

A Study of Development and Production of Relaxing VR Content

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Abstract

Virtual reality is being increasingly used for healing and therapy for mental health. In this study, we developed VR-based immersive content that enables virtual travel without the limitations of time and physical conditions. We aim to develop and produce VR content for relaxation and meditation using the beautiful natural scenery. To make realistic and immersive content, we took a video of natural sceneries with a small UAV connected to a VR camera. The content was developed through stitching, video editing and post-processing of the initially captured video data, and then the created VR video was inserted into the VR device. The produced content will be helpful for stress and used to heal the mind and body of exhausted modern people by providing the place with great scenery and sound in an immersive way at any time.

Keywords: Virtual Reality, Augmented Reality, eXtended Reality, Immersive Contents, Healing VR

1. INTRODUCTION

Recently, the demand for medical services has been increasing due to the advent of the aging society and psychological diseases caused by intensifying competition. Virtual Reality technology is emerging as an alternative to psychotherapy and nurturing medical professionals to respond to these changes. VR is a technology that makes you feel as if you are in a different place from reality by generating similar perceptual stimuli. In the United States and Europe, therapy using VR is being applied to cognitive-behavioral treatment for patients with social anxiety, social phobia and aerophobia [1]. Significantly, as the number of employees who are physically and mentally stressed caused by the COVID-19 pandemic increases, the demand for healing VR that can provide both healing and well-being at the same time is increasing, and accordingly, the market value is gradually increasing [2].

After 'Pokémon Go' based on Augmented Reality drew explosive attention worldwide in 2016, interest in immersive content such as Virtual Reality and Augmented Reality has been increasing. Cafes, where people can experience immersive content while enjoying drinks, have been launched and as famous creators and celebrities have experienced it, they gained public interest and enthusiasm [3].

The non-face-to-face culture pandemic has increased the demand for immersive content such as VR, AR and meta-verse that can be experienced without directly seeing and touching [4]. One of the reasons for immersive content to be highlighted is that it can be applied to all industries, including manufacturing, construction, education, national defense, medical care and culture.

As interest in improving individual happiness and quality of life increases, the need for experiences for relaxation and healing of mind and body and realistic content for this purpose is increasing. However, there is

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very little immersive VR content created for meditation and relaxation. In addition, existing VR images are often made with the feeling of looking around in the place rather than experiencing the site because the camera is fixed at a specific location to shoot. In this study, we intend to create relaxing VR content for relaxation and meditation by shooting the beautiful natural scenery of Jeju Island in a realistic and lively manner.

2. RELATED STUDIES

Immersive content refers to next-generation digital content that provides a high sense of realism through the characteristics of immersion, interaction and intelligence. Immersive content includes Virtual Reality, Augmented Reality, Mixed Reality, Projection Mapping, Interactive Media and Hologram [5]. Such realistic content is emerging as an innovative technology in the education field. It is easy to secure safety and efficiency because it is possible to indirectly experience situations that are dangerous, expensive, or impossible to share, such as disaster training or space travel [5]. Table 1 shows the core technologies of immersive content.

Table 1. Major Technology of Realistic Content

Technologies	Main features [6]
Immersive visualization	<ul style="list-style-type: none"> • Technology that provides users with an immersive virtual reality environment • Visualization device technology such as HMD and projection, Image visualization technology software
Immersive interaction	<ul style="list-style-type: none"> • Technology, based on the user's five senses that correspond to input/output between virtual reality participants and the system • Motion-based simulator, location tracking of virtual reality participant, tactile, haptic, olfactory and taste-related technologies
Virtual Reality environment production and simulation	<ul style="list-style-type: none"> • Technology that creates a virtual reality environment based on 360-degree panoramic images or restoration • Provide scenario-based immersive visualization and interactive environment for virtual reality participants

2.1 Types of immersive content

Immersive content can be divided mainly into VR (Virtual Reality), AR (Augmented Reality), MR (Mixed Reality) and XR (eXtended Reality), including all functions of VR, AR and MR.

Immersive content is being used in various fields, including education, medical care, tourism, movies, performances, automobiles and aviation, as well as in the cultural industry. Without limiting watching and listening to video content on a fixed screen, experiential marketing content that utilizes sensory, emotional, cognitive, behavioral and relational elements beyond sight and hearing is gaining popularity. Table 2 shows the definition of immersive content technology.

