of Madness ", and found many strange situations in the game. Following the hints provided by the game master "Harry", Fang Pak Kai seems to be uncovering the truth step by step. But AK unexpectedly appeared and pulled Fang Pak kai closer to an abyss that could not be recovered.
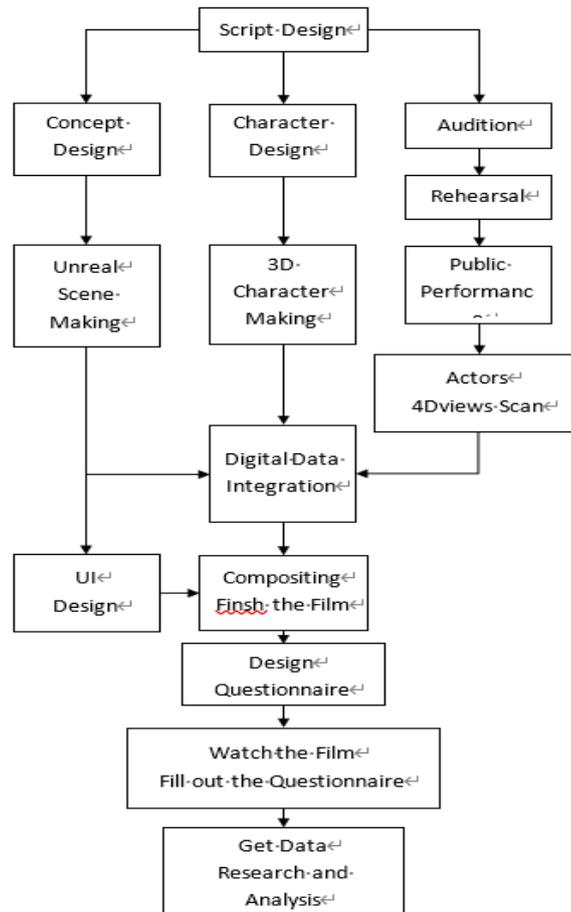
Fig.4　*Research Architecture Flowchart*

The story is set in the near future, when VR technology is quite mature and affordable and popular, Live streaming self-media is still popular, and in order to increase or maintain online response, It is often necessary to dig for material that will appeal to the audience, even if it is controversial or dangerous. The live broadcaster AK uses VR equipment but accidentally touches a taboo field. It is precisely in the Cthulhu style that is wanted to be expressed, when it goes beyond the realm of human common sense and mortal incomprehension, it constantly spreads unspeakable fear, gradually pushing itself to the brink of madness. The story style is based on the movie " Searching " (Figure 5), which constantly switches between multiple perspectives, including network cameras, watching Youtube videos, and VR subjective perspectives. Immerse the audience into the protagonist's search process, to unravel the truth step by step, experience what it's like for reason to gradually disintegrate. Then experience the psychological thriller that Cthulhu style is best at.

Fig.5　*Movie "Searching" (2018)*

2. Concept Design

In the novels of Lovecraft, the descriptions of deities and creatures often include the key phrase "indescribable." This usage stems from the difficulty of fully depicting the true appearance of these mysterious beings through words alone. Therefore, in the process of visualization, creators are able to freely explore and experiment, aiming to showcase the unique nature of these deities and creatures. This freedom of expression provides creators with more creative space and imagination, enabling them to interpret the existence of these enigmatic beings in various forms. This study aims to give these alien creatures more aesthetic significance. The imagery of monsters should not only evoke fear, but also present an alternative sense of profound beauty. Audiences should be able to perceive a vast and mysterious supernatural world beyond reason, where the dark and enigmatic cosmos contrasts with the insignificance of human civilization. From the unknown fear, a transformation into a grand sense of terror occurs, providing a unique aesthetic experience through this juxtaposition. It is within this experience of terror that the allure of the Cthulhu Mythos lies.

