

Exploring the Feasibility of Virtual Reality Technology in Visual Design

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Abstract: With the rapid development of the Internet, the presentation form of visual works is becoming increasingly rich, covering 2D, 3D, and dynamic and other forms of expression, at the same time, the public's aesthetic and functional needs for visual works are also increasing, no longer satisfied with the traditional way of receiving information, but the pursuit of a higher quality of experience in the spiritual and visual level. In this development background, this paper focuses on the feasibility of virtual reality technology's application in visual design. Through an in-depth analysis of the characteristics and advantages of virtual reality technology and the current development trend of visual design, it explores its potential to enhance the immersion, feasibility, and innovation of visual design, and provides examples with practical cases.

Keywords: Virtual Reality Technology; Digital Design; Artistic Expression; Visual Design.

1. Introduction

In the wave of digitalisation, virtual reality technology has gradually entered various fields such as architecture, medical care and games, bringing people brand-new opportunities and experiences. At the same time, the introduction of virtual reality technology also opens up a new path for visual design, giving designers a broader, free and immersive creative world, designers can create more three-dimensional, vivid and interactive visual works, while the user becomes a participant, deeply integrated into the situation created by the design. Therefore, virtual reality technology has a milestone academic and research significance in visual design research.

2. Overview of Virtual Reality Technology

2.1. The Concept of Virtual Reality Technology

VR technology (Virtual Reality, Virtual Reality Technology), from the name, can be simply understood as the technology that combines virtual and reality, integrates computer technology, simulation technology and information technology, based on actual data to build an all-round, immersive three-dimensional virtual world [1]. Creating a virtual reality environment that combines visual, tactile, auditory and other multi-sensory experiences, so that people in it are like being there. The technology uses real-life data, converted into electronic signals by computer technology, and then combined with various types of output devices, transformed into people's perceptible phenomena, because these phenomena are not directly visible, but the real world simulated by the computer technology, so you need to use the VR glasses to assist in the interaction. VR technology in entertainment, tourism, medical, and other fields have applications, in the game and VR tourism is the most widely used so that people can get some relaxation after their busy life, through the virtual reality to temporarily get rid of the busy real world.

2.2. Development of Virtual Reality Technology

In 1929, virtual reality technology quietly appeared, and

the world's first flight simulator 'Link Trainer' was born, it can make pilots accurately and experience the feeling of controlling the aircraft, this is a successful attempt to apply virtual reality technology. In 1939, William Gruber created a stereoscopic view mirror, based on stereoscopic vision, allowing people to see 3D images. In 1952, Morton Heilig created the first immersive device Sensorama, combining a variety of effects to promote the development of the concept of virtual reality technology. In 1939, William Gruber created the stereoscopic viewer, based on stereoscopic vision, which allowed people to see 3D images. 1952, Morton Heilig created the first immersive device, Sensorama, which integrated multiple effects and promoted the development of virtual reality technology concepts. In 1968, the first head-mounted three-dimensional display marked the virtual reality technology in the hardware equipment to take a key step forward. 1980s, VR entered a high-speed development stage, beginning in the computer, the Internet and other technologies combined to form a more realistic virtual image.

Until 2016, VR product technology ushered in a breakthrough, and set off a capital market investment boom, this year is also known as 'VR year'. With the continuous progress of social productivity and science and technology, as well as the emergence of artificial intelligence, 5G and other new technologies, virtual reality technology has stepped into the 'VR+' era, and the demand for VR technology in all walks of life is increasing day by day, and it has gradually become a new field of science and technology.

3. The Impact of Virtual Reality Technology in Visual Design

Visual design is based on traditional design and incorporates human visual elements. It is not simply to achieve the established conceptual objectives but to complete the design, incorporate the visual information that the designer expects and is satisfied with, and actively convey various types of information to the public through human visual reception.

Along with the development of society and technological progress, visual design can be connected with virtual environments, typically virtual reality and augmented reality

technologies. Applying these two technologies can bring an immersive visual experience for users. The image of an experience is generally generated by building a three-dimensional model, so when users watch it, they can feel the visual effect of a sense of reality.

3.1. Provide New Visual Design Concepts

Graphic design relies, in whole or in part, on visual presentation for its many methods of expression. It expresses itself with the help of images in 2D space, covering logos, typography, painting, and colours, as well as relevant content displayed through electronic devices. With the progress of science and technology, art design and design concepts will change accordingly, and design concepts tend to innovate with the progress of science and technology.

Throughout the history of art and design, the Crystal Palace, built in the second half of the 19th century during the British Arts and Crafts Movement to promote the achievements of the British Industrial Revolution, was designed to demonstrate the mechanical instincts of industrial production, pioneering the use of standardised components, as well as the use of steel and glass to carry out the design and construction of the first. It was the first industrial revolution that saw the emergence of mechanised, standardised factory assembly line production techniques, which impacted the traditional handmade design workshop approach to production. People began to think about the link between mechanised production and design, designers began to think about the relationship between science and technology and art and design, the door to the world of modern design was slowly opening and new design concepts were gradually being accepted.

