Social VR: A New Form of Social Communication in the Future or a Beautiful Illusion?

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Abstract. The further development of 5G technology provides new development possibilities for the application of VR technology in various fields. The application of VR in the social field has derived the concept of "social VR". This paper focuses on where social VR is new and where is the future of social VR going. By means of comparing with traditional ways of socializing, this paper proposes three new features of social VR: high immersion, diverse interactive modes, and contextualized social content. We classify social VR applications and take two popular social VR games: VRChat and Facebook Horizon, as examples to illustrate the current development of social VR applications and the possible existence of social VR. Moreover, a series of problems and countermeasures are explained and further considered. This paper is of great significance in the development of social VR. It indicates that there is a good prospect for the future of social VR.

1. Introduction
With the coming of the age of 5G communication, the passion for virtual reality technology has been rekindled. At present, VR has obtained preliminary applications in various industries, including education, gaming, medical treatment, psychology, art, and so on.[1] Social networking is an important part of human social activities. With the development of technology, people are no longer satisfied with face-to-face communication that is constrained by space. Offline social networking has extended to online social networking. WeChat, Weibo, and TikTok have become the main means for people to socialize online. As the next generation of computing platform, how will VR reframe our social communication in unimaginative ways?

Social VR relies on virtual reality technology, enabling people to achieve multi-dimensional interaction without meeting each other. It is an emerging social method. Compared with traditional social methods, Social VR has three new features: high immersion, diverse interactive modes, and contextualized social content. After acquiring Oculus VR in 2014, Facebook has taken social VR as an important part of its development roadmap and launched Facebook Spaces VR social platform at Oculus Connect Conference, 2016. What’s more, Facebook will launch a new VR world named Facebook Horizon in 2020. Game platform Steam has also launched its own social VR application—VR Home. Many research teams around the world are experimenting in the social VR field. Nowadays, VR tools social and social VR games are two types of social VR applications on the market. This paper proposes the new features of social VR and analyses several VR social applications nowadays.

Social VR will change the definition of social, the virtual game world appearing in the science fiction movie Ready Player One may come true, where people can have their own avatars and...
socialize. However, social VR will also bring numerous issues such as security, ethics, etc. Will social VR become a new form of social communication in the future or is it just a beautiful illusion?

2. The concept of social VR

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2.1. Visual Reality

Virtual reality technology is an important direction of simulation technology. It is a collection of simulation technology, computer graphics, human-machine interface technology, multimedia technology, sensing technology, network technology and many other technologies. VR includes simulation environment, perception, natural skills, and sensing equipment. VR has three technical characteristics: immersion, interaction and imagination. These three characteristics are interconnected and influence each other. It is called "the triangle of virtual reality technology", see Figure 1. The immersion of VR surrounds the users in the virtual world, including visual immersion, auditory immersion, and tactile immersion. The interactivity of virtual reality technology provides naturalness and real-time, which fully meet the characteristics required for social functions. The imagination of VR enables users to obtain the imagination of the next behavior and state of the system through the logical processes of judgment, reasoning and association based on various information and their behaviors obtained in the virtual world. The technical characteristics of VR have laid a solid foundation for VR social applications.

![Figure 1. The triangle of virtual reality technology.](image)

2.2. Social media

Social intercourse is a basic demand of human beings. People establish social network, amuse and realize self-fulfillment through social intercourse. The application of social media extends from offline to online and the form of social media also evolves with the development of technology. The social media form based on 2G communication technology is represented by QQ, Post bar and BBS. People can only communicate through emoticons, words and pictures. With the arrival of wireless mobile Internet era basing on 3G network, voice messages, pictures and other more explicit and convenient ways can be used to chat. Short video products are representative of this stage, such as Tik Tok, Miaopai, Kuaishou. People can find targeted content according to personalized tags and communicate via videos based on 4G communication technology. There are five types of social media: social network, photo sharing, video sharing, interactive media and blog community. With the gradual popularization of 5G communication technology, new forms of social media based on this technology are being explored.

2.3. Social VR

With the development of virtual reality technology, VR has been widely used in gaming, education and other areas. Social VR is the application of VR technology in social field. In 2018, Google and Facebook put forward the concept of "social VR ". People can have their own image in the virtual world. In the real-time and dynamic simulation environment, they can communicate in a multisensory way, which makes social communication immersive. There is a gap between the image people build in
social media and the image in reality. On one hand, the description of users’ ideal image can be built through avatar in VR.[4] On the other hand, with the help of virtual environment, social VR can make the most important element in social communication——"sharing" everywhere, which is the ideal state that social communication wants to achieve.[5]

3. New features of social VR

Compared with traditional social methods, social VR mainly presents the following three obvious characteristics.

