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Interactive Design and Application Of Improving Player Immersion In VR Game

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Abstract:

In the context of the continuous development of virtual reality technology, due to the unique immersive experience and strong interactivity of virtual reality technology, all walks of life have strengthened the research and development of innovative applications of virtual reality technology. The main purpose of this study is to explore the ideas for improvement and improvement in game interactivity design to integrate virtual reality technology. In this regard, this article briefly analyzes the practical application of virtual reality technology in the field of games and some problems existing in game design, and discusses the problems analyzed and the aspects that need to be improved. Finally, we discuss the specific ways in which games use virtual reality technology to enhance player immersion from four aspects: game character design, plot design, game task design, and scene environment design.By addressing these elements, the study aims to provide a comprehensive framework for developers seeking to create more engaging and immersive gaming experiences.

Keywords: Virtual reality; interaction design; VR game design.

1. Introduction

Nowadays, with the continuous development and improvement of virtual reality technology, a series of emerging industries such as VR digital picture books, art display and VR version digital games have also developed rapidly. Virtual reality technology, as a comprehensive information technology,Utilize and comprehensive the latest development results of a variety of high -tech such as multimedia technology, simulation technology, display technology, etc, immersive VR enables users to actually participate in the virtual world created by computers, allowing people to experience the immersive effect through the use of interactive devices [1]. The strong immersive experience of this technology has made it one of the important features of the current field. Therefore, VR game design, as an important part of the VR game industry, is different from ordinary game design, and its requirements for game immersion are even stronger. Comprehensive VR technology has the interaction, immersion, conception, and Perception, the existing game interaction design still has some problems in adapting to virtual reality technology. For example, in current VR games, players have higher re-

quirements for the degree of freedom in character control because they can control their own movement trajectories and interactive actions, Some games may encounter some rigidity issues, such as NPCs not setting corresponding lines or expressions for this situation, and can only make a single response to the player's actions or conversations. Or the game scene may be too single and the gameplay too consistent with other types of games on the market, the game background story may be lacking, and the difference between the game kernel and ordinary computer console games on the market cannot be highlighted. Players may have difficulty understanding what the game is going on during the gameplay. The above issues may all lead to players experiencing low immersion, lack of character effects, and difficulty in immersing themselves in the storyline while playing.

This article will discussed based on the problems analyzed and the need to be improved. And the specific ways in which games use virtual reality technology to enhance player immersion are discussed from four aspects: game character design, plot design, game task design, and scene environment design. Explore and analyze how to improve the character design of the protagonist and other NPCs by combining game content and actual needs, designing game plots and scenes for specific player groups and their interests, and setting up directional and feedback incentive game interaction tasks to enhance the immersive experience of players.

2. VR Technology and Key Points of Its Interactive Design

2.1 Development of VR Technology and its Application in Interactive Games

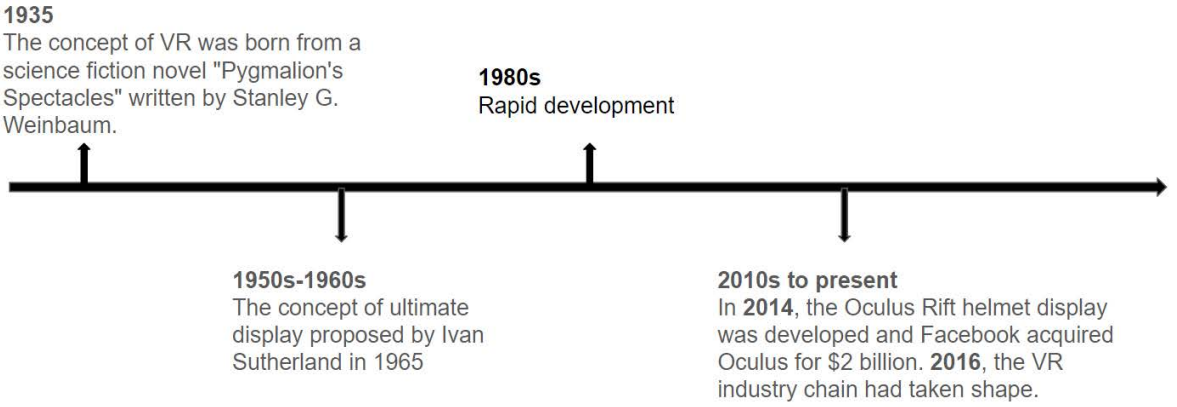

Fig. 1 VR development flow chart (Photo/Picture credit : Original)