The experience of terror can ultimately be transformed into a certain pleasure, which can be explained using Zillmann (1978) proposed the theory suggests that when individuals are exposed to different stimuli, they can experience various emotions. The theory also proposes that our response to one stimulus can amplify our perception of another stimulus. In simple terms, suspense and fear in horror movies can evoke negative emotions related to danger and also amplify our desire for the ultimate resolution or outcome. When the crisis is finally resolved, the long-accumulated negative feelings can suddenly transform into a sense of relief, providing us with a cathartic sense of happiness and a feeling of being released from a burden [9]. Lovecraftian endings often involve humans facing overwhelming and incomprehensible forces, resulting in a sense of powerlessness and tragic outcomes that remain unresolved. The crisis remains unresolved, and the inability to explain it leaves the audience unsatisfied, sometimes even causing the fear to extend beyond the fictional realm. Carroll (1990) point that the unreal scenarios in horror films allow viewers to temporarily detach themselves from familiar social contexts. This detachment helps them imagine living in a different world while providing a safe space for exploring unknown fears. Therefore, by experiencing the lingering thrill of unknown fears from a safe distance, viewers can derive pleasure and fascination, which is the essence and allure of horror films [22].

Mariani (2019) proposed three characteristics of horror: "creating tension", "establishing relevance for the viewers", and "a sense of unrealism"[23]. So the author incorporates more familiar and commonly seen local environmental elements in scene design to deepen the association between the unknown horror elements and our familiar living environment. Creating an atmosphere of pervasive eeriness to heighten the sense of horror. (Figure 6, Figure 7, Figure 8)

Fig.6 *"Mind of Madness" Concept Design I*
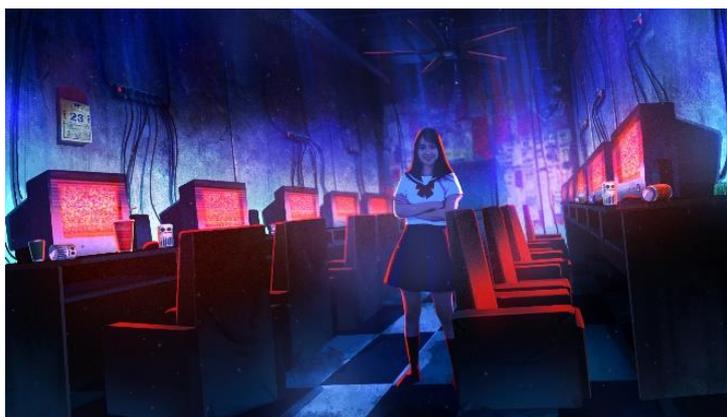

Fig.7 *"Mind of Madness" concept Designn II*

Fig.8　*"Mind of Madness" Concept Design III*

3. Character Design

The video is divided into two parts: live actors performance and virtual character animation performance digital data using 4Dviews Volumetric Capture technology. In the live-action part, Zhao Yi Hu will play the investigator Fang Bo-Kai, Lin Yu will play the missing Internet celebrity AK, and Lin Sing Ting will play the mysterious yellow woman Harry Among them, AK and Harry obtained digital dynamic data through the process of 4Dviews Volumetric Capture system that used for performances in 3D virtual scenes. The virtual characters mainly refer to a large number of Cthulhu-style paintings. After sorting out and conceiving, they discuss with the painter before hand-painted art design, and produce the character's three-dimensional perspective design and color settings. see (Figure 9, Figure 10, Figure 11)

Fig.9　*"Cthulhu"*

Fig.10　*"DeepOnes"*

Fig.11　*"The King in Yellow"*

Then enter the 3D animation character process, first use ZBRUSH to sculpt a fine high-polygon 3D character model. After the 3D high-model modeling is confirmed, it is imported into MAYA to re-topology the high-model model, referring to the distribution of human muscles. After generating a low-polygon model with a reasonable and uniform topology, then UV Unwrapping. Next import it into SubstancePaint for texture and material drawing. And return to MAYA, Integrate the textures and adjust the texture according to the PBR shader. At the same time, set the skeleton rig of the character for animation performances. Finally, according to the type of rendering engine, render the final 3D image as a reference for art style discussion and film post-production synthesis (Figure 12).

Fig.12　*"The King in Yellow" LookDev*

4. Rehearsal & Public Performances

In order to avoid wasting the working time of the crew, and hope to help the work efficiency during the official shooting, and eliminate the possibility of accidents as much as possible. The author read the script and rehearse by myself. By rehearsing in advance, adjust the dialogue of the characters, arrange the performance of the actors, and estimate the performance time (Figure 13).