3.1. High immersion[6]

As a major technical feature of VR, immersion can be fully reflected in the social application scenario. People can be brought into the virtual world through VR equipment and be immersed in it. For example, in the traditional live broadcast, the audiences can only watch the live broadcast in front of the screen. On the contrary, if the live broadcasts are in the virtual world, the audiences are able to break the screen barrier and interact with the anchor in the same environment. Social VR is closer to offline social communication. The former is in a virtual space, while the latter is in a real space. Compared with chat on WeChat or other social networking software, the highly immersive nature of social VR reduces social nihilism to a certain extent.

3.2. Diverse interactive modes

What social VR subvert is not visual imaging but interactive modes. Although the way of telephone and video breaks the limit of distance to socialize, the way of people's interaction is limited: only through hearing and vision. People's sense of smell and touch can't be directly felt like face-to-face. In real life, the language means of interpersonal communication can be divided into verbal communication and non-verbal communication. Ray Birdwhistell, an American psychologist, found that non-verbal communication including eye language, gesture, body posture, facial expression, behavior and touch accounted for 70% of interpersonal communication, while verbal communication accounted for only 30%.[7] In social VR, nonverbal communication can be presented in virtual social scene through real-time capture, which changes social communication from plane to three-dimensional and realizes zero distance communication. Social VR is not only limited to information sharing, it concentrates more about experience sharing in comparison to the traditional instant messaging software.

3.3. Contextualized social content.

The virtual community provides a variety of virtual scenes. Users can play VR games to cooperate and fight together in the virtual world. It’s similar to the party games in the real world.[8] Various interactive modes compose the social content, avoiding the awkward situation of nothing to say and no way to socialize in traditional social interaction.[9] This makes it more convenient to understand each other. In brief, contextualization can take social media to a new height, which reflects the strong sociality of social VR.

4. Development of VR social applications

At the present time, VR social products on the market can be divided into VR social games and VR social tools according to what they focus. The VR social game aims to create a multiplayer online game experience. It emphasizes on social attributes, but the degree of VR interaction is light. VR social tools can be classified according to the ways of only socializing with friends (private) and strangers (public). Figure 2 shows some of the existing VR social applications.
In order to analyse and design the VR social application from diverse perspectives, Zachary Deocadiz, the designer of within VR, has developed a framework for evaluating and designing VR social applications, see Figure 3(a). He analysed and evaluated six VR social applications in eight dimensions: guided and self-taught, public and private, prescribed and user-generated, anonymous and identified, reactive and preemptive, simple and complex, persistent and temporary, shareable and real time. Figure 3(b) shows a graph based on this framework to analyse VR social applications. The analysis results can be seen in Figure 4.

**Figure 2.** VR social application classification quadrant diagram.

**Figure 3.** (a) A list of all the spectrums within the framework, (b) A graph exploration that allows us to plot existing social VR explorations. Note that being closer to the center means that the app is closer to the other side of the spectrum, as opposed to being the opposite of the axis label.[10]
Figure 4. The analysis of six VR social applications.[10]

**VRChat** is a multiplayer online VR game launched in 2017. Figure 5 shows publicity pictures of **VRChat**. Although its name contains "VR", for some of its game functions, VR devices are not necessary. **VRChat** allows players to have their own image, to design their own rooms, to chat with other players in the square, and to play with friends or to watch movies in the game module. The high degree of freedom and creativity of **VRChat** make it all the rage. According to data in early 2019, the number of its users has reached 4 million. However, only 30% of the 4 million users are VR users, that is to say, most users are only addicted to the game function of creating virtual image, rather than the social attribute of VR social games. **Recroom** is also a popular VR social game. It has a large number of theme rooms and is almost leisure games with many people fighting against each other. It focuses on entertainment interaction so it is very suitable for players who are eager to fight or cooperate with their friends. Whereas, its social nature is weak and it is more inclined to leisure game functions.

