

Research on virtual reality in the live stream industry

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Abstract. The live-streaming industry has seen significant growth in recent years, driven by advances in virtual reality technology and the growing popularity of online content consumption. This article explores the potential of virtual reality (VR) to revolutionize the live streaming industry, and analyzes VR's impact on user experience and content creation. After discussing the potential impact of VR technology on broadcasters, content creators and viewers, the article also elaborates on the main challenges and opportunities related to VR and live streaming platforms. The findings of this study provide valuable insights for researchers, practitioners, and industry stakeholders interested in understanding the role of VR in shaping the future of live streaming.

Keywords: Virtual Reality, Live Stream Industry, Media, Sport Games.

1. Introduction

In recent years, virtual reality has developed rapidly and plays an important role in people's lives, such as games, marketing, e-commerce, education and many other fields. Convolutional Neural Networks (CNN), in particular, has successfully used virtual reality to broadcast the first Democratic debate live in 121 countries [1]. Based on the better live viewing experience provided by virtual reality (VR), more and more people choose to use VR to watch videos and live broadcasts.

About 3 million VR headsets were sold in 2016. Meanwhile, at The Consumer Electronics Show (CES 2017), Samsung confirmed that more than 5 million Gear VR headsets are in use worldwide. And YouTube also has a huge VR user base, with the most viewed 360-degree video having over 53 million views and counting [2]. This information provides a clear picture of how large the audience for VR is and the potential for its market development. Various live broadcast platforms and their service businesses are constantly optimizing and improving their live broadcast equipment to provide viewers with better live broadcast services. Due to the popularity of VR, the number of VR live events is also increasing significantly. The Olympic Broadcasting Service provided only 85 hours of live VR content to 14 rights-holding broadcasters representing 31 territories. The NBA announced in October that it will produce one game per week in the form of a live VR broadcast. The number of sports organizations pursuing the technology has also been increasing, including National Association for Stock Car Auto Racing (NASCAR), National Football League (NFL), and Union of European Football Associations (UEFA), etc [3].

In addition, many social software have also begun to provide VR live broadcast functions, such as YouTube launched 360-degree live broadcast in April 2016, and Twitter launched Periscope 360 live broadcast service in December 2016. Facebook Live 360 launched in 2017. In short, VR has changed

people's views on live TV in life. With the popularization of technology, more and more people will choose to use VR to watch live video.

2. VR in live stream: enhancing user experience

2.1. Immersive viewing experience:

Virtual Reality provides users with a highly immersive viewing experience by transporting them into a virtual environment. Users can feel a sense of presence and engagement as they explore virtual spaces and interact with the live-stream content [4]. For example, a live broadcast of a basketball game. Due to the venue and time constraints of the game, a large part of the audience will not be able to participate in the game on site. However, the atmosphere of the scene cannot be conveyed to the audience through TV or relay, so many audiences will gather in the reserved bar or other places to watch the game together. However, public safety incidents often occur because of the large number of people. The emergence of VR and its application on headsets can largely solve these problems. When the audience wears headphones, they can personally experience the intensity and atmosphere of the event. Choose different viewing angles to experience the game as a live audience, and you can choose to follow the player's movement to lock the viewing angle and experience the game completely immersively. At the same time, you can also hear the cheers of other audiences at the scene, satisfying the needs of attention for participation.

2.2. Interactive engagement:

VR can realize interactive participation with live content. Through VR technology, viewers can interact virtually with live content. This can include interacting with virtual objects, manipulating the environment, or participating in virtual events. For example, at a live concert broadcast live in VR, audience members can virtually move around the concert venue, choose different camera angles, and even interact with virtual elements such as virtual merchandise or avatars representing other audience members [5].

In addition, the VR live broadcast platform can enable a real-time feedback mechanism, allowing viewers to provide opinions, ask questions or make suggestions during the live broadcast. This can be done through text chat, voice communication or even gesture-based interaction. Content creators can then respond to feedback and incorporate viewer input into the live stream, enhancing overall engagement and engagement.