Fig.13　*The author's preview and the actor official performance*

## 5. 4Dviews Shooting and Capture actors' performances

In order to show the interlacing effect of virtual and reality in the film. The author uses a large number of VR subjective perspectives to allow the audience and characters to feel the immersive at the same time. The actors in charge of performing VR virtual scenes must be scanned by the 4Dview volumetric capture system to obtain dynamic digital data for post-compositing processing (Figure14). Furthermore, while utilizing 4DViews enables swift acquisition of digital model data, there is a risk of interpenetration errors when actors wear or use transparent accessories. Additionally, the scanned digital data has limitations in resolution, and if the camera lens gets too close to the model, the issue of inadequate resolution becomes amplified. The character models may appear realistic but lacking in authenticity, resulting in the "Uncanny Valley" effect. Interestingly, this unnatural sensation contributes to enhancing the eerie and terrifying ambiance of the final production.

Fig.14　*Actor accepts 4Dviews scan*

6. Unreal Realtime Rendering

The animation part of this film is produced by real-time rendering using the Unreal game engine. First of all, the scene production and lighting setup are performed in Unreal, and the real-time rendering efficiency is extremely high. It can conveniently and quickly create the atmosphere of the scene, and then combine the 3D virtual character with the Alembic file format provided by the 4Dviews volumetric capture system (Figure15). Abbreviated as .abc, an opensource format developed by movie visual effects companies: ILM, Sony Pictures and Imageworks, which can import complex dynamic scene data into different software for use). Arrange the position of the character in Unreal, and record the movement trajectory through the VR helmet, complete the virtual camera movement, and then perform real-time rendering to generate the image sequence (Figure 16).
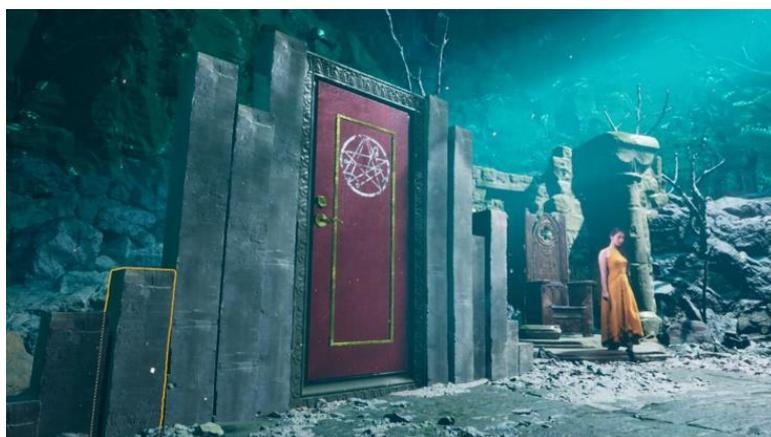
Fig.15　*Character digital data Combining UNREAL scenes*

Fig.16　*VR helmet to record camera move*

7. Image composite and Editing

The phase mainly deals with the combination of live-action shooting and UI design, using the subjective perspective of simulating the network camera and the live broadcast of Internet celebrities, allowing the audience to experience a feeling of hiding behind the Internet and peeping at others through the camera and screen. Finally, all the materials are integrated, including the complete video of actor shooting combined with special effects, animation sequence image files, standard characters, opening animation and end credits design, and sound effects and music, and are concatenated into a complete film through editing techniques (Figure 17).