The concept of virtual reality originated from a 1935 science fiction novel, Pygmalion's Spectacles. In the novel, the author Stanley· G· Weinbaum described a virtual reality system that provides a full immersive experience including vision, smell, and touch (Fig.1). With the continuous advancement of science and technology, the birth of virtual reality technology and augmented reality technology has made it possible for humans to envision immersive virtual reality. In recent years, the innovation of virtual reality technology has enabled the interaction between people and machines to evolve from information interaction methods such as text, voice, images, and videos to immersive content interaction methods such as gestures, body sensation, voice, eye tracking, and brain waves. As VR technology continues to improve, network infrastructure upgrades and hardware equipment matures, the applications of Virtual Reality areas are rapidly expanding from entertainment fields such as games and movies to other vertical fields such as education, sports, and medical care [2]. The VR R&D boom is on the rise, and 2016 is called the first year of VR [3].

With the rapid development of VR, immersive VR has become the focus of attention of many industries. Especially in the gaming industry, many VR games were exhibited at the 2016 E3 exhibition. In addition, VR versions of well-known games such as Final Fantasy, Resident Evil, and Batman: Arkham Knight will also be released one by one [4]. Looking at the development process of games, they have gone through a process from 2D to 3D and then to immersive VR mode. Its picture accuracy and game plot are constantly being improved as technology improves. As game graphics and technology advance, games become more realistic and immersive. In the interactive application of VR in games, players, as the controllers of the story, can decide the progress and ending of the plot by themselves, which requires a lot of plot interaction in the

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narrative.

2.2 Reality of Game Interaction

The authenticity of VR technology space is mainly reflected in the visual aspect, which provides users with an interactive space by building a virtual environment. VR game interaction allows players to see everything in a three-dimensional environment. Therefore, the space seen by the eyes can not only help users understand the shape and size of things, but also help them judge the distance between people and objects, the material of objects, etc. People get up to 80% of information through vision, so the authenticity and intuitiveness of the visual experience in interactive design are particularly important. The interaction of scene objects is also an important aspect of reflecting the authenticity of VR space. The practicality and efficiency of interactive actions increase players' real perception of the game to a certain extent. For example, the weight design, touch design and actual interaction design of interactive items make users perceive the virtual world as being similar or consistent with the normal world.

2.3 Technical Issues Faced by VR Games

At present, there are relatively few VR games and VR games have not yet entered a mature stage. So the number of truly high-quality games is limited. In addition, the cost of using VR technology itself is high, the equipment is expensive, and it also requires a high-end computer and a certain amount of gaming space. The strict equipment and environmental requirements make potential players reluctant to buy VR equipment, and game production companies are reluctant to develop VR games because they cannot make a profit due to the small number of players [5].

In terms of interaction, 3D modeling and optimization technology are not fully developed, the physics engine in VR games is difficult to write, and the interaction design of VR games is likely to have low interaction and presence effects. Players cannot have a real relationship with or influence on the virtual world. At first, they may feel fresh about the unique environmental effects of VR games, but after the freshness wears off, they find that their behavior has too little impact on the virtual world or that the coherent reaction is too low. They may lose their sense of self-existence and thus lose interest in playing. In 2016, Steed et al. from University College London conducted a study on the sense of self-presence in virtual reality. The results showed that the presence of self-avatars and appropriate interactions can effectively enhance the sense of self-presence [6].

In addition, VR technology is used in games to create grand, high-impact scenes to fit the real world in order to win the favor of players, but this realistic effect may lead to the loss of game content or core ideas, and some people may experience physiological reactions such as nausea and vomiting when experiencing overly realistic virtual scenes. VR production still needs to consider the balance between scene realism and player physiology.

3. Application of Interaction Design in VR Games

3.1 Plot Design

Plot design is the core framework of a game. Whether it is an action-adventure game, a role-playing game or a casual game, the game needs the support of a background story. If the game does not have a basic plot or background story, players will feel quite confused when playing the game. A good plot design can also narrow the distance between players and characters and enhance the sense of immersion. Take Detroit: Become Human as an example. This game is an interactive movie game with artificial intelligence as the theme, produced by Quantic. It is loved by many players because of its huge plot construction and rich ending development. In the game, players need to play the three protagonists Kara, Connor, and Marcus according to the chapters, and different choices will determine the ending of the game. The game is equipped with a unique plot system, using three main story lines to complement each other, and every choice made by the player will affect the direction of the plot. It is worth mentioning that the game specifically cancels the active save method in terms of mechanism, in order to avoid the possibility that players choose an unsatisfactory option in the plot and want to reload the file. After all, there is no re-select option in real life. The game's innovation and improvement in the plot allow the work to show the possibility of a new direction of play. The player's decision will change the plot and ending of the game. This design allows the majority of players to completely put themselves in the shoes of the players and think: If I face this situation, what would I do? The future of Detroit is in the hands of the players.