Table 2. VR, AR and MR Technology

Fields	Definitions [7]
VR (Virtual Reality)	<ul style="list-style-type: none"> -Meaning that only 100% virtual reality space that is contrary to reality is visualized -Maximize immersion through realistic virtual space
AR (Augmented Reality)	<ul style="list-style-type: none"> -Unlike virtual reality, it means actual reality, A form in which additional information is superimposed on the projected reality
MR (Mixed Reality)	<ul style="list-style-type: none"> -Meaning both real and virtual reality -MR is to place a virtual object in the real space or to construct a virtual space around a real object by recognizing it.

Virtual reality(VR) is a technology that makes people feel that they interact with actual reality, which is difficult to experience in their daily lives without directly experiencing it. Virtual reality provides an immersive and realistic environment [1].

Augmented reality(AR) refers to a system and related technology that provides virtual information about space and situations by superimposing virtual objects (e.g., objects, texts, videos) created through computer modeling in the natural environment [8].

Mixed reality(MR) is a combination of VR and AR technologies. It maximizes the user experience by taking the strength of AR, such as the three-dimensionality, immersion and the sense of reality. By synthesizing the reality in front of the user and computer graphics(CG) in real-time, an overwhelming sense of presence that conveys the feeling as if the actual object exists in front of the user can be realized. In addition, it provides an immersive feeling like you are in virtual reality because it allows the user to observe an object from all angles [9].

Extended Reality(XR) includes all immersive technologies such as Virtual Reality, Augmented Reality and Mixed Reality. It is a technology that enables an experience similar to reality (realism) by applying digital content sensory technology [10]. XR is used to virtualize the patient's condition and identify the exact surgical location for treatment or conduct sports events, concerts and fairs in a virtual space. In addition, as the demand for contact-free exhibitions, tourism and travel is rapidly increasing, XR technology is changing the way we work and enjoy life in the noncontact culture [10].

Meta-verse is a compound word of 'meta' meaning virtual and transcendence and 'universe' meaning a three-dimensional virtual world. Meta-verse is a concept that has evolved one step further than VR. Metaverse is characterized more than just enjoying games or virtual reality using avatars but engaging in social and cultural activities like actual in real-world [8].

2.2 Cases of Immersive Content

Representative examples of the application of immersive content in Korea include VR and AR-based fire suppression (firefighter) education and training content and global healing and travel VR content.

As buildings become more extensive and taller, as well as with the tendency to go underground and to be complex, and at the same time, with the advent of new fire-fighting objects, the types of disasters are becoming more diversified and complicated day by day. Due to environmental changes such as an expansion of fire-fighting activity areas, an increase in disaster risk factors and the complexity of on-site response technology, firefighters' frequency of exposure to risks and accident factors at disaster sites has increased. For this reason, since reality-based training cannot be provided, VR/AR-based response training contents have been developed and used for training [11]. The realistic training content created by ETRI was produced as fully immersive experiential content using multi-sensory interface technology.

As interest in the pursuit of personal happiness and improvement of the quality of life has steadily increased, healing, which enjoys relaxation and leisure, continues to gain popularity. Healing VR content was developed with the purpose of providing peace, anxiety reduction, and emotional stability to people who are under severe pressure and stress in their busy lives. Nature Treks gives users the feeling of walking in nature with mystical nature themes and sound effects that purify their minds. Users can choose and experience the theme they want from among 12 themes such as dense forest, sea and space. In each theme, users can also experience activities to adjust the weather, make stars and grow trees and flowers. In other words, users can create the world they want in VR and experience relaxation in nature outside of everyday life.

Research and development of immersive content are continuously being carried out abroad as well. Lockheed Martin used Microsoft's AR device, HoloLens, in the production and design of spacecraft, including the Mars rover, starting from 2018. The company's space division has been experimenting and researching ways to use augmented reality for the past five years. Recently, they have begun experimenting with AR in the

manufacture of a spacecraft, Orion, being built for NASA to travel to Mars. As a result, the drilling process was shortened from 8 hours to 45 minutes, and the panel insertion process was shortened from 6 weeks to 2 weeks [12].