The VR live broadcast platform can also provide social functions, enabling viewers to interact with each other during the live broadcast. This can include features like virtual lounges or chat rooms where viewers can connect, network and share their experiences. Social interaction fosters a sense of community and creates a shared experience that makes live streaming more engaging and enjoyable for viewers. Viewers contribute their own content, which not only increases user-generated creativity, but also contributes to the live content itself [6].

Interactive participation in VR live broadcasts not only enhances the viewer experience, but also provides content creators with valuable insights and opportunities for audience engagement. By enabling viewers to actively participate and become co-creators of content, VR technology transforms passive viewers into active participants, resulting in a more immersive and engaging live broadcast experience.

2.3. Social environment

VR live streaming platforms often offer social features that enable viewers to interact with each other during the live stream. This can include features such as virtual lounges or chat rooms where viewers can connect, communicate, and share their experiences. Social interaction fosters a sense of community and creates a shared experience, making the live stream more engaging and enjoyable for viewers.

VR live-streaming platforms offer social interaction features that allow users to connect with friends and other viewers. This sense of co-presence creates a shared experience, making live streaming more social and engaging[7].

3. VR in live stream: transforming content creation

VR technology is changing content creation in the live streaming industry by providing enhanced immersion, expanding creative possibilities, and enabling real-time interactive experiences. Empowering content creators to push the boundaries of live streaming while delivering new dimensions of storytelling and audience engagement.

3.1. Enhanced immersion:

VR enables content creators to provide a more immersive experience to their viewers. By capturing and streaming content in VR format, viewers can feel like they are physically present in the virtual environment. This heightened sense of immersion creates a more engaging and captivating experience for the audience.

3.2. Degree video capture:

360-VR allows content creators to capture and stream live video in 360 degrees. This means that viewers can have a panoramic view of the entire environment, providing a more comprehensive and immersive perspective. 360-degree video capture enhances storytelling capabilities and allows for more dynamic and visually stunning live stream presentations [3].

3.3. Virtual set design:

With VR, content creators can design and create virtual sets for their live streams. Virtual sets offer unlimited creative possibilities, allowing for the creation of unique and visually appealing environments that may not be feasible in the physical world. Content creators can transport their viewers to virtual stages, exotic locations, or imaginative landscapes, enhancing the overall production value and visual experience.

3.4. Augmented reality overlays:

VR can also be combined with augmented reality (AR) technology to overlay virtual elements onto the live stream. Content creators can add interactive and dynamic visual effects, graphics, or informational overlays, enhancing the viewer's understanding and engagement. For example, in a live sports event, AR overlays can display player statistics or real-time game analysis, providing additional context and information to the viewers.

3.5. Real-time VR streaming

Advancements in real-time VR streaming technology enable content creators to broadcast live streams directly from virtual environments. This means that viewers can experience the live stream as it happens, in real time, without the need for post-production or editing. Real-time VR streaming opens up new possibilities for interactive storytelling and allows content creators to deliver unique and immersive experiences to their audience immediately [4].

3.6. Creative expression:

VR presents content creators with new avenues for creative expression. It allows them to experiment with innovative formats, techniques, and narratives that leverage the unique capabilities of VR technology. By pushing the boundaries of traditional live stream content creation, creators can deliver more impactful and memorable experiences to their viewers.

Overall, VR technology is transforming content creation in the live stream industry by providing enhanced immersion, expanding creative possibilities, and enabling real-time interactive experiences. It offers a new dimension of storytelling and audience engagement, allowing content creators to push the boundaries of what is possible in live streaming.

4. Challenge and opportunity

4.1. Challenge

4.1.1. Technical limitations and infrastructure requirements. VR technology requires specific hardware, such as VR headsets, which can be expensive and can limit the accessibility of VR live streams. The cost and technical requirements of VR devices may pose a barrier to some viewers, preventing widespread adoption. Additionally, streaming VR content requires massive bandwidth and low latency to ensure a smooth and immersive experience. High-quality VR streaming can be data-intensive and can strain your internet connection, resulting in buffering or reduced video quality. Overcoming bandwidth and latency challenges is critical to delivering a seamless VR live experience [8].