Fig.17　*The effect of the concept short film*

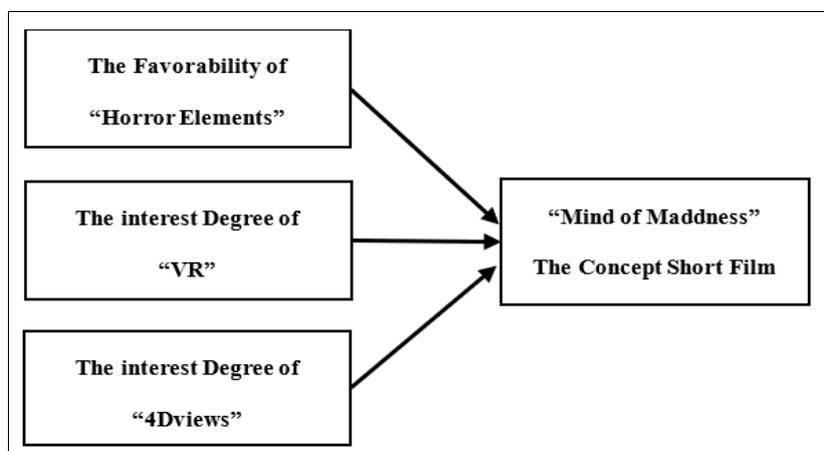## IV. Questionnaire survey and Analysis

1. Study Design and Analysis Architecture

This study is the first of its kind to combine VR and 4DViews technology with the concept of horror elements for the creation of a short film. It explores the impact of the film "Mind of Madness" on the subjects' emotions and perception. Since the creation type is a horror genre, it is extremely important to arouse the interest and love of the subjects. This study focuses on investigating the respondents' perceptions and preferences regarding three aspects: "The Favorability of Horror Elements", "The Interest Degree of VR" and "The Interest Degree of 4Dviews" (Figure18). The data will be collected through a questionnaire survey.

The purpose of this questionnaire survey is to explore the respondents' perceptions of a new creative work, a VR horror short film that incorporates horror elements, VR effects, and 4DViews technology. The study aims to assess whether these three aspects enhance the film's appeal and analyze how they contribute to the diversified development of the horror genre. Finally, based on the viewers' feedback and experiences after watching the conceptual short film "Mind of Madness" the study will analyze the potential positive impact of integrating new technological elements on the development of horror experiential works.

The integration of the creative work and research data in this study can contribute significantly in two aspects.

Firstly, it provides valuable insights into the value of VR and 4DViews technology for future research on VR horror short films in Taiwan. Secondly, it offers a reference for those interested in exploring VR horror concepts, by providing data on respondents' level of interest in VR and liking for horror elements.

Fig.18 *Analysis Architecture*

2. Survey tools

The aim of this study is to investigate the impact of three aspects - "The Favorability of Horror Elements", "The Interest Degree of VR", "The Interest Degree of 4Dviews" - on the respondents. A questionnaire survey will be conducted to gather data on these aspects. The survey method adopts electronic questionnaire.

The author uses questionnaire survey method and uses Likert scale to measure. In terms of the design of the questionnaire, the respondents answered the items stated in the questionnaire to understand their degree of agreement with the items stated, divided into strongly disagree, disagree, general, agree, and strongly agree. Integrate and quantify the questionnaire survey results and use SPSS version 26.00 for statistical analysis.

Firstly, the responses of all participants to the survey items were analyzed to assess the consistency among the research items, and the Cronbach's α coefficient ranged from 0.70 to 0.98, indicating good reliability of the questionnaire. Although the interest in VR content showed a coefficient of 0.694, which is very close to 0.7, it can still be considered as having good reliability (Table 1).Furthermore, the questionnaire will collect basic demographic data along with responses on the levels of "The Favorability of Horror Elements" "The Interest Degree of VR" and "The Interest Degree of 4Dviews" After consolidating and quantifying the data from the questionnaire, the quantified results will be presented using percentages and mean values ± standard deviation. Lastly, the Pearson correlation coefficient will be used to analyze the correlation between the three aspects: "The Favorability of Horror Elements", "The Interest Degree of VR" and "The Interest Degree of 4Dviews" with respect to the concept short film "Mind of Madness"

Table1. *Cronbach＇s α reliability table*

levels	Cronbach's α
The Favorability of Horror Elements	0.856
The Interest Degree of VR	0.694
The Interest Degree of 4Dviews	0.713
Reliability of the full questionnaire	0.865

3. Survey Results

According to the analysis of basic data from 85 valid questionnaires, the gender distribution showed that 67.1% were male and 32.9% were female. The age distribution was 0% under 17 years old, 76.5% between 18

and 30 years old, 15.3% between 30 and 40 years old, and 8.2% over 40 years old. The present study aims to investigate the impact of the short film " Mind of Madness " on the participants and explore their perceptions and preferences regarding the" The Favorability of Horror Elements " " The Interest Degree of VR " and " The Interest Degree of 4Dviews". Data were collected to further analyze these three dimensions using Pearson correlation coefficient. The findings suggest that these aspects positively contribute to the innovative expression in this genre, which can potentially facilitate the development of related themes and types in the future.

