

A comparative analysis of user interface through virtual reality media art works case analysis

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Abstract

Virtual reality technologies are applied in various fields at home and abroad. Some renowned media artists create artworks by making good use of virtual reality technology. Some artists create their artworks focusing on virtual reality and augmented reality. There were some studies on virtual space and real space but due to development of virtual reality technology using advanced technology has increased. Virtual reality media artworks interact with viewers with physically changed by a user. In this process, interface is composed properly. Advanced technology helps a user to experience virtual reality, psychological change and modify artworks physically. Virtual reality's interface allows a viewer to be immersed in contents and to interact with artwork through sensuous experience. Interface embedded in such artworks provides a user with various information and explains situation of virtual reality space. This paper analyzes and examines media artworks that virtual reality technology is applied centering on artworks implemented as VR art platform.

Keyword : Virtual reality, media art, VR art platform, artwork, UI

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1. Introduction

Rapid progress of advanced technology in today's society allows men to acquire information more easily. Virtual reality receives a particular attention from many fields as well as computer experts. Virtual reality system has appeared in movie, game, model house, education and medical simulation which introduced virtual reality. Virtual reality means men going around empty space seeing, hearing, touching and operating objects that actually do not exist believing they exist. Virtual reality which deserves to be called next generation interface is not fictitious. Virtual reality is closely related to our everyday life. Virtual reality is likely to be used in various fields. This study will cover virtual reality interface shown in media artworks. Virtual reality interface should be made so that a user can be immersed in virtual reality beyond implementation of graphic elements such as icon, layout and colors. Virtual reality interface requires extensive knowledge including programming, ergonomics and cognitive psychology. Virtual reality technology that can provide virtual real space namely three dimensional space is used in media artworks. This study will look into media artworks examples implemented as VR art platform and analyze virtual reality interface.

2. Interface and virtual reality

2.1. Definition of interface in virtual reality

Interface refers to access, boundary, contact area and relay device. Interface has a meaning of harmony or interaction. Interface in virtual reality is area where a user contacts. Interface allows a user to use any machine or device efficiently and a user and a machine to interact each other. Considering such actual meaning of interface, man made media around us such as mobile phones, cars, cameras, door handle and key hole can be called an interface. Nowadays, meaning of interface has been used in computers a lot[1]. Such interface shows space in a manner that a user can use it easily in media artworks. Interface in media art refers to a method which shows a user space and should make it possible for a user to understand space easily and comfortably while navigating space and give a strong impression on a subject. In other words, interface in media art should make virtual environment which is visually attractive and users can get information more rapidly they need[2]. Interface should be designed so that it fits human body and senses as men use it. Therefore, aesthetic and engineering programming should be intervened in an interface so that user and system can communicate more

effectively[3].

Virtual reality allows a user to see, hear and touch an object existing as computer data and feel reality in infinite artificial world created by using computers[4]. A user controls an object by using HMD and VR related controller in three dimensional environment by using consolidated application of input mechanism or computers that can sense motion and advanced technologies for interactive three dimensional modeling and simulation[5]. Virtual reality is defined as advanced technology that creates virtual environment by using computers allowing a user to communicate in three dimension. Virtual reality refers to technology that expresses phenomenon which actually does not exist by causing delusion of human senses[6]. Virtual reality is innovative technology that embodies models in three dimension on computer and explores in such environment and leads interactive environment. In other words, virtual reality allows a user and an object to interact with each other and a user to experience artificial world by deluding human sensory systems. Virtual reality can be viewed as a form of interface with characteristics of environment simulation which is partly controlled by men. Existing interface is just continuous reproduction of images depending on produced images providing users with passive experience only. On the other hand, in virtual reality, three dimensional figures interact with men, provide lots of information implementing situation a man wants in virtual world created as a man intends. Virtual reality technology intends to create virtual reality by setting and combining senses such as voice, touch and smell virtually using computers.

2.2. Interface design analysis elements in virtual reality

Elements that are needed to analyze virtual reality interface are organized based on existing interface design analysis. Classification of design elements composing interface varies among researchers but elements most researchers presented include navigation, graphics, text, color, layout, spatial structure and multi media[7].

Navigation structure is conceptual and practical model which comprises contents of virtual reality space. Properly designed navigation that allows users to use easily forms a very important factor leading virtual reality space successfully. Elements that can give a help to navigation namely navigation tools are icon and menu bar can deliver meaning rapidly and induce user's behaviors. For navigation design, it should be possible for visitors to understand present location and inform visitors where they have to go.