Fig. 2 Detroit: Become Human,Three Main Characters [7]

The unique story design of Detroit: Become Human shows the different possibilities of game designers to innovate future plot construction (Fig.2). However, in the current stage of VR game production, producers rely too much on the huge physical sense of VR games to show excitement and impact, and the focus is too single, resulting in the loss of the core plot and emotional transmission. A study analyzing the reasons for the failure of the game adaptation of the movie ET concluded that the adapted game lost the 'strong emotional attachment' to the aliens that the original work evoked in children [7]. In VR games, the emotions that the game conveys to players are crucial. Therefore, when designing the game plot at the current stage, producers need to consider the thoughts and emotions behind the plot to resonate with players and thereby increase the immersion of the game.

3.2 Character Design

Character design needs to be combined with the actual needs of the game and designed according to the plot required in the game. When designing game characters, you can design them according to the characteristics and interests of the main user groups of the game product, and pay attention to the details of the character's facial expressions and subtle movements by referring to the daily life of the public.

VR games mostly use the first-person perspective as the main perspective, which means that players will experience a different story immersive through the perspective of the protagonist or other characters in the game. Therefore, the resonance between the characters in the game and the player's story is the key to improving immersion. Some studies have shown that when players resonate with characters, they seem to develop a sense of enjoyment. However, the so-called resonancedoes not require that the player's real-life situation is completely consistent, but rather that the character reflects the player or a certain characteristic. In the VR version of Resident Evil 7 (2017), the overall direction of the game is the story of Ethan rescuing his wife Mia and fighting against various losses. In the game, players need to play the role of Ethan to feel the terrifying atmosphere in the game space, face conflicts, and complete the game (Fig.3) [8]. Unlike the protagonists of other series, Ethan is an ordinary person who is unprepared and inexperienced. He has no abilities except for his strong recovery ability. The dubbing is filled with the protagonist's collapse, screams, and nervous breathing. When players experience Ethan's perspective, they will empathize with the helplessness and hope of escape of ordinary people when facing disasters, and make choices about who to save. Because the protagonist is just an ordinary person and does not have the ability to protect everyone, players must make choices and get different game results.

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Fig. 3 Resident Evil 7 Character Design [8]

This kind of character design can enhance the player's sense of empathy to a certain extent. When the protagonist is trapped in a terrible situation, he will experience fear, struggle, panic and other emotions like a normal person. The player will better understand the difficulties Ethan needs to face, and can also better understand some of the decisions made by the protagonist, allowing the player to put themselves in the protagonist's shoes and think about how to use the resources at hand to escape the current predicament. However, this design may cause some players to feel frustrated. Some players may think that games are a place to get rid of the fatigue and distress of daily life. If the character and ability design of the protagonist are not much different from those of ordinary people, then how can they relax in the game if they have to face disasters from the perspective of ordinary people? Games can allow players to experience a second life, so the balance of character design should be mastered.

3.3 Scene Design——Diverse Culture and Artistic Style

Game scene design is an important part of digital game creation and one of the most direct communication points between the game and the players [9]. A major feature of VR is its visual creation. When a game is released, most players focus on Does it look good? It can be seen that the visual aspect of the game has an impact on the player's first impression. The first element that players first understand about the game is the game scene view. Scene design plays a key role in establishing the overall tone and rendering the environmental atmosphere in digital game design. Its quality directly affects the quality of the game itself. With the development of the game industry and the increase in the total number of digital games, players are gradually getting tired of the same scene design effects. Designers are beginning to look for game scene designs that are more distinctive and more attractive to players [9]. Game scene design can be divided into background story scene design and art style design. The scene design is required to be as novel as possible but must be linked to the overall world view of the game .

