Application of Virtual Reality Technology in the Development of Game Industry

Kaihua Guo *

Qingdao Wei Ming School, Qingdao, China

* Corresponding Author's Email: 1396562165@qq.com

Abstract. Virtual reality technology will accelerate the development of gaming and bring a new gaming experience to users. One of the main benefits of virtual reality technology is that it can swiftly capture the information that a game needs to send in the game and provide consumers an immersive and realistic sense, improving the realism of the game scene. Players may interact with game characters and scenes by using virtual reality technology in game creation. Gaming wearable devices, which enable users to play games using their head, hands, feet, and even the complete body, are one of the most significant applications of virtual reality technology in the game business. In the future, humans will have holographic displays that can be viewed with only the naked eye, as well as holographic technology that is ideal for regular viewing and gaming environments. Virtual reality games can also be incorporated into Hollywood blockbuster-level film and television special effects once the technology is further developed and perfected, giving spectators an even more stunning experience. The development of virtual reality technologies is now underway. By adhering to the idea of designing technology with people in mind, we can encourage the development of virtual reality games in the near future.

Keywords: Augmented Reality; Game Industry; Wearable Devices; Virtual Reality.

1. Introduction

Virtual reality technology is becoming one of the major sources of entertainment in people's lives. Virtual reality technology, also known as VR technology, is a computer simulation system developed through a collection of related technologies such as computer graphics and simulation technology, stereoscopic display technology, sensor network technology, voice input and output technology, and spatial positioning technology [1]. The biggest feature of this technology is to create a virtual environment by imitating the user's sense of hearing, vision, and touch, and allow the user to receive the feeling of the real environment in this environment and be able to interact with things in the environment, and ultimately give the user that everything in the environment is real.

Virtual reality technology involves many disciplines and application fields. According to the data of 805 virtual reality research projects, the current applications in entertainment, education and art occupy the mainstream, accounting for 21.4%, followed by military and aviation accounting for 12.7%, medicine. 6.13% in terms of robotics, 6.21% in robotics, 4.96% in business, and a considerable proportion in visual computing, manufacturing, etc. Nowadays, given the continuous growth of cutting-edge technologies utilized in gaming, technological limitations are no longer a barrier to creating amazing gaming experiences. Virtual reality and 5G technology have the potential to greatly expand the game industry. Virtual reality technology was created for video games and provides lifelike games and sensory-rich input without delay. More than ever, gaming will be enjoyable. IDC recently released the 2022 Worldwide Augmented and Virtual Reality Spending Guide [2]. The guide looks forward to the development of the augmented and virtual reality market in the next five years (2022-2026) from multiple dimensions such as reality types, technologies, industry users and application scenarios. According to IDC's latest forecast data, the total global virtual reality investment scale in 2021 is approximately $14.67 billion, and is expected to increase to $74.73 billion in 2026, with a five-year compound growth rate (CAGR) of 38.5%. Among them, the five-year CAGR of the Chinese market is expected to reach 43.8%, ranking first in the world in

terms of growth rate. By 2026, expenditure on augmented reality and virtual reality technology in the Asia-Pacific region will have grown at a compound annual growth rate (CAGR) of 42.4% (Figure 1).

With the further intelligentization of game industry, virtual reality technology makes the game have more interactive experience, which strengthens the substitution of the game and the pleasure of playing. It makes the work of art have vitality, makes the artistic conception of the work more vivid, and transforms people's imagination of the work of art into reality. Few studies have been conducted in this field due to the rapid growth of virtual reality technology in development of game industry. The objectives of this paper are to: 1) present the features of virtual reality and advantages of virtual reality in game industry; 2) discuss the practice of virtual reality technology in game design.