Graphic elements of pictures and other images should arouse consumer's interest as greatest element drawing user's attention. Visual image draws attention and arouses interest as it is more immediate than

characters and its contents are implicative and symbolic. Resolution and size of graphics in virtual reality have a direct influence on computer processing speed. Resolution refers to pixel size of graphics. As resolution is higher, amount of data to be processes increases making computer processing speed slower. It is important to determine picture's size fitting popular HMD screen size because graphics are likely to appear different depending on HMD screen owned by users.

Texts should be put into interface delivering information easily and rapidly as means of basic information delivery and keeping in good harmony with other elements. Typography in virtual reality has several technological constraints. However a designer creates considering aesthetic and functional aspects, shapes vary depending on user's HMD use environment and a user can change environment as he pleases. However, such problems can be solved in some degree by changing characters to images using graphic tools.

Another important problem in interface design is colors. Colors play a great role in establishing images of space or brand by their powerful visual stimulation and psychological association. Senses men can feel through colors are quite subjective but have some universality. For example, when a man sees red, he associates red with fire, love, apples and blood. Blue brings up the image of sky, sea and firmness. When certain color stimulates common associations among all men, such color plays a role as a symbol or a sign. Therefore using proper colors can draw user's attention and increase an interest. For example, information of the same kind can strengthen uniformity and organization of interface and make a strong impression by applying systematic color planning depending on nature and content of information using the same color[8].

Layout refers to formation and placement of picture. In other words, layout places texts or photographs to be delivered to people on space determined in printing or visual media. In case of multi media layout design including printed matter, both functional aspect and visual aspect should be considered. A designer creates layout design considering how components in a picture should be placed to effectively deliver its contents to users. Multimedia users usually treat multimedia products in the same manner that they see printed matters. For example, a user tends to see from top left to bottom right. Content highlighted is considered more important. Things at the top are considered more important than those at the bottom. In creating layout design, a designer needs to consider habits of users so that they can acquire information more easily and quickly.

Spatial structure aims to create a good interface by placing information which users want and providers intend to deliver properly. In order to design spatial structure, a designer should clearly understand what a user wants and relevant information should be located in a clearly visible place .

The foremost part in space should draw user's attention as a user sees first in space. The most important content should be placed at the center of a picture to draw attention. Visual elements should be placed in a part which can be seen from any circumstance taking picture's size into consideration so that visitors can use information easily. If important information is located in a place which is difficult to be found, its function as information is likely to be weakened.

Multi media digitize information formed as several types of media such as characteristics, graphics, figures, sound and images and unify them with a computer. Multi media are interactive. Multi media technologies that allow recipient and supplier to interact with each other are widely used in various areas including industry, education and entertainment in digital information age. Multi media technologies are of great help in attracting users attention as they can provide various information including pictures, characters, sound and video[9].

3. Media artworks that make use of virtual reality

As virtual reality technology and augmented reality technology have developed and gained popularity, some artists have made good use of such technologies in creating media art. Among such cases, Acute Art, VR art platform has produced and displayed artworks that technology and artistic expression are combined. Acute Art creates artworks through virtual reality and gives a demonstration of them by means of App Store, Google Play, HTC Viveport, and Steam free of charge. Artists who participated in Acute Art are Christo & Jeanne-Claude, Marina Abramovic, Jeff Koons, Anish Kapoor, Olafur Eliasson and Jakob [10]. This paper will cover artworks by above mentioned artists to find out how virtual reality has been used in their artworks.

Christo Vladimirov Javacheff was born in Gabrovo, Bulgaria on June 13, 1935. Jeanne Claude was born in Casablanca, Morocco on June 13, 1935. They married in 1962 and worked together on lots of projects. They represent land art. Recently, they initiated a large project. They install media on natural environment or surface. It takes them long hours to complete their artworks as project's scale is immense or their project requires permission from relevant authorities.

The London Mastaba (Project for London, Hyde Park, Serpentine Lake) by Christo & Jeanne-Claude allows a user to appreciate artwork at a distance in virtual reality space. Above artwork was displayed as main project at Serpentine Gallery in London from June 18, 2018 to September 9, 2018 entitled 'Christo and Jeanne-Claude: Barrels and the Mastaba 1958-2018'. 7506 drums are used in above artwork. Aforementioned artwork consists of red, white, blue and purple. Drums are piled into 20 meter high

rhombus. Above artwork floats on water by using high-density polyethylene cubes[11]. Above artwork will be dismantled from September 23, 2018 and its components will be recycled. Artwork created based on virtual reality technology is being demonstrated at present[12]. This allows viewers to appreciate artwork in virtual space through VR platform by moving actual artwork to virtual space.