Fig. 4 Cyberpunk 2077 scene concept style [10]

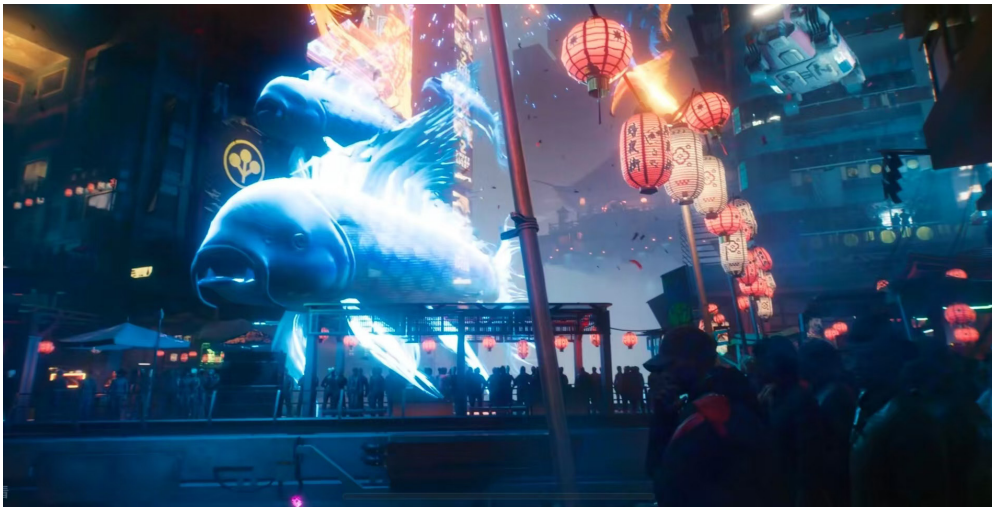

Fig. 5 Cyberpunk 2077 Japanese Street Culture [10]

Take Cyberpunk 2077 as an example (Fig.4 and Fig.5). The game presents a complete cyberpunk city - huge amounts of data, complex transportation, cool mechanical prostheses, gorgeous neon lights, a fusion of Eastern and Western regional cultures, a society full of material flows [10]. In addition to the cyberpunk style, the game also highlights the characteristics of rich-poor gap and mixed styles in scene production. In Night City, players can see the intuitive comparison of the rich-poor gap in the same city. In addition, Cyberpunk is also equipped with stylized facilities with unique regional characteristics such as Japantown and Chinatown. These two major design features lay the foundation for the overall characteristics and expression of the game. At the same time, the multi-element design feature avoids the aesthetic fatigue of players caused by similar design elements. The complete scene design and semi-open gameplay style add more playability to the game.

3.4 Mission Design

As an indispensable part of game design, task design plays an important role in helping players understand game mechanisms and experience game plots. In the interactive design of VR games, task design should focus on feedback, motivation and efficiency.

Strong directionality refers to the clarity of in-game mission issuance and guidance. In games with special gameplay or mechanisms, tutorials are also part of the mission guidance. In order to prevent players from losing interest and allowing them to experience the subsequent plot as

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early as possible, some games simplify the tutorial or simply ignore its design. This will result in players not understanding the core mechanism of the game after playing for a long time. Such games may lose some user groups because they cannot allow new players to fully understand the game mechanism and gameplay methods. Take Texas Chainsaw as an example. This game imitates the core gameplay of asymmetric games such as Dead by Daylight. The main gameplay of the game is that the players of two camps have the task of escaping or hindering escape. But perhaps because there were similar games before, the game's tutorial design is extremely simple. In the player feedback on major websites, nearly 40% of the negative reviews are due to the lack of guidance in the early stages of the game. In addition, the design should pay attention to guidance, that is, guiding players to complete tasks and advance the plot. In game interaction design, designers should pay attention to the reward mechanism after the task is completed, and use appropriate rewards to encourage players to continue the plot.

4. Conclusion

In general, this paper focuses on the challenges currently faced by VR games, especially the limitations of user operability functions and the lack of immersion in VR virtual environments. We focused on analyzing the advantages and disadvantages of the interactive design of existing games on the market and explored how to effectively enhance immersion in game design. Although the VR industry has only been around for a short time and has not yet achieved full development, and there is still huge room for improvement, designers are constantly reforming and innovating in game production. The rise of VR technology has injected unprecedented vitality into the field of game design, prompting game designers to explore and innovate game construction and experience in unique ways. In this context, designers not only need to pay attention to technological advances, but also consider the deepening of user experience and strive to overcome the shortcomings of interaction design in VR games. By introducing more intuitive operation methods, rich environmental details, and more immersive audio and video effects, designers can effectively enhance user participation and immersion. In addition, the use of advanced technologies such as spatial audio, tactile feedback and body motion capture can further enhance players' real experience in virtual environments.

Overall, although VR games still face challenges in terms of user operability and immersion, with the continuous advancement of technology and innovation of design concepts, future VR games are expected to provide players with richer and more engaging experiences. Designers play a vital role in this process. Their exploration and innovation will drive the continued development of the VR gaming industry and create more diverse and immersive gaming experiences.

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