Workers assembling wind turbines at GE's Renewable Energy parts plant in Florida, USA, wore smart glasses to perform remote maintenance. The smart glasses are equipped with AR software Upskill's platform Skylight, and the remote maintenance was supported by streaming the operator's view of the site in real-time to a specialist in another space. Experts can grasp the situation as if they were in the field and deliver specific instructions to workers, and assembly using educational videos or digital manuals is possible [13].

2.3 Small UAV

An unmanned aerial vehicle(UAV) is a vehicle without a human pilot aboard. Nowadays, the most popular unmanned vehicles are drones. Generally, unmanned aerial vehicles used for aerial photography can be divided into fixed-wing type drones and rotary wings type drones.

A fixed-wing type drone looks like a small airplane, uses the lift force of air acting on the fixed-wing for flight. The advantage of fixed-wing drones is that they consume less fuel and thus have a longer flight time. However, it is challenging to take low-altitude and oblique shots because a runway is required and stopping a flight is impossible. Therefore, it is mainly used for surveying because it is advantageous to take vertical shots while flying for a long time at high altitudes.

On the other side, a rotary-wing type drone similar to a helicopter is capable of vertical take-off, landing and stationary flight. In addition, it is possible to shoot in a narrow space and has the advantage of being able to shoot vertical and inclined images. However, the disadvantage is that the flight time is short because electricity must be consumed continuously to stop and fly. Figure 1 shows Types of small UAVs called drones.

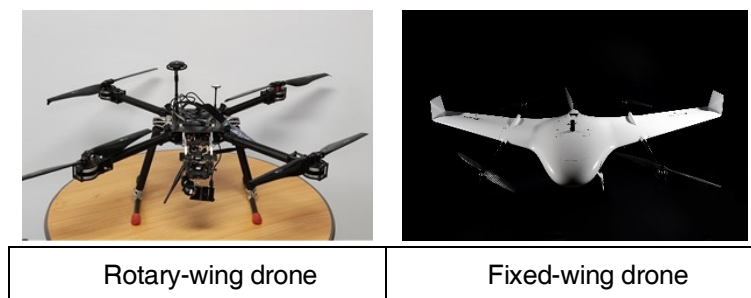


Figure 1. Types of small UAVs

3. DEVELOPMENT OF RELAXING VR CONTENT

3.1 Content concepts

People go on vacation somewhere in the forest or the sea to escape the tiring life of the city. People have a longing for an island that is not easily accessible. They get psychological stability and rest through the awe of the clear sky and nature on an island. The three concepts of forest, sea and sky frequently appear in VR content for healing. [14]. By applying VR time-lapse technology, we created content that allows users to experience the visual beauty of Jeju Island. Using visual color and sound effects, we created content that is effective for the relaxation of the mind and body. In addition, a technology that allows easy content operation through tablet control is applied.

Moreover, the overall concept is set as mountains, forests, valleys, sky, sea, etc. It provides opportunities for direct experience that presents a time for relaxation and time with the beautiful nature of Jeju Island to

people of various ages who have not been able to experience it due to physical limitations, time limitations and access restrictions in the real world. Figure 2 shows the planning intent of VR virtual experience contents.