**Figure 5.** **VRChat** propaganda screenshots.[11]

Due to the fact that VR devices are not yet popular, the development of VR social tool applications is far inferior than VR social games. **Holoportation, High Fidelity and Facebook space** are several typical VR social tools. Their main goal is to break the distance between users and let users create experience in virtual scene through gesture recognition, facial expression synchronization, eye tracking, visual recognition and other technologies. They are a new interpretation of social tools in the form of VR. However, in the attempt of VR social tools, there are generally too few people. One is that the number of people allowed to be online is small, and the other is that the number of users is small, far from meeting the needs of a social application. **Oculus quest and rift platform** under **Facebook** will introduce a new VR social world named **Facebook horizon** in 2020 that has an excellent prospect. It starts with a bustling town square where people meet and communicate, and then expands into a connected world where people can explore new places, play games, build communities,
and even create their own new experiences. Figure 6 shows publicity pictures of Facebook Horizon. Since Facebook has the largest population of Internet users in the world, there will be a great progress for social VR if Facebook can lead users to this new VR social world.

![Figure 6. Facebook Horizon propaganda screenshots.][12]

5. Problems and Countermeasures

5.1. Technical Problems
In order to popularize social applications, it involves a lot of complex technical problems. First of all, we need to solve the problem of data transmission delay. Because the interaction in the virtual scene is no longer so simple as a piece of text or a piece of voice, more reliable and efficient data transmission technology is required. And the data consumption of VR social applications will be 100 times that of traditional social applications. In addition, there are many basic problems to be solved, including deep learning, facial expression recognition, hand recognition, 3D scene restoration, etc. However, with the landing of 5G and the hot development of artificial intelligence, VR social applications with rich game functions and good user experience are just around the corner. For example, a recent engineering study published in Nature has realized a wireless touch sensitive interface that can communicate and cover the skin surface. It can be used as VR synthetic skin in VR social applications. Figure 7 shows the structure of the wireless touch sensitive interface.

![Figure 7. Wireless touch sensitive interface.][13]

5.2. Price problems
As a hardware driven application, the price of VR devices is a major factor affecting its popularity. VR social game itself is difficult to be a prying force for VR device sales. As a new computer vision upgrade, VR is bound to bring about further development of virtual image. However, it is unlikely to build social products based solely on VR avatars, and even leverage the entire VR market. Figure 8 shows some of the VR devices and their official guide price is marked at the bottom.
5.3. User acceptance
Although social VR brings many benefits, it inevitably needs the support of VR devices, which are far from the portability of mobile phones. Besides, users have to isolated from the real world, so it is not suitable for some scenes with many people, such as subway. In the era of time fragmentation, for users who are used to WeChat and other more convenient social tools, a period of adaptation and acceptance is required.

5.4. Security issues
In our real life, there are social costs in the social interaction between people. Thus, people will consider the negative effects of their inappropriate words and behaviors. However, with the advent of the information age, the low threshold and disconnected network space from real life greatly reduces the cost of social activities in the network, and the low-cost social activities magnify the malice of humanity, resulting in the social phenomenon of network violence. And social VR, a more real and open social way, will make the malicious human nature more intuitive, and also make people feel the malicious harm more easily. Too real audition experience in social VR interaction may influence people's behavior imperceptibly, even extend to the real world outside VR, and bring some violence and pornography factors to the real world, which may lead to a series of crime problems. Moreover, there are more users' personal privacy information in social VR. How to protect personal privacy security is also a serious issue social VR faces.

For example, in the film named Ready Player One, the actor Perzival just ignored the difference between virtual and reality and divulged his personal information in the virtual world, resulting in hunting and killing.

Therefore, we should prevent the risk of social VR from the source. In F8 Developer Conference 2019, Facebook proposed a "security bubble" scheme to ensure a safe distance in social VR.[17] In addition, similar to other cultural industries such as movies and games, social VR platform is supposed to establish a grading system to prevent low-age users from receiving inappropriate things.

6. Conclusion
Although virtual identity has a fatal attraction for people, people's love for virtual identity only seems to stay at the level of customization of their own virtual image currently. But with the popularization of VR devices and the maturity of VR interaction technology and on the premise of protecting users' personal privacy, we believe that social VR will become a new form of social communication in the future.

Nowadays, people are accessing social media through smartphones and tablet computers, but in the future, VR devices can transfer many activities requiring physical presence to VR, which provides users with more freedom to decide how to portray themselves as others on the Internet. More importantly, the initial goal of social media is to contact people all over the world. No matter WeChat or all kinds of live software can't really shorten the distance to make users from a long distance get together in one place. But VR social can be said to actually achieve the "presence". To some extent, social VR is the real social. The future of social VR is full of imagination. As well as the technical problems to be overcome, what we need to do now is to reduce the risks and dangers caused by social
VR. In conclusion, we ought to embrace the new social era in the future with a positive and cautious attitude.

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