The Research of Virtual Reality Technology on Application and Competition

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Abstract. From 1929, Edwin Link created a flight simulator, to today's PICO4 virtual reality all-in-one machine. From the first attempt at virtual reality technology, to now China's domestic PICO company has developed a new VR all-in-one machine. This is undoubtedly a huge step forward. In the virtual reality technology industry, in addition to China's PICO company, the world also has Meta's brand Oculus, Valve Corporation and others leading the development of the virtual reality industry. Oculus has the largest market. Here, by comparing the development of virtual reality technology and product research and development of different companies, this paper studies the development of the virtual reality technology industry today and gives suggestions on what aspects businesses should continue to consider improving in the future. Observing the development of virtual reality technology from the perspective of a consumer not only helps other consumers better understand the advantages of virtual reality technology but also gives creators suggestions on how to satisfy consumers.

Keywords: Virtual reality, Business competition, Development suggestions.

1. Introduction

1.1. Background

The origins of virtual reality can date back to a British physicist called Charles Wheatstone who introduced the concept of stereo vision to the world in 1838. In 1929 Edwin Link created a flight simulator which was the first successful attempt at virtual reality technology. Then Morton Heiliger created Sensorama and Tele sphere, the first virtual reality device to experience immersive senses in 1952 and the first head-mounted display in 1960, respectively. The most important thing was that there was a head-mounted display which was created in 1968 connected to the computer. In 1975, Milon Kruger exhibited VIDEOPLACE, which was a virtual environment using computer graphics. With the development of technology, many virtual reality companies have made progress on virtual reality equipment, such as Oculus VR, Pico and Apple Inc. VR products for human beings is a new product, if it can be very competitive in the market operation, it is indeed a good research direction.

1.2. Related Research

Innocenti analyzed the impact of using virtual reality technology in economic experiments, including the advantages and disadvantages. In the future, the cost of using virtual reality will become lower and lower so it will be useful and possible to use Virtual Reality to set economic experiences. However, because of the anonymity and different experiences of virtual reality, people's behavior will change, so setting different scenarios can help analyze different behaviors. The author believes that the virtual world should be used to establish the same model as the real world to verify whether the virtual behavior corresponds to the real world [1]. Harrison et al. believe that virtual worlds have a certain level of risk. Virtual worlds have several advantages, for example, people can break distance and time limits, there is a unified time in the virtual world, and even if the player is not online, the virtual world does not stop; You can also determine your nationality, appearance, gender and so on according to your own preferences; And it can break the interaction limits of reality and have a more real sense of experience. However, because of the virtual property of the virtual world, players' information can be fake, so people's trust in strangers participating in them is also reduced [2]. Chesney et al. do not explicitly say whether they supported virtual worlds but instead focus on

whether virtual worlds could reproduce traditional experiments. The answer is that there is no significant difference between the two, so authors believe that the virtual world may be an effective alternative to the traditional experiment, and may get different conclusions. They also argue that computer technology in virtual worlds can study the social sciences and study users from different backgrounds, but users will not necessarily behave in a standard way because participants will have their own behavioral themes [3].

Fiore et al. think that virtual experiments can be used in environmental and resource economics. Because it is a costly and time-consuming experiment to test these two fields in reality, it is completely possible to test different risk assessments in the virtual world in a short time. The authors introduce the economists to VR technology, the latest developments and the benefits of the technology first, and then use a case study approach to reach their conclusions [4]. Anthes et al. show that although virtual reality is developing rapidly, many software and hardware problems are difficult to solve. For example, some users say that they cannot move their hands because there is no complete information about the user's posture, but it can be solved through the third perspective; There is also a halo problem that is very difficult to solve; The authors believe that it is necessary to improve the resolution and optics equipments in the future [5]. Peeters argued that virtual reality can be used in the language sciences because virtual reality has three characteristics: experimental control, ecological validity and reproducibility. The use of virtual technology can also be used to reliably collect data and has been applied in the field of language science. The author also compares the cost difference between virtual experiments and computer experiments, and many professional students have the skills to design virtual experiments, so the author believes that virtual reality has great potential [6].

Messner et al. believe that virtual reality can be integrated into the teaching of architectural engineering because it allows students to build buildings virtually and better understand drawings. The authors also compare the feasibility of 4D CAD modeling. The author also believes that there is a need to develop low-cost products to improve the educational experience, but so far there has been no success [7]. Saffo et al. think they can combine social platforms with virtual reality, which has a large user base, and use this platform to set up a virtual environment for remote, synchronous operations. They believe this approach could open up new possibilities for virtual reality, for example, virtual reality can be used in large-scale collaborative research [8].