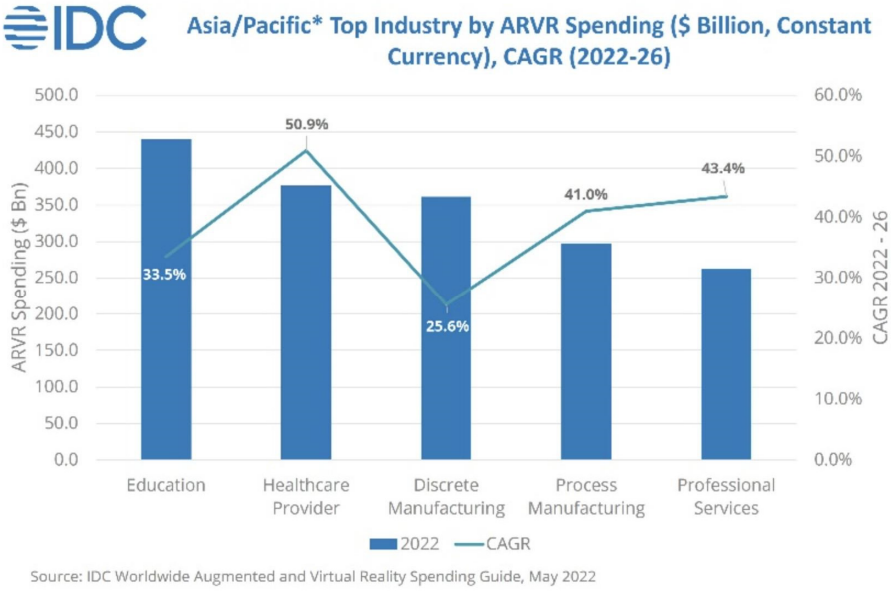


Fig 1. 2021 global virtual reality technology market (Data source: Worldwide Augmented and Virtual Reality Spending Guide)

2. Application of Virtual Reality Technology in the Development of Game Industry

2.1 Virtual Reality Technology

Virtual reality is a technology that comprehensively utilizes computer graphics systems and various interface devices to generate an interactive immersive environment on a computer. It can simulate a three-dimensional virtual world through a computer, and provides users with visual, auditory, tactile, and other sensory simulations, allowing users to browse, interact and investigate this generated virtual world from their own point of view, using natural skills and certain equipment. The main characteristics of virtual reality technology are immersion, interactivity and imagination. Figure 2 shows the evolution of virtual reality in the past 200 years [3]. The generalized virtual reality also includes augmented reality, mixed reality and augmented virtual reality. Augmented reality is to superimpose computer-generated digital objects on top of video images or real environments, presenting a new environment that combines virtual and real to users. Mixed reality is similar to the augmented reality, except that computer-generated object in augmented reality is distinguishable from real-world objects, they are indistinguishable in mixed reality.