(1) The Favorability of Horror Elements

This research uses the concept short film "Mind of Madness" to obtain the audience's thoughts and the Favorability of horror elements. Survey **"whether you are interested in horror- genres works in reading, film and television, games and other entertainment activities"**, **"whether you feel fun when experiencing horror-genres works"**, **"do you like the horror genre of various creative expression"**. According to the results of the questionnaire survey based on Likert five equal scales, it is found "whether you are interested in horror- genres works in reading, film and television, games and other entertainment activities" is 3.9 ± 0.09;" whether you feel fun when experiencing horror-genres works" is 3.7 ± 0.14;**"do you like the horror genre of various creative expression"** is 4.2 ± 1.01. Based on the participants' liking for horror-related elements, the highest interest was observed in the category of "do you like the horror genre of various creative expression" However, in terms of "whether you feel fun when experiencing horror-genres works" the scores were relatively lower across all three dimensions. This might be attributed to (1) individual factors affecting the lower scores, and (2) the potential room for improvement in creating a more intense atmosphere and enhancing the art design in the production of this work. Considering the participants' liking for horror-related elements, the findings related to the "do you like the horror genre of various creative expression" from this study can offer valuable reference points for future creators or researchers in exploring diverse approaches in horror genre creations.

(2) The Interest Degree of VR

This research uses the concept short film "Mind of Madness" to obtain the audience's thoughts and The Interest Degree of VR. Investigate **"The Interest in VR experience"**,**" Have a lot of experience in experiencing VR"**, **"Use of VR equipment will enhance the experience of horror"**, **"Expect to use VR equipment to experience horror-genre works"**," The Interest in the VR effect presented in the content of Mind of Madness". According to the results of the questionnaire survey based on the Likert five-equal scale,"The Interest in VR experience" is 4.0 ± 1.00;"Have a lot of experience in experiencing VR" is 2.3 ± 1.14; "Use of VR equipment will enhance the experience of horror" is 4.5 ± 0.68; "Expect to use VR equipment to experience horror-genre works"is 4.2 ± 1.01;**"The Interest in the VR effect presented in the content of Mind of Madness"** is 3.7 ± 0.86. It can be seen from the data that the audience has high degree of interest and high acceptance of VR technology.

Based on the participants' interest in VR content, although they had limited exposure to **" Have a lot of experience in experiencing VR"** they showed great enthusiasm in **"The Interest in VR experience"** and **"Use of VR equipment will enhance the experience of horror"** and **"Expect to use VR equipment to experience horror-genre works"** These findings indicate that the development of horror-themed content in the VR market might be a promising and emerging direction. Furthermore, the participants expressed significant interest in **"The Interest in the VR effect presented in the content of** "**Mind of Madness"**" but slightly less than in other options (such as **"The Interest in VR experience" "Use of VR equipment will enhance the experience of horror"** and **"Expect to use VR equipment to experience horror-genre works"**). This result may indicate that the work still has room for improvement, such as enhancing the quality and refinement of the content. Overall, the study highlights the potential appeal of horror-themed content in the VR domain and suggests that further enhancements and innovations could lead to exciting developments in this area.

(3) The Interest Degree of 4Dviews

This research uses the concept short film "Mind of Madness" to obtain the audience's thoughts and preferences on adding 4Dviews content. Investigate **"the degree of interest in 4Dviews technology ","the expectation to using more 4Dviews technology to create horror works"**, **"The interest degree of the 4Dviews effect presented in the content of Mind of Madness"**. According to the results of the questionnaire survey based on the Likert five equivalent scale, **"The Interest Degree of 4Dviews technology"** is 4.2 ± 0.84;**"the expectation to use more 4Dviews technology to create horror works"** is 4.3 ± 0.85;**"The interest degree of the 4Dviews effect presented in the content of Mind of Madness"** is 4.0 ± 0.89. From the data, it can be seen that the audience has a high interest degree and high acceptance of 4Dviews technology.