The continuous progress of science and technology effectively promotes the continuous improvement of art and design standards, and design concepts also follow the trends of the times and push forward new ideas. Virtual reality

technology provides new concepts for visual design, for example: the concept of immersive experience, so that the design is shifted to build an immersive space, the designer needs to consider the full range of sensory experience, guiding the user to participate in depth; interactive dynamic design concept, virtual reality technology breaks the traditional mode of static design, the user can interact in real time with the virtual reality, the design is no longer static and unchanging, but according to the user's behaviour to carry out Analysis, change, which requires designers to plan in advance a variety of interactive feedback, so that the visual effect is natural and logical; multi-sensory integration concept, the design is no longer limited to the screen, but also integrated into the sense of touch, hearing, etc., for example, simulating the underwater adventure of the virtual scene in the oceanarium, you can simulate the impact of the current through the vibration and create a mysterious atmosphere with the sound effects, to enhance the all-round experience.

3.2. Enhance the Sense of Immersion and Experience in Visual Design

Under the trend of improving people's quality of life and spiritual world, the public's aesthetic requirements for design are also gradually improving, and designers design visual works not only to convey information but also need to give more consideration to the aesthetic value of the design and the deeper meaning behind the design. In order to meet the requirements of design in accuracy and artistry, design works are usually composed of symbols, colours, words, spatial levels and so on. The emergence of virtual reality technology transforms these elements from 2D plane to 3D space, which effectively improves the expressive effect of the design works, and establishes a new and unique sensory world.

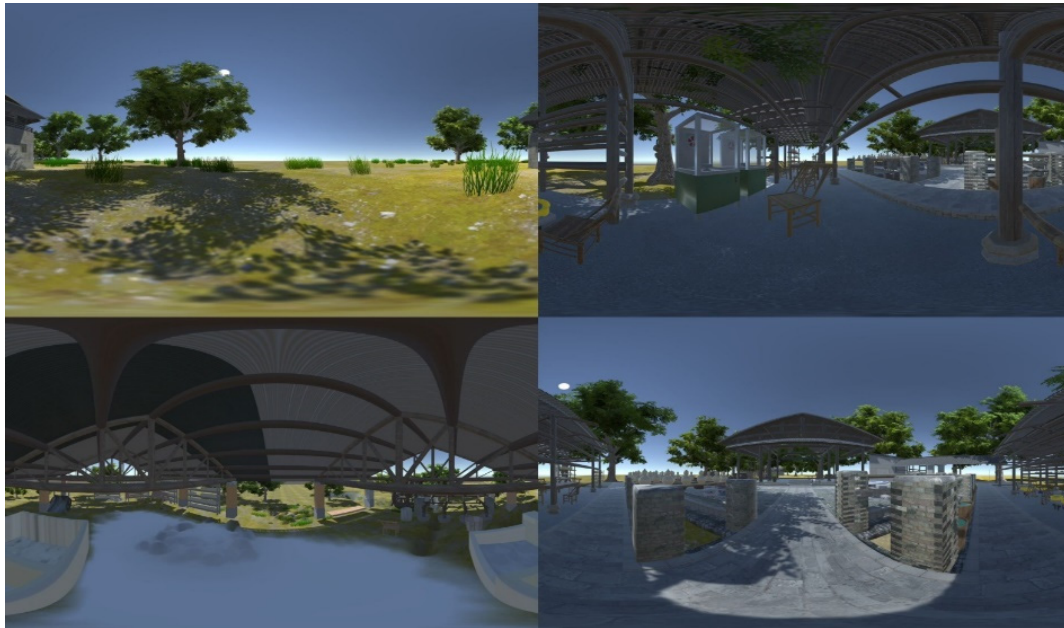


Figure 1. Part of the scene of VR Porcelain Manufacturing 72 Processes

In the application process of virtual reality technology, designers not only need to pay attention to visual design and research but also need to pay attention to the experience of other senses such as touch, hearing and even smell. By analysing the multiple senses of the experiencer, they can design works that meet the aesthetic needs of the audience,

are more vivid and realistic, create a sense of being there for the user, and enhance the user's sense of experience. Had the honour to participate in the VR project - 'VR porcelain seventy-two processes', part of the results in Figure 1, its purpose is to combine VR and ceramic production processes through the demonstration of VR technology, porcelain

production process knowledge popularisation, which can make foreign friends in the use of VR technology at the same time to understand the culture of porcelain, so that the ceramic production of the cultural history of the international stage further. Cultural history in the international arena to further promote, and play the role of popular science so that the dissemination of porcelain-making technology is more effective.