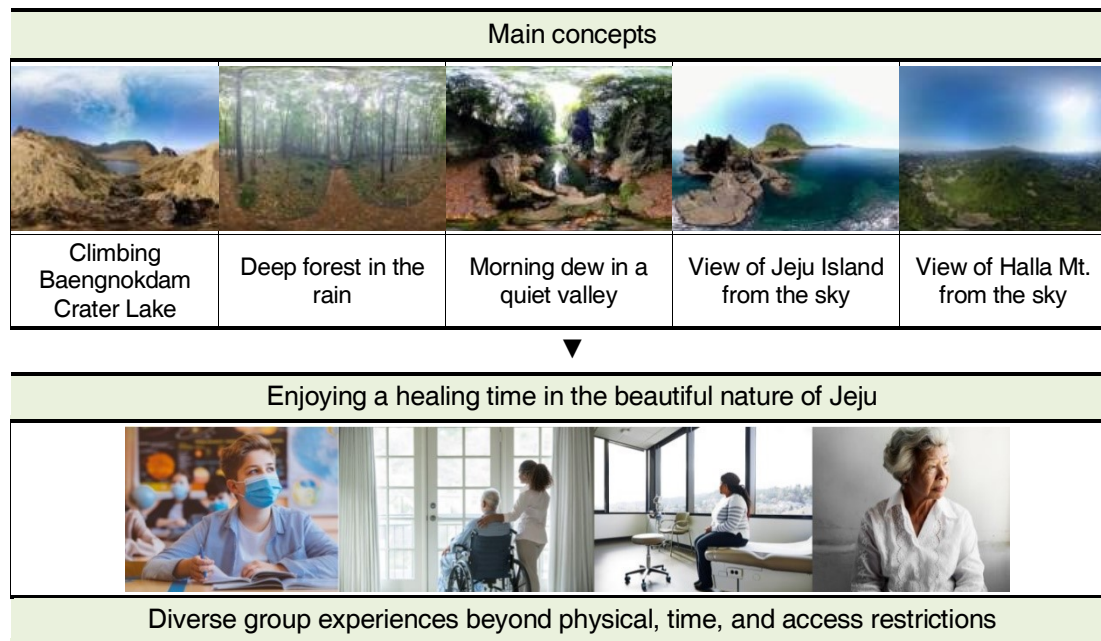


Figure 2. Planning Intention of VR Virtual Experience Content

3.2 Process

Beautiful sceneries in Jeju Island were produced as VR virtual experience content. The forest, sea and sky, which the general public prefers most for healing, were selected as the filming targets. The image collection was taken by attaching a VR camera to a small UAV rather than the conventional method. Data collection stitching was performed because the 360 VR image had to be matched so that images taken with multiple lenses could be viewed as one. And then, VR images were edited using each stitched VR image source. When shooting the VR video using a small UAV, there is no function of a gimbal to adjust the camera’s level, so it is necessary to readjust the numerical value according to the horizon imbalance during post-production. In the next step, color correction and CG work were performed and background music and sound effects were inserted to correct and edit the video. Finally, the completed VR content was applied to PICO as a VR video device to experience it. Figure 3 shows the VR virtual experience content creation process.

Step 1	Planning	<ul style="list-style-type: none"> • Drafting Scenario • Filming Location Selection • Establish a shooting schedule
Step 2	Shooting	<ul style="list-style-type: none"> • Video recording by attaching VR camera to the drone
Step 3	Data Collection and Stitching	<ul style="list-style-type: none"> • Matching VR footage to a single 360 image
Step 4	Video Editing	<ul style="list-style-type: none"> • VR video editing using each matched VR video source
Step 5	Correction	<ul style="list-style-type: none"> • VR video master copy through sound and color correction
Step 6	Apply to VR device	<ul style="list-style-type: none"> • Apply the completed VR image to the VR image device for the experience

Figure 3. VR content creation process

3.3 Methods

Aerial images for VR virtual experience contents were filmed using drones. In this study, a rotary-wing drone that can take pictures of the beautiful scenery of Jeju Island from various angles was used. A VR camera was installed on the rotorcraft drone to enable 360-degree video shooting. Omni of GoPro© was used as the VR camera.

Autopano of KOLOR© was used for VR stitching, and then Premier pro of ADOBE© was used for VR image editing. The editing process of making the original video source into immersive content is as shown in Figure 4 [15].