Henriques and Winkler use a review of literature and patents to study the development of virtual reality technology in the automotive field, including challenges and opportunities. They believe that the impact of virtual reality on cars is in marketing planning, cost reduction and shortening product launch time. The conclusion is that technology is in the hands of a few people, and the combination of technology has encountered various problems, both software and hardware [9]. Smutny analyses the virtual reality educational application market between 2019 and 2021. After analyzing the content of different products and users' evaluation of products, two conclusions are drawn. The first is that the software is generally in English. Second, there are five areas where educational applications are popular, such as nature, space, medicine, art and history. The author also hopes to study what kind of virtual reality technology will be accepted by users in the future [10].

1.3. Objective

In the first part of this paper, this paper will study the specific difficulties encountered in the initial development of virtual reality technology, what characteristics of virtual reality technology products, and what special experience virtual reality technology has. The second part also studies the business development status of typical leading companies. In the third part, this paper gives several development suggestions for the reference of relevant professionals from the perspective of consumers. Another advantage of this article is that it provides an overview of what virtual reality is, its history, and the companies that are leading the way today.

2. Features of VR products

2.1. Immersive Interaction

Users can immerse themselves in a virtual world. In a new world with unique time rules and no geographical restrictions. Although there are time differences due to geographical differences in real life, this limitation can be broken in the virtual world, because after the user exits the virtual reality, the time inside will not stop. And although everyone lives in different regions on this platform, they can shuttle to any place they want to go in the next second. In addition, users can interact in real-time, with strangers or friends and can communicate face to face. In the virtual environment, users can choose their favorite skin tone, features and clothes. In communication, you can use words and actions to communicate as if you were meeting in real life. This new social experience not only allows people to interact, but other users can directly feel real emotions. In the virtual world, users will not be harmed by natural disasters or human factors, such as earthquakes, tsunamis, car accidents and attacks. Therefore, users do not need to spend high medical costs as in reality and can protect their own safety. Even if someone dies of natural causes, the user's loved ones can meet the deceased person in the virtual world.

2.2. Virtual Content

After the success of virtual technology, in addition to building virtual worlds, various elements can be created, such as games, sports and movies. Nowadays, there are already many amusement venues that have joined the 3D roller coaster project, and in the future, virtual roller coasters that are more real than 3D technology can be realized. In addition, you can also experience more realistic virtual shooting games. Virtual technology can also be applied in sports. Immersed in the virtual environment to exercise, makes exercise more popular so that the public enjoys fitness more. In addition, the movie can also develop virtual technology, allowing users to participate in the movie. Therefore, both the virtual world and virtual activities are very desirable entertainment activities.

2.3. Special Experience

The virtual world is a unique experience, and when the technology is mature, you can experience crossing obstacles, touching things, and so on. However, because of the need to wear a head-mounted or wearable device, some users will feel uncomfortable. This feeling is called motion sickness, and the person experiencing it will have feelings of nausea, sweating, headache and dizziness. Although motion sickness can make some users have a bad experience, it can be improved by constantly wearing it.

3. Business application

3.1. Apple Vision Pro

In the early morning of June 6, 2023, Beijing time, at Apple's WWDC2023 developer conference, Apple Vision Pro was officially released and is expected to be listed in the United States in early 2024. The Vision Pro has multiple cameras that users can control with gestures, eyes and voice. It is a new generation of electronic products that can be used for work, communication and entertainment. Apple plans to start selling the Vision Pro in the global market by the end of 2024, and the source said that Apple has begun to discuss whether to choose the United Kingdom and Canada as the first countries outside the United States, followed by France, Germany, Australia, China, Japan and South Korea. Apple claims that with the Vision Pro, apps can be displayed in front of the user's eyes, filling in the surrounding environment, and using the rotation button to adjust the Angle of view. In addition to the high-resolution system, multiple cameras, and cutting-edge accessories, Apple also took comfort into account, so it used comfortable fabrics and polished the glass surface.