Based on the participants' interest in 4DViews content, they exhibited a strong fascination with **"the degree of interest in 4Dviews technology "**, **"the expectation to using more 4Dviews technology to create horror works"** and **"The interest degree of the 4Dviews effect presented in the content of Mind of Madness".**" These high scores indicate that the research's innovative combination of VR and 4DViews in horror-themed conceptual short films could potentially be a promising and emerging direction for future development.

(4) The Relevance of Horror Elements, VR , and 4Dviews to the Concept Short Film "Mind of Madness"

The Pearson correlation coefficient was utilized to analyze the correlation among three aspects: **"The Favorability of Horror Elements" "The Interest Degree of VR"** and **"The Interest Degree of 4Dviews"** concerning the conceptual film " Mind of Madness"

After investigation, the correlation coefficient between **"The Favorability of Horror Elements"** and the expectation degree in this work is 0.0164 (P value is 0.133), which does not reach a significant positive correlation. The correlation coefficient of **"The Interest Degree of VR "**and the expectation degree in this work is 0.528 (The correlation coefficient between **"The Interest Degree of 4Dviews"** and the expectation degree in this work is 0.514 (P value is 0.000), which is a significant positive correlation.

The results indicate that, except for the **"The Favorability of Horror Elements"** which did not show a significant positive correlation with the expectation for the conceptual film "Mind of Madness" both **"The Interest Degree of VR"** and **"The Interest Degree of 4Dviews"** exhibited a significant positive correlation with the participants' expectation for the film. This suggests that further enhancement is required in developing horror elements for the film. However, the innovative incorporation of VR and 4DViews content has garnered a remarkably high level of interest, providing valuable reference for future developers and researchers in the field.

V.Conclusion

This research is the first of its kind to explore the creative integration of VR and 4DViews technologies with horror elements in concept short film development. The study aims to analyze the preferences and correlations of participants towards the film, including **"The Favorability of Horror Elements" ,"The Interest Degree of VR " ,"The Interest Degree of 4Dviews"** and **"The Relevance of Horror Elements, VR , and 4Dviews to the Concept Short Film "Mind of Madness"**.

The research findings indicate that participants showed the highest interest in the aspect of **"The Favorability of Horror Elements"** specifically in the sub-category of **"do you like the horror genre of various creative expression"** Regarding **"The Interest Degree of VR"** participants demonstrated extremely high interest in sub-categories such as **"The Interest in VR experience","Have a lot of experience in experiencing VR" "Use of VR equipment will enhance the experience of horror"** and **"Expect to use VR equipment to experience horror-genre works".** Similarly, in terms of **"The Interest Degree of 4Dviews"** participants

exhibited extremely high interest in sub-categories including **"The Interest Degree of 4Dviews technology"** **"The expectation to using more 4Dviews technology to create horror works"** and **"The interest degree of the 4Dviews effect presented in the content of Mind of Madness"**

Finally, in the **"The Relevance of Horror Elements, VR , and 4Dviews to the Concept Short Film"Mind of Madness""** there were significant positive correlations between **"The Interest Degree of VR"** and **"The Interest Degree of 4Dviews"** regarding participants' expectations for this film. Based on the overall results, it is evident that this film received higher levels of liking and interest in the aspects of **"The Favorability of Horror Elements"** ,**"The Interest Degree of VR"** and **"The Interest Degree of 4Dviews".** While the correlation with **"The Favorability of Horror Elements"** did not reach a positive correlation, significant positive correlations were found between **"The Interest Degree of VR"** and **"The Interest Degree of 4Dviews"** in relation to participants' expectations for the film. This indicates that there is room for improvement in the development and presentation of horror elements in this film.

However, the research data indicates that participants generally have a high level of liking for VR content and 4DViews content. Similarly, this film has garnered significant interest in the development of VR and 4DViews content, suggesting that future developments and creations, especially in new character development, may focus on VR and 4DViews. This could potentially be a new direction for future developments, providing valuable research references for developers and scholars.