[Fig. 1] Christo & Jeanne-Claude, The London Mastaba, 2018



[Fig. 2] Marina Abramović, still from Rising, 2017. Courtesy of Acute Art

Rising by Marina Abramović implies that sea level is rising due to climate change by means of images. A user who experiences virtual reality wearing HMD is faced with an artist making a gesture in glass cistern which water is filled. When user's hand and artist's hand contact each other, glacier in

the polar region collapses melting. An artist induces users to think about an influence of climate change on environment through above artwork. An artist asks users to choose whether they are submerged under water by preparing environment lowering level of glass cistern[13]. Marina Abramović, performance artist expresses space and time through experimental performance. Through this artwork, existence as artist moves to another level. Developers perform work after modeling by capturing distinctive facial expression. Virtual reality technology is used as a tool through which an artist and a user interact with each other. An artist meets and communes with users in virtual reality. This places emphasis on artist's avatar as medium for an artist to commune with users. Artist's avatar plays a role as interface in virtual reality space and has elements to give users rights to choose or lead a story. At the end, texts are shown and interacting with users is validated.



[Fig. 3] Anish Kapoor, stills from *Into Yourself - Fall*, 2018. Courtesy of Acute Art

Into Yourself - Fall by Anish Kapoor is about a journey through human body in virtual reality space. Above artwork arouses dizziness through simulation which moves human body like a maze. Once users begin journey in a forest, they are faced with large unconscious space in a vacant ground near trees. They pass through a tunnel made up of walls looking like muscles. Anish Kapoor induces users to experience surrealistic senses exploring the unknown world. The artwork is developed around a concept which actual experience is made through journey of virtual space. Users have experience of wearing HMD. Virtual reality technology arouses transcendental sensibility along with tactile sensation. Virtual reality technology allows a user to move to virtual reality in his body with sound[14]. All

progresses follow narrative which is essential. An artist presents a direction based on existing VR works pointing out narrative as a problem. Above artwork is designed based on dizziness that occurs when using HMD. Above artwork begins with bright forest and then viewers are drawn into indoor space stained with blood. Artist thought that experience gained from artwork belongs to boundary between reality and illusion. Above artwork is created based on design elements of interface making use of virtual reality minimizing elements which are unnecessary for user's experiencing artwork.



[Fig. 4] Jeff Koons, Talking VR and Phryne, 2017

Jeff Koons is famous for kitsch artworks[15]. Talking VR and Phryne using virtual reality technology was created based on Phryne, artwork. Phryne named after the most beautiful woman in ancient world. Phryne was designed based on spirit of pastoral art. A user exploring centering on transcendence and self allusion in virtual reality space gets to meet Phryne in idealized garden. Motion of ballerina, a member of New York City Ballet was created by using motion capture technology. Ballerina made of metallic reflective materials is a guide to peaceful world and interacts[16]. Ballerina as muse informing and erasing unrest delivers elegant, harmonious and universal ministry. An artist sets parameters in virtual space. An artist makes use of virtual reality technology by finding new areas stimulating other senses in virtual space.

Olafur Eliasson creates artworks based on studies of natural phenomena. He reproduced phenomena having immaterial elements such water, moss, light, rainbow, motion, fog and wind and induces viewers to see aforementioned phenomena with another viewpoint. Rainbow created with virtual reality

technology of VR art platform represents rainbow which is temporary natural phenomenon in virtual space. Rainbow Assembly sprays water drops from the ceiling and sheds light to implement various forms of rainbow.



[Fig. 5] Olafur Eliasson, Rainbow, 2017

A motif of above artwork is actual work. In virtual space, interaction with water drops is added[17]. Rainbow is created according to correlations among three points when user's viewpoint is at specific angle in a composition similar to principle of rainbow's creation. VR controller communicates with an artwork interacting with virtual water falling softly. Several users can take part in space at the same time. Interaction through controller allows a user to perceive presence of other users as it is visible even though a user is far from water drops. A user can move to space taking part in artwork with others. Relationships between self and surroundings expand new space in VR and new area of artistic activities. Artist induces viewers to think over relationships between reality, representation and perception through virtual reality artworks.