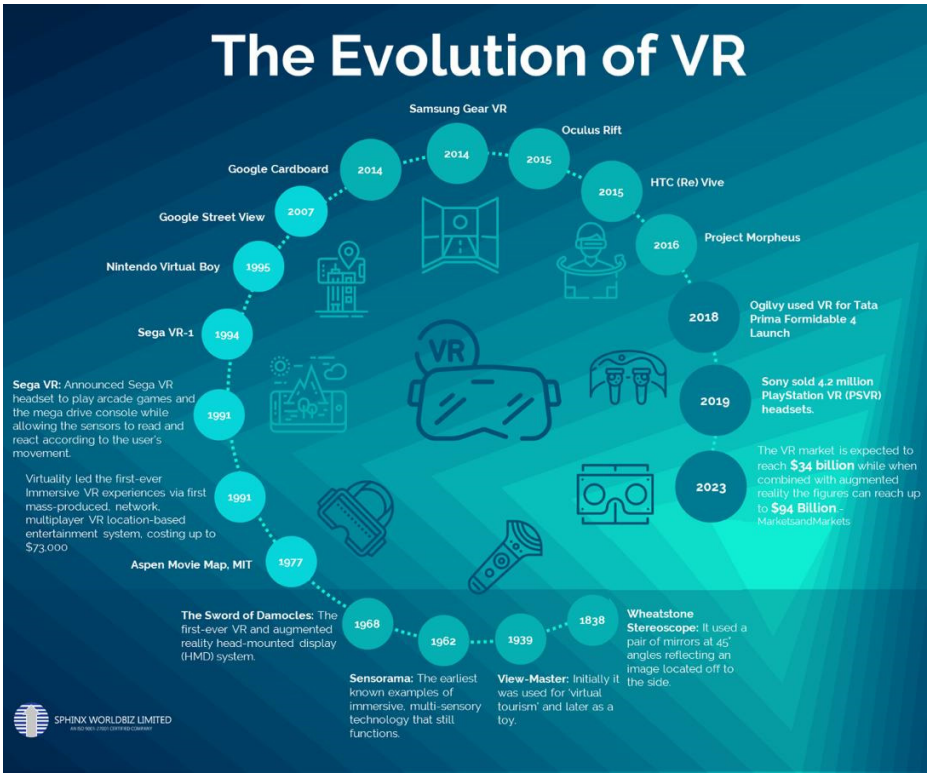


Fig 2. The evolution of virtual reality in past 200 years

2.2 Advantages of Virtual Reality in Game Industry

Virtual reality technology can quickly record the information that the game needs to transmit in the game, and provide users with an immersive and realistic feeling, making the game scene more realistic [4]. Using virtual reality technology in game design allows players to interact with characters and scenes in the game. Considering the physics of virtual reality, the game experience will be more diverse and personalized. In addition, the application devices of virtual reality games include hardware helmets, game pads, etc. According to the virtual scene displayed in the hardware helmet, users can use the game pad to simulate the relevant operations of the characters in the scene, which can improve the degree of interaction between the users and the machine. Game design under virtual reality technology will have more sense of space and operation, allowing players to feel more fun in the game. Compared with the traditional game design, virtual reality games do not need screens. The current way of virtual reality games is HUD design, which presents the information to the players in a packaged way. In this way, the game players can feel immersed, and the realistic effect of the scene is added, so that the user can produce and real the same feeling in the environment.

3. The Practice of Virtual Reality Technology in Game Design

Virtual reality technology changes the traditional games which use keyboard, mouse, and fingers to operate, allowing players to play games with head, hands, feet and even the entire body [5]. After opening the game interface and putting on the virtual reality device, users can watch the surrounding scenes of the game in 360 degrees and perform actions such as stepping back and squatting. In addition, another important application of virtual reality technology in game industry is gaming wearable devices. The phrase "wearable technology" refers to a wide range of gadgets that people can employ as body accessories [6]. These devices might be wireless with microprocessors and Internet connections, or incorporated into garments. In the gaming accessories market, wearable technology creates an experience such as a halo deck by combining virtual reality and augmented reality. Wearable gaming devices may potentially benefit from 5G technology and cloud computing

[7]. The world of gaming is set to cross a new sensory border, with anything from glasses and vests to headphones and gloves. The current panoramic video of virtual reality needs 20 to 40 Mbps data rate with a 50 ms latency. In the future, players may enjoy more pleasant virtual reality experiences thanks to the significant increase in data throughput (> 100 Mbps) and decrease in latency (1 ms) that 5G technology can deliver. People will feel the same physical rush from immersive gaming experiences' lifelike haptic feedback as they would from actual actions and feelings. Wearable gaming equipment can assist players in interacting with others and being fully immersed in their game. Wearable gadgets should be designed using the same architecture and development tools as video games by using cloud computing and network functionalities.

There are still many problems of virtual reality technology in game development. For instance, the battery packs make the headphones overly heavy, or the brain receives conflicting signals from the balancing organs in the ears and the eyes, causing a dizzy feeling. These issues frequently turn into a bottleneck in the creation of video games or other media. By releasing gamers from cumbersome equipment and showcasing the boundless possibilities of immersive technology, ultra-wideband network such as 5G technology can take virtual reality to the next level. By blending the lines between the real world and the virtual world, ultra-wideband network and virtual reality can alter how players engage with games.

4. Conclusion

The development of virtual reality technology in the future game and television industry is under an exponential rate. New film and game industries related to virtual reality will also rise and it will undoubtedly revolutionize the gaming landscape. The emergence of virtual reality technology will accelerate the development of gaming and bring a new gaming experience to users. According to the discussion in this paper, the major advantage of virtual reality technology is it can quickly record the information that the game needs to transmit in the game, and provide users with an immersive and realistic feeling, making the game scene more realistic. Using virtual reality technology in game design allows players to interact with characters and scenes in the game. One of the most import applications of virtual reality technology in game industry is gaming wearable devices which can allow players to play games with head, hands, feet and even the entire body. In the future of virtual reality game, people will have virtual reality equipment suitable for ordinary viewing, virtual reality gaming rooms suitable, and naked-eye holographic viewing that can get rid of heavy viewing equipment. In addition, the virtual reality technology will be more perfect and mature, and virtual reality games can also be integrated into Hollywood blockbuster-level film and television special effects, thereby bringing audiences a more shocking experience. Nowadays, it is the growth period of virtual reality technology. Adhering to the design concept of technology serving people, we can promote the future of virtual reality game to come as soon as possible.

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