With the help of VR technology, the audience has more choices in observing the works, can directly adjust the angle of appreciation and zoom in on details at will, and can also interact with the works haptically, for example, using feedback gloves, vibration feedback and other equipment. In the process of audience appreciation and interaction, the designer can also learn the audience's demand bias and emotional feedback through the feedback system, through which the feedback information can be further optimised to make the design work more artistic value and communication value.

3.3. Breakthrough the Limitations of Traditional Visual Design

In terms of the way human beings acquire information, vision accounts for 70 per cent of the amount of information people acquire, followed by hearing, touch and taste. In order to achieve realistic effects and satisfy people's visual and auditory habits, the images and sounds of the virtual environment should be three-dimensional. While virtual reality technology requires high computational processing speed and display of the computer, in recent years, with the substantial improvement of microcomputer performance, higher quality virtual reality technology has been realized on microcomputers. The cost reduction and the popularity of microcomputers will greatly promote the application and development of this technology [2].

In the era of rapid development of the network, the Internet has gradually become the key carrier of visual design, that is, the design of digital, in order to make the design adapt to the development of the network and thus appeared a variety of digital design forms, such as 'web design' and 'UI design', dynamic visual design also came into being. To adapt the design to the development of the network, there are many forms of digital design, such as 'web design' and 'UI design', and dynamic visual design has also emerged. Therefore, the birth of VR technology gives designers a new form of design expression reference, but also gives designers more design ideas, for the expression of the concept of design products have more choices. And then the above 'VR porcelain seventy-two processes' as an example, the emergence of VR technology to break the technical boundaries of people's virtual viewing, people do not need to go into the science and technology museums and exhibition centres, just a pair of VR glasses can be in any place to visit and learn. The VR demonstration of the porcelain production process can be half the effort, no longer use the long H5 page, in order to improve the fun at the same time, reduce the limitations of traditional science and culture dissemination.

3.4. Enhance the Efficiency and Accuracy of Visual Design

In the traditional visual design stage, designers mostly rely on 2D plane drawings or simple 3D models to show the design ideas, but due to the single form of expression, designers and customers find it difficult to comprehensively

and intuitively perceive the design effect, usually need to spend a lot of time for repeated modifications and adjustments, and sometimes even need to be completely overturned and then re-designed, the design efficiency of this approach is low.

With the development of technology, virtual reality technology has brought significant changes to the visual design field. With the help of VR technology, designers can enter a highly simulated virtual environment, feel the design space and layout immersively, foresee possible problems in advance, and greatly improve design efficiency. In terms of accuracy, designers are able to precisely position and adjust design elements in the virtual space to ensure that the proportion of each part, scale and other elements are in line with expectations and reality. Taking interior design as an example, in traditional design, designers need to draw multiple drafts of plane sketches and renderings, and it is difficult for clients to understand the design intent. With the introduction of VR technology, designers can quickly build a virtual demo model, where customers and designers can be there together, feeling the spatial scale, proportionality, and changes in architectural shadows at different times of the day under sunlight, and adjusting the position of furniture, replacing different colours and materials, etc., not only to improve the quality of the interior design but also to improve the quality of the interior design. For the unsatisfactory part of the design, the designer can adjust the position of the furniture, and change different colours and materials according to the feedback on the spot, which not only improves the efficiency of the design but also ensures that the final design effect meets the expectation.

3.5. Provide New Ways of Communicating Visual Design

Traditional design communication is relatively single and limited, mainly relying on physical media, such as posters, flyers and other paper media, the scope of the audience is limited by geographical restrictions. The development of digital era, mostly in 2D images, video form, but the user can only passively accept the preset content, the lack of interaction between the user and the design work and experience. The media has gradually changed from complexity to simplicity, from heaviness to lightness, from tangible to intangible, from time-biased to space-biased, and from valuing speed to valuing quality [3].

Virtual reality technology has brought innovation to visual design communication. It builds an immersive virtual space, breaking the traditional 2D plane. With the help of VR equipment, users are no longer bystanders, but can deeply participate in it, exploring the design works from their perspectives. Users can change the elements of the design scene according to their operation, such as adjusting the colour, moving the position and so on, to achieve a personalized experience, respecting the autonomy of human beings, and it will be easier to accept and believe in the information brought by the virtual environment that we live in when we operate following our ideas so that the Compared with the communication effect of one-way communication methods, the communication effect of two-way interactive communication methods emphasized in virtual reality design is better [4].

Take the museum exhibition design as an example, after the introduction of virtual reality technology, the audience put on VR headset and other equipment, as if in the historical scene, can be 60 degrees all-round viewing details of cultural relics,

but also to trigger the virtual explanation, in-depth understanding of the story behind the cultural relics: in the display of ancient paintings and calligraphy, the audience can be 'closer' to the screen, to see the changes in the brush strokes and force. When displaying ancient architecture, the audience can travel freely to feel the combination of spatial structure and light and shadow, which is a new way of communication that can make cultural relics 'live' up and let the audience 'move' up.