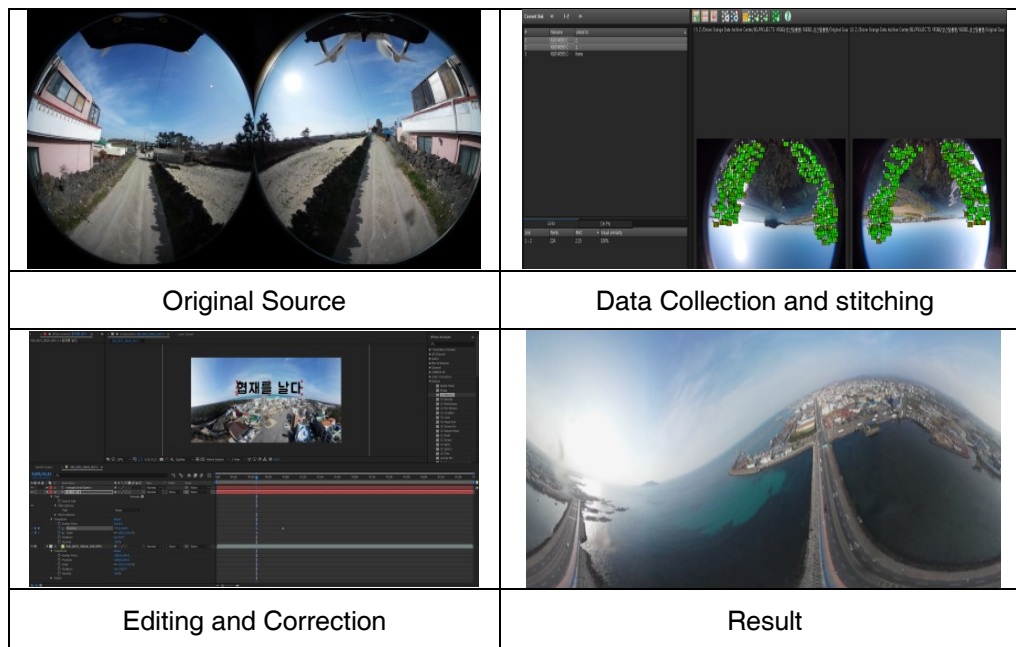


Figure 4. Example of video editing

Image editing and sound work were performed using an image editing program. And color correction was performed to apply color therapy. The primary colors of visual content are mainly composed of blue and green areas so that the primary colors can exert a visual therapy function to improve emotional stability and sentiment. Green color supports balance, harmony, nature acceptance and love. Blue color increases calmness, love, kindness, truth, inner peace.

As the primary colors for each content, ‘forest’ was assigned as green, ‘sea’ as blue and ‘sky’ as blue and green. Also, white noise, such as wind in a deep forest, water in a valley, waves and rain, triggers an Autonomous Sensory Meridian Response (ASMR). Using this, a healing content capable of visual and auditory therapy was produced to increase psychological stability and concentration.

Advanced VR production techniques were introduced to provide a high level of experience in times and places including skies that are not easy to experience. And the contents were produced using the panoramic view of Jeju from the sky, the deep forest at dawn, the valley and the mood of the rainy woods.

4. RESULTS

4.1 Relaxing VR content

The developed content consisted of three sessions: Forest Content, Sea Content and Sky Content. The

playback time was 15 minutes, and the format was saved as a video file. Figure 5 is snapshots of the relaxing VR contents with the theme of green forest. The forest VR were applied by adding sound effects, such as birdsong and grass bugs. Users can listen to the breathing guidance for meditation and the sounds of nature to help with meditation. Even if the user closes their eyes for meditation, the user can feel the feeling of meditating in the arms of beautiful nature through the visual image and hearing of VR.