This study combines the concept of horror elements with VR and 4DViews in the short film " Mind of Madness " and based on the research results, the following three directions are discussed and suggested: (1) The development of horror themes in the VR market may be an emerging direction; (2) There is still room for improvement in the development and presentation of horror elements in this work; (3) The level of interest in **"do you like the horror genre of various creative expression"** can provide valuable reference.

Firstly, regarding (1) the potential emergence of horror themes in the VR market as a new development direction, the high level of interest in VR and 4DViews content development in this film suggests that new creative works and VR/4DViews development may become emerging trends in the future. For this aspect, the study clearly explains the creative process involved in providing this direction, including methods of creation, script design, art design, character design, live-action shooting operations, 4DViews actor performance capture, Unreal real-time rendering, image compositing, and post-production processes. A comprehensive overview of the creative workflow is presented, offering detailed guidance and conceptual insights for future aspiring creators or research scholars interested in exploring this direction.

Secondly, as the correlation of **"The Favorability of Horror Elements"** did not show a significant positive relationship, we discuss (2) areas where this work can improve in the development and presentation of horror elements. Other influencing factors may come into play, such as Taiwan's definition of horror or its historical background. Taiwan's definition of horror often revolves around local folklore, cultural characteristics, customs, and contemporary events. However, delving further into the horror aspects unique to Taiwan, observing how Taiwanese people identify with these ideas becomes an essential and crucial issue. Taiwan has its own historical records, constantly striving to shed the label of "colony," and this historical experience has shaped the cultural identity of its people, leading to characteristics like self-doubt, lack of self-esteem and confidence, and the burden of traditional Han Chinese culture.

Consequently, a sense of "self-identity" may be lacking, and individuals frequently question their origins, asking, "Who am I? Where do I come from? Where am I going?" This quest for identity and facing the "unknown" while feeling powerless against external forces aligns with the thematic premise of "fear" in horror literature. Thus, the aspect of "interest in horror elements" in this study could be better explored through concrete representations

of the abstract aspects of the "unknown," "powerlessness," or "identity." Emphasizing Taiwan's unique horror elements in these dimensions may provide valuable insights for future research in related fields.

Lastly, regarding (3) the **"do you like the horror genre of various creative expression"** in this research, it can provide valuable reference value for further discussion and suggestions. Through the process of creating the concept film "Mad Mind," I gained a deeper understanding of the direction for the localized development of horror themes in Taiwan. Horror themes have remained popular and enduring due to human physiological responses and entertainment demands. In this study, I aim to infuse traditional horror elements with future-oriented technological aspects such as VR and 4DViews technology. By doing so, I hope to inspire the creation of more innovative works that blend different factors and explore the possibilities of developing new horror narratives. Utilizing refined visuals and captivating narrative techniques, I seek to explore the potential of new horror texts. The concept short film creates a virtual realm, offering an experiential platform for users to understand, feel, and imagine the prototype concept in an online environment. Additionally, through the concept showcase video, users can comprehend, experience, and imagine the possible outcomes of implementation. For instance, in a VR virtual reality experience, incorporating multiplayer connectivity to engage in thematic and real-time interactive gaming experiences. The ideal scenario involves users from different locations donning VR headsets to simultaneously enter the scripted environment. The virtual environment is interactive, allowing players to customize their status and appearance, assuming various roles. The game host acts as the creator within this virtual environment, controlling a broader range of elements and providing feedback based on the rules of player interaction.For individuals, this can be an exciting narrative experience, while for multiple participants, it can become a highly interactive live show. Audiences can observe the entire gaming process through live streaming and participate in discussions regarding character actions and storyline progression.

In conclusion, we hope that the process and findings of this research can provide other creators and researchers with a wealth of experiential and reference material, encompassing conceptual, intuitive, and technical aspects. By sharing our insights, we aim to inspire future endeavors in the realm of horror experiences, paving the way for new and expanded horizons and exploring the possibilities of interdisciplinary collaboration.The survey has revealed that participants universally express high praise and anticipation for the future development and interactive gaming potential of the project. Based on the creative approach and research significance of this work, it holds great potential for further development and interactive experiences in the future. Finally, we aspire that the data and information obtained through this research and creative process can be valuable reference points for interested individuals and entities in the industry and academia, particularly those seeking to fuse and innovate with relevant thematic elements. May this facilitate further advancements and innovations in the field.

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