Demonstration of Aquaphobia by Jakob Steensen connects psychological scenery and ecology by using virtual reality. Concept of above artwork is men's change in awareness of sea level and climate change in the future. Above artwork has five step explanation telling fear of water along with microorganisms in outer space. While travelling virtual space, microorganisms recite a poem suggesting parting between virtual environment and users hovering environment. Wet substances penetrate into digital storage device like virus passing through mod, water, underground infrastructure, root and plant by creating future

oriented environment. Liquids penetrate into body's internal system[18]. Above artwork explains dark side relationship which environment gives to environment which lies under road paved with concrete.



[Fig. 6] Jakob Steensen, Demonstration of Aquaphobia, 2017

4. Comparative analysis of virtual reality user interface in media artworks

When analyzing six artworks implemented in VR art platform, it was found that design analysis elements of virtual reality interface are furtively expressed. The London Mastaba by Christo & Jeanne-Claude leads a user centering on artworks in virtual environment and increases sense of immersion by implementing actual environment with factual images. Artwork created in actual environment is moved to virtual world through flow of time, waves in lake, a note of a bird and the sound of falling water. Interface elements enough for a user to appreciate and experience artwork making use of multimedia elements in the visual and auditory senses are used. Second artwork is Rising by Marina Abramović. This artwork explains a process which arouses seriousness of climate change and user's attention to climate change through artist's avatar. Rising by Marina Abramović plays a role as analysis elements of interface by making use of virtual space rather than two dimensional explanation and allowing artist's avatar and user to commune with each other. Third artwork is Into Yourself - Fall by Anish Kapoor. In this artwork, a user experiences his own body in virtual environment. A user passes through a forest and a tunnel made up of muscles. Information interface is provided by using sound. Considering virtual reality puts emphasis on presence as use of multimedia, it is desirable to make use of proper interface rather than additional texts. Interface is composed based on visual image information guided along ways. A user experiences imaginary space of his body through virtual reality. Fourth artwork is Talking VR and Phryne by Jeff Koons. This artwork composes an interface centering on ballerina character made of metallic reflective material existing in virtual reality. Interaction between

a user and a character provides all information in virtual reality. User studying and observing character's motion is artwork's essence and such communication process provides a user with sensuous mutual response. Fifth artwork is Rainbow by Olafur Eliasson. This artwork is also implemented in actual space and sprayed water is expressed as particles in virtual space. A user can change a direction which rainbow particles move by using a controller with both hands and location of light can also be adjusted [4]. This artwork makes use of space where several users experience at the same time. Users study rainbow particles and act freely in virtual space through interface of set value entered in a controller. Sixth and the last artwork is Demonstration of Aquaphobia by Jakob Steensen. A user moves to space built with future oriented environment along alien organism characters and appreciates artist's world view expressed in virtual reality. A user travels space listening to explanation about artwork through sound in specific space. Interface is composed through voice and character. A user goes through five step test procedures which accords with artwork's concept.

5. Conclusion

In virtual reality space, several users can communicate one another and work together. Virtual reality technology provides lots of opportunities to various fields but finding new information and developing technologies are needed to overcome spatial and physical limits[19]. This paper analyzes interface of media artworks displayed based on VR art platform which virtual reality technology is combined. Artworks existing in actual space are implemented with virtual reality technology through VR art platform. A user experiences mainly through observation and research. Interface is composed centering on character and sound representing multi media. Environmental factors in actual space are implemented as they are as process for a user to be immersed in virtual reality. Interfaces play a role as points that do not interfere with such expression. Interface of analyzed virtual reality is composed of object or sound embedded in artwork. A user is immersed in contents and communicates with an artwork through sensuous experience[20]. Interface embedded in artwork provides a user with information and explains a situation of virtual reality space. Interface elements of virtual reality are included in three dimensional virtual space. Virtual environment itself plays a role as interface like real world. Media artworks that have approaches which are different from commercial virtual reality contents pursue user's immersion and sympathy. Virtual reality technology which is applied in media artworks makes relationships between artist and user closer. All things in space are reflected as artwork. As application of virtual reality technology has expanded, research on virtual reality interface should be designed and developed

customized to users to induce users to actively participate and have ideal experience. Further research is to design and implement user customized environment interface based on virtual environment.

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