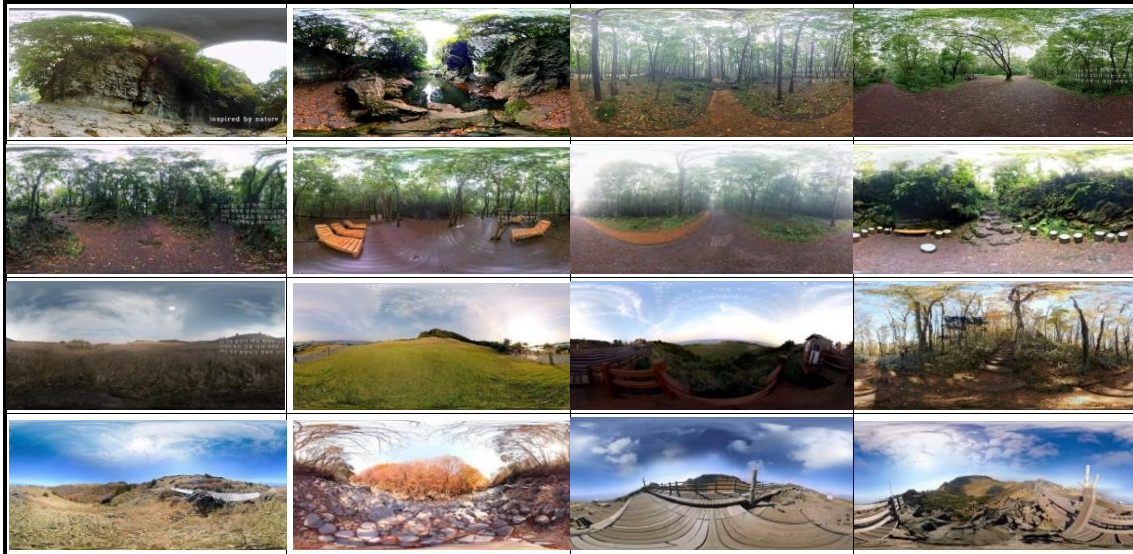


Figure 5. Snapshots of VR with the theme of forest

Figure 6 is a snapshot of the relaxing VR contents with the theme of the blue sea.

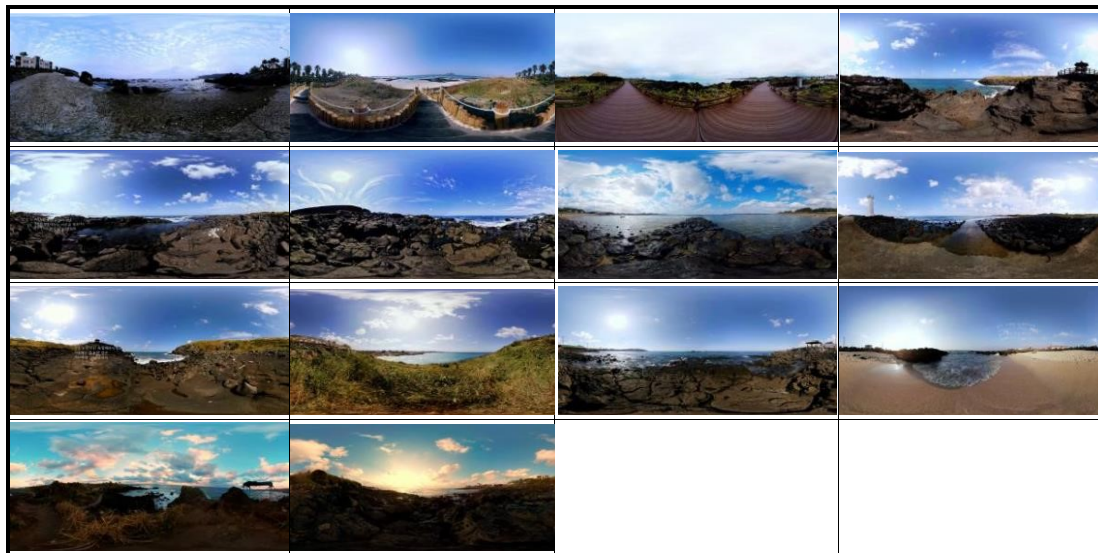


Figure 6. Snapshots of VR with the theme of the sea

Figure 7 is a snapshot of the relaxing VR contents with the theme of the aerial view of the sky.