4. Application of Virtual Reality Technology in Visual Design

4.1. Visual Design of National Geographic Magazine

In traditional graphic design, designers rely on hand-drawn sketches, and 2D software to create, the design process is relatively abstract, and it is difficult to intuitively feel the final effect. With the emergence of virtual reality technology, designers have begun to try visual design with the help of VR.

National Geographic (National Geographic) magazine was founded in 1888, is one of the world's most well-known popular geographic magazines, not only with academic rigour, but its high-quality admission requirements also have high readability. After the emergence of virtual reality technology, National Geographic launched a new game 'National Geographic Explore VR (National Geographic Explore VR)', the content previously presented in magazines, books, and TV programmes, with the help of VR technology to achieve a new presentation, with the VR equipment as a very immersive carrier, people can be. With VR equipment as a highly immersive carrier, people can 'be in' different corners of the world and start an adventure in person. Designers through VR technology to create a virtual polar scene, in this virtual environment, the user is able to freely adjust the angle of view, from a different perspective to observe the natural environment, riding a rowboat 'shuttle' between the icebergs, and occasionally penguins leaping out of the water! VR technology allows designers to no longer be confined to 2D screens, which can more intuitively show the polar scenery, and also will enable readers to no longer stay in the static beauty of the scenery, but to take them personally into the photo experience. 'VR technology allows everyone to see the possibilities of VR travel, allowing users to enjoy the world's magnificent, beautiful and exotic landscapes even during their busy lives.

4.2. Digital Display of the Famous Painting 'Qingming Riverside'

Qingming Shanghe Tu is a custom painting created by Zhang Zeduan, a painter of the Northern Song Dynasty, and one of the ten most famous heirloom paintings in China, depicting the bustling scene from the suburbs to the city during the Qingming Festival in the Northern Song Dynasty capital city of Bianjing (present-day Kaifeng, Henan Province), which is firstly hidden in the National Palace Museum. With the development of 5G technology, cloud computing, big data and other new technologies, virtual reality has been widely used in the museum field, and VR technology has gradually moved from entertainment to practicality [5]. Henan Kaifeng Qingming Shangheyuan scenic area to create a 'Qingming Shanghe Tu' 5.0 VR large space exploration experience of immersive display, the audience only needs to wear VR equipment, as if instantly

travelled to the Northern Song Dynasty Bianjing, the scene in the scrolls in the form of 3D dynamics in front of the eyes unfolded, the audience can be free to 'shuttle' in the bustling streets, interact with street-side residents, and interact with street-side residents, the audience can also freely 'shuttle' in the streets, the audience can interact with street-side residents. The audience can freely 'travel' through the bustling streets, interact with the residents on the street, observe their attitudes and movements at close range, and even 'walk' into the shop to observe the internal furnishings.

Compared with the traditional display, the VR display breaks the distance between the cultural relics and the audience and allows the audience to deeply participate in it and feel the life of the people on both sides of the Bianhe River depicted in the paintings and the pedestrian traffic on the Hongqiao Bridge and other scenes in the picture. This innovative display not only enhances the audience's visiting experience but also spreads traditional culture more widely. Qingming Riverside Drawing 5.0 VR is the world's first time and space roaming of a national treasure IP. Audiences from different countries, age groups and professions in the exhibition hall came together to immerse themselves in this cultural feast across time and space, which also provides a successful example of the fusion of traditional cultural dissemination and visual design.

5. Summaries

Virtual reality technology has demonstrated its feasibility and potential in the field of visual design, bringing unprecedented opportunities and a new future for the development of visual design. Visual design covers a wide range of areas, penetrating into every aspect of the public's daily life, as well as deeper cultural dimensions. With the support of virtual reality technology, visual art shows the qualities of composability and diversity, which undoubtedly represents a new direction in the development process of contemporary visual art.

However, the application of virtual reality technology in visual design still faces many challenges: from the technical level, the low popularity, general performance and high cost of the equipment; from the design level, designers need to continuously improve their own ability and innovative thinking to better master virtual reality technology for creation; from the user experience level, further testing and optimization of the interaction mode and the quality of the content are needed to meet the increasing number of users. From the user experience level, it is also necessary to further test and optimise the interaction methods and content quality to meet the increasing interaction needs of users. With the rapid development of VR technology, people have gained a more flexible and diversified three-dimensional visual experience, which not only improves the effect of visual design but also makes users feel more real and immersive. Looking to the future, virtual reality technology is expected to be more widely used and developed in the field of visual design, and constantly push forward to bring the public a richer and more exciting visual experience.

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