3.2. China-Related Campines

China Huina Technology Co., Ltd. is mainly engaged in the promotion and layout of video passenger flow analysis systems in the field of commercial retail. The company's main products are digital hardware and software integration, passenger flow data analysis and remote store inspection system, data and operation and maintenance services, big data platform development, and intelligent screen management system. The AR reality navigation project of the offline shopping mall created by the company and its thousand mu information in collaboration with Baidu Map for Shanghai Daning International Plaza has been put into operation. This service selects the problem of "consumers are easy to get lost in a large open space" to start with, through real-time accurate route guidance, so that consumers can get a simple, intuitive and interesting immersive navigation experience, and integrates the shopping guide function to improve consumers' offline shopping experience.

4. Advice and Enlightenment

First, one of the most important things in virtual reality that needs to be improved is the development of an all-in-one VR machine that can be played without a computer. Nowadays, most VR devices need to be connected to computer hosts, and VR all-in-one machines can be used directly without connecting hosts. Compared with the PC helmet, the all-in-one machine is more conducive to consumer use, and carrying and the price is cheaper. However, the all-in-one machine also has many disadvantages, such as poor heat dissipation, which is not conducive to users playing 3D games or opening large programs. In addition, consumers need to always replace new devices. If the consumer wants to upgrade the experience or the display screen does not work, they need to buy new products.

Next, Helping users with motion sickness is also an important part of the research. For producers, producers need to build better optics and tracking sensors to achieve higher refresh rates at higher resolutions. In this way, the picture stability is smoother and flicker-free, and the response time is shorter. In addition, manufacturers can remove parts of the user's body from the virtual world to reduce perceived conflict. One of the causes of motion sickness is that the user's body perceives that they are in a place that is not represented in the virtual glasses, so the physical sensation does not match what is seen in front of them, resulting in the feeling of vertigo. For users, if the user has a feeling of vertigo after wearing virtual glasses, the user needs to constantly wear them to overcome it. At first, users can limit their time. When the user feels uncomfortable, they can take off their glasses, close their eyes and take a deep breath. The user then adds more and more time to practice. More importantly, consumers should take good care of the equipment and wipe the equipment with a special cloth without abrasiveness in time.

Moreover, there are also special groups in the market that need to be considered, such as people with visual impairments and coordination disorders. For nearsighted or far-sighted groups, the equipment produced by the manufacturer needs to have a certain distance from the human eye, in order to freely add glasses accessories or the manufacturer customized according to user needs. In addition to games and film and television, virtual reality technology can also be applied in various industries, including healthcare, education and tourism. For the medical industry, creators can create a virtual surgical environment for doctors to practice, rather than gaining experience in urgent real surgery. More importantly, this benefits cognitive behavioral therapy, which addresses patients' problems in a controlled virtual environment. Such as soldiers traumatized by war and patients suffering from phobias. It can put the patient in a situation that they are afraid of and constantly overcome it or put them in a warm and harmonious atmosphere to ease their mood. For the education industry, the use of virtual technology to create a unique learning environment is conducive to attracting students' interest in learning, so that the classroom is no longer boring. For example, some students have difficulty understanding three-dimensional concepts, teachers can lead students to feel mathematical graphics through virtual glasses. For the tourism industry, businesses can upload virtual

compositions of attractions, restaurants and hotels on a virtual platform, allowing consumers to visit and experience them in advance.

At present, it is not easy for businesses to achieve good results in the market. Because the virtual devices currently developed are only suitable for entertainment, and there is not a lot of software that can play. And the price is so high, it is difficult for most consumers to afford it, which makes it not a necessity. Therefore, in addition to increasing the games that can be experienced, businesses can also use the new era of Internet publicity to establish a brand reputation. For example, manufacturers can cooperate with Internet celebrities to bring goods live. Set up special product experience areas in offline sales stores and large tourist hotels. The most important thing is that technologists can develop virtual platforms that are more free to design according to consumer preferences. Although virtual devices are not a necessity in the entertainment industry, they will be very popular in the healthcare, education and tourism industries once they create a virtual environment that can change freely.

5. Conclusion

This paper has studied the virtual reality technology that can immerse users in a certain environment and described the application of this technology, product features and an overview of the development history of virtual reality technology. If a new business wants to grow in the virtual technology industry, what software and hardware challenges the new business need to consider? Including, but not limited to, problems that have been solved by leading technology companies as the technology has evolved. Then, this paper studies the development of Apple Vision Pro products and related technologies in China. Finally, this paper will focus on how to apply virtual reality technology in real life, including the game industry, which is developing vigorously, and the education, construction, and medical industries with great potential. Even though virtual technology products are not a necessity today if they can be developed in many industries, their impact in the future will be huge.

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