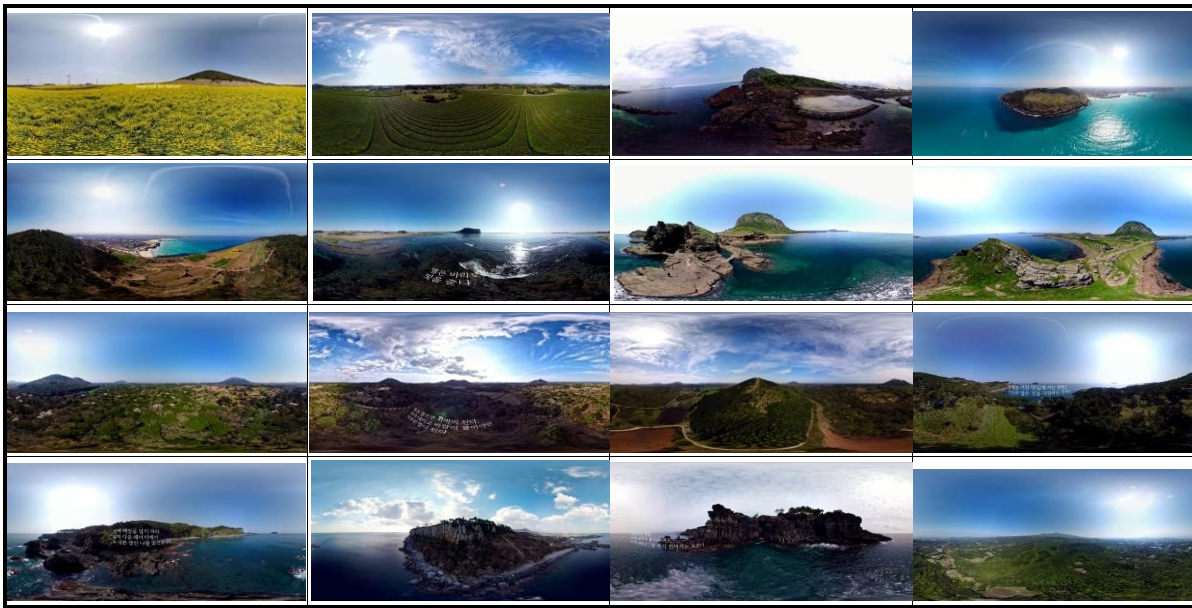


Figure 7. Snapshots of VR with the theme of sky

4.2 Content Experience Flow Chart

The produced relaxing VR content was inserted into a VR device and provided to experience it. The way to experience the overall content is as shown in the figure below. On the VR experience screen, three types of content can be selected and experienced.

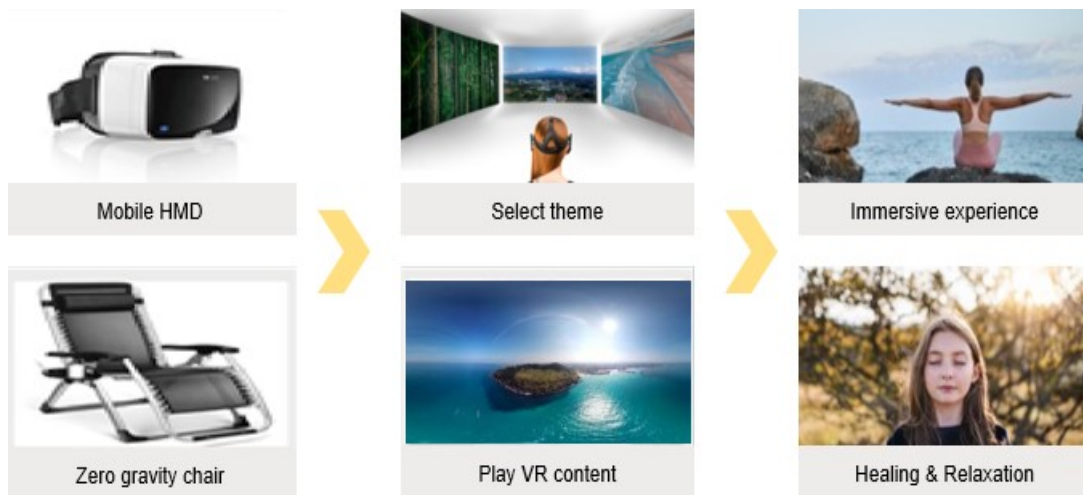


Figure 8. Content Experience Flow Chart

4.3 Features of the Developed Content

The developed VR healing contents have the following characteristics that distinguish them from existing VR contents. It was creating content that can relieve mental and physical fatigue by experiencing the beauty of the healing course through virtual reality content and experiencing physical/psychological healing. Using the latest VR cameras and drones, the beautiful scenery of nature viewed from the ground and the sky is transformed into VR content. It serves to share the feeling of fun and enjoyment through experience.

In addition, to meet the needs of users who want to rest, comfortable visual and auditory elements are composed and directed relaxing contents such as forest, sea and sky in Jeju Island with non-stimulating experiential contents. Furthermore, users can slowly enjoy realistic experiences like endorphin generation purposed experiences or slow experiences of rest as if they were in various fantastic places in Jeju Island. Therefore, the content was produced to provide comfort through visual and auditory immersion to relax muscles and relieve stress. Also, it was made to experience physical and psychological healing, such as physical recovery and meditation through new surprises.