4.1.2. Content production cost. Creating high-quality VR live broadcast content requires specialized equipment and expertise, and the cost is higher than traditional live broadcast. Additionally, capturing and editing VR content can be more complex than traditional live streaming, requiring additional resources, skills, and production workflows. Content creators need to invest in VR-specific equipment and training to create engaging VR livestreaming experiences [2].

4.1.3. User experience. Some viewers may experience motion sickness or discomfort when using a VR headset, especially during fast-paced or intense VR experiences. This directly limits the duration of a VR live session and greatly reduces viewer engagement. Addressing motion sickness and providing a comfortable VR experience is critical to ensuring audience satisfaction and minimizing negative impact.

4.1.4. Privacy and ethical issues. VR technology can capture and transmit users' personal information, including physical location, body movements, and facial expressions. Once this data can be used to track and monitor users without their knowledge or consent, it raises privacy concerns [8]. Additionally, VR live streaming platforms can facilitate cyberbullying and harassment, as users can create immoral or offensive content that can be used to intimidate or harass others, such as simulated violence or sexual content. This can have a negative impact on society, as well as cause emotional distress and psychological harm to users. At the same time, VR technology can be addictive and socially isolating, as users can become immersed in the virtual environment and lose touch with the real world. This can have a negative impact on mental health and wellbeing.

4.2. Opportunity

Immersive and engaging experiences:

VR technology offers unparalleled immersion, allowing viewers to feel like they are physically present in the virtual environment. This level of immersion enhances engagement and can provide unique and memorable live stream experiences. VR live streams have the potential to transport viewers to different locations, events, or scenarios, creating a sense of presence and excitement [6].

4.2.1. Enhanced interactivity. VR enables interactive participation, allowing viewers to actively engage and interact with the content. Users can manipulate virtual objects, participate in virtual events, or communicate with other viewers, enhancing the social aspect of live streams. The interactive nature of VR opens up opportunities for innovative and engaging live stream formats that go beyond passive viewing.

4.2.2. Virtual commerce and monetization. VR live streams can create new avenues for virtual commerce and monetization. Content creators can offer virtual merchandise, sponsored virtual events, or virtual experiences that viewers can purchase or subscribe to. VR live streams provide opportunities for content creators to generate revenue through virtual transactions, sponsorships, and partnerships[5].

4.2.3. Global reach and accessibility. VR live streams have the potential to reach a global audience, transcending geographical limitations. Viewers from different parts of the world can experience live events, performances, or conferences virtually, without the need for physical travel. This global reach and accessibility can significantly expand the audience base and increase the potential impact of live stream content.

4.2.4. Data analytics and personalization. VR live streams can provide valuable data insights about viewer behavior, preferences, and engagement. By analyzing user interactions and feedback, content creators can gain a deeper understanding of their audience and tailor future live stream experiences to specific viewer preferences. This data-driven approach enables personalized and targeted content delivery, enhancing viewer satisfaction and retention.

5. Conclusion

This paper conducts a comprehensive analysis of the integration of virtual reality technology in the live broadcast industry. By enhancing user experience and content creation, VR has the potential to revolutionize how live streaming is perceived and consumed. However, some challenges such as technical limitations, content adaptation and user adoption need to be addressed. Industry stakeholders should carefully consider the implications and opportunities of VR in order to stay ahead of the ever-evolving field of live streaming.

The analysis of the application of VR in live broadcasting in this article is mainly based on theoretical analysis, without actual collection of relevant data, and no specific analysis of VR technology. In the future, we will have a more detailed understanding of the needs and updates of VR technology in live broadcasting, and better give suggestions on the direction of VR optimization and development.

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