5. CONCLUSION

In this study, a camera rig that can be mounted on a small UAV was manufactured to enable shooting at a low altitude and from a long distance. In addition, VR content about the beautiful natural sceneries of Jeju Island was produced to enable more realistic experiential rest. We have created VR contents of representative beautiful places and nature in Jeju Island and developed VR healing experience contents that can be operated and experienced through tablet control so that anyone can efficiently handle it. In addition to healing contents through nature, various healing elements such as graphics and CG are combined to facilitate the production and application of additional contents. Especially since it does not require complicated installation and wide space and people of all ages or any gender can easily operate and experience it, we created SLOW experience content for rest and healing. The developed content enables anyone to relax and meditate in the beautiful nature of Jeju Island without being restricted by physical disabilities or places. Providing the best location and sound in an immersive way, it is expected to be used as content that heals the tired mind and body of modern people.

This study is to develop experiential VR content for meditation and relaxation using only a small UAV. It has not been verified how this experience affects the healing of the mind and body. In the future, it is necessary to develop customized content optimized for an individual's physical and mental state and research its healing effect.

REFERENCES

- [1] H.S. Chun, "Application of Virtual Reality in the Medical Field," *The Journal of the Electronics and Telecommunications Trends*, Vol. 34, No. 2, p. 20, April 2019.
- [2] S.Y. Choi, S.J. Kim, N.Y. Lee, et al., "Development of VR Healing Content 'NORNIR' Using Color Therapy," *The Journal of the Korea Computer Graphics Society*, Vol. 26, No. 3, pp. 143-153, July 2020.
- [3] ETRI Webzine, Electronics Telecommunications Research Institute, Vol. 180, July 2021. <https://www.etri.re.kr/webzine/20210723/sub01.html>
- [4] P.H. Kim, "Local governments are 'excited' at the immersive content," IT Chosun, 2021.05.05, http://it.chosun.com/site/data/html_dir/2021/05/04/2021050401364.html
- [5] Y.S. Shim, "Technology Trends of Realistic Contents and Application to Educational Contents," *The Journal of the Convergence on Culture Technology (JCCT)*, Vol. 5, No. 4, pp. 315-320, Nov 2019. [3]
- [6] S.J. Kim and E.J. Kim, "The Use of Virtual Reality in Psychiatry: A Review." *The Journal of the Korea Academy of Child and Adolescent Psychiatry*, Vol. 31, No. 1, pp. 26-32, Jan 2020.
- [7] H.Y. Kim, "The Untact, the Direction of Immersive Content Technology," *Weekly ICT trend*, No.1972, p. 5, Nov 2020.
- [8] S.W. Im and K.W. Seo, "KISTEP Technology Trend Brief," *AR/VR technology*, No. 2018-09, p. 2, Sep 2018.
- [9] J.Y. Back, "Mixed Reality (MR) Technology Trends," *Weekly technology trend*, p. 16, Feb 2019.
- [10] K.T. Lee, "eXtended Reality Convergence technology trend," *The Journal of The Korean Institute of*

Communication Sciences(JKICS), Vol. 37, No. 10, p. 17, Sep 2020.

- [11] J.W. Moon and H.J. Kang, "Analysis of Usage in Education and Training Field utilizing Virtual /Augmented Reality(XR)," *Issue Report*, National IT Industry Promotion Agency, No.2020-19, pp. 15, Dec 2020.
- [12] H.S. Nam, H.G. Kim and S.H. Lee, "A Study on How to Foster Realistic Industries in the 5G Era-Policies for Immersive Industry Development," *Research Report*, Software Policy & Research Institute, RE-091, pp. 71-73, Jan 2020.
- [13] K. Klobardanz, "Looking Smart: Augmented Reality Is Seeing Real Results in Industry," *GE Reports: The future of work*, General Electronics, May 2017.
- [14] H.C. Kim and H.W. Kim, "VR experience content production for implementation of healing health service," in Proc. The 7th International Integrated Conference & Concert on Convergence, pp. 101-102, July 22-24, 2021.
- [15] H.C. Kim and M.J. Kim, "Implementation and Production of Tourism VR Contents Utilizing Small UAV," in Proc. The 7th International Integrated Conference & Concert on Convergence, pp. 97-100, July 22-24, 2021.