

Research on the Application of VR Technology in the Field of Automotive Marketing

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ABSTRACT

With the increasingly fierce competition in the automotive market, the application of VR technology in automotive marketing by automotive enterprises plays an important role in improving consumer experience, gaining competitive advantages in the industry, and boosting the digital transformation of automotive enterprises. This paper reviews the current situation of VR technology in the field of automobile marketing, studies relevant policies, summarizes the application of VR technology in automobile marketing, and finally forecasts the development trend of VR technology in automobile marketing and gives relevant suggestions. The purpose of this paper is to provide some reference for promoting Chinese automobile enterprises to obtain competitive advantage in global automobile marketing.

KEYWORDS

VR technology; Automobile marketing

1. INTRODUCTION

At present, virtual reality(abbreviated as VR) technology is developing rapidly and has been widely used in many industries. On the other hand, in the field of automobile marketing, its focus is also shifting towards consumers and the buyer's market, gradually abandoning traditional marketing methods such as advertising and changing to marketing methods that pay more attention to consumer experience, so as to have the opportunity to grasp the direction of automobile consumption in the new era. [1]

The domestic automobile market has now reached a trillion level. The competition in both the traditional automobile market and the new energy automobile market is gradually intensifying. If relevant enterprises in the automobile industry want to better grasp the opportunities and meet the challenges, appropriate marketing drainage is the key step. Experts predict that the future marketing of the automotive industry will no longer rely on physical and offline marketing. In addition, by using vr virtual reality technology and 3D real scene modeling technology, the panoramic and full content display of vehicle and automobile marketing process can not only bring more powerful visual effects to consumers, but also bring consumers novel purchase experience. This new marketing method has expanded new ideas for automobile marketing and provided assistance for the digital transformation of the automobile industry, At the same time, it is of great significance for Chinese automobile enterprises to seize the competitive advantage of the global automobile industry in the field of marketing. [2]

2. OVERVIEW OF VR TECHNOLOGY

2.1. Introduction to VR technology

Virtual reality technology is an emerging technology, which has been gradually developed and continuously used in practice since the last century. Virtual reality technology creates an almost real virtual environment by using computer group simulation, so as to bring people an immersive experience. With the continuous development of society and the progress of science and technology, the convenience and good experience of VR technology attract the eyes of all walks of life. With the great technological progress of virtual reality itself, it has gradually become a new technological commanding point. [3]

The key points of virtual reality technology are as follows: 1. Tracking registration technology and 3D tracking registration technology are important key technologies in the field of virtual reality. By tracking and positioning the images or objects in the real scene, the virtual objects are superimposed on the real scene according to the correct spatial perspective relationship. 2. display technology, which refers to the integration of user interaction interface and image, making full use of realistic environment image, so as to achieve the application effect similar to micro camera. In addition, the image of external environment is collected to help the further processing of computer image, so that the images of virtual and real environment are superimposed and fully integrated. 3. virtual object generation technology, which is based on three-dimensional modeling, has the advantage of more truly embodying virtual objects. In the process of research and development, the object must be displayed collectively in an all-round way. 4. interactive technology refers to the design of an artificial system, which constructs two or more interactive individuals into the content and structure of communication, and enables them to cooperate with each other to achieve the design purpose. 5. merging technology. In order to solve the problem of virtual reality lacking in realism, it is necessary to deal with the relationship between virtual things and real things in advance. At the same time, it is required that virtual information and real information should have four conditions: geometric consistency, model authenticity, lighting consistency and hue consistency. Only in this way can virtual information and real scenes be perfectly integrated. [4]

2.2. VR technology status

In recent years, virtual reality technology and the new era technology with AI, 5g, cloud computing, Internet of things as the core have become increasingly close. For example, smart chip, metaverse, blockchain and other new concepts are gradually emerging, and the virtual reality industry is more complete in terms of software and hardware, content application and other links. At the current stage, the virtual reality industry has formed a certain ecology and system in China. Based on technological innovation, continuous product upgrading and integrated application are the main line, showing great potential and attracting the attention of capital.

Virtual reality is making technological breakthroughs step by step, and its application has spread to thousands of households, integrated into all walks of life, and promoted the process of social intelligence and industrialization.

Production, study, research, administration and application jointly promote the development of China's virtual reality industry. Many regions have also begun to step up the layout of related industries. At the same time, local governments have successively issued some supporting policies and measures for virtual reality related industries.

At present, virtual reality technology is particularly widely used in film and television, games, education, medical treatment, tourism, automobiles and other fields. For example, the deep integration of VR education, virtual simulation technology and education and teaching has enriched the manifestations of digital education resources, effectively solved the shortage of high-quality

education resources in some regions, and provided a new implementable way for the balanced development of regional education. Due to the development of virtual reality technology, the tourism industry has also made a lot of profits, creating a new Internet+tourism mode, bringing customers a new experience. With the help of modeling and rendering technology, it can restore fragile cultural relics, cultural relics and other scenes through three-dimensional models, increasing the interest and interaction of tourism. In the field of VR automobile, combined with the virtual scene with infinite space presented in the rear entertainment system, and combined with the extension of visual, auditory, tactile and other multi sensory experience, automobile manufacturers will build a virtual car theater in the cockpit, and at the same time, take over the virtual arena to realize the real sense of immersion through the equipment, so that users can obtain a richer and diversified immersion experience and have more fun driving.

2.3. VR technology industry related policies

Virtual reality technology has shown great potential. In order to accelerate its implementation and promote its integration and development with other industries, local governments have launched a series of key tasks and action standard policies:

In October 2022, the Ministry of Industry and Information Technology, the Ministry of Education, the Ministry of Culture and Tourism, the General Administration of Radio, Film and Television, and the General Administration of Sport jointly released the Action Plan for the Integration and Development of Virtual Reality and Industry Applications (2022-2026). The plan points out that by 2026, key technologies for immersive audiovisual integration of 3D and virtual reality will be breakthroughs, and the new generation of humanized virtual reality terminal products will continue to be enriched, The large-scale application of virtual reality in important economic and social industries.

In April 2023, the Ministry of industry and information technology and the Ministry of culture and tourism jointly issued the notice on strengthening the collaborative innovation and development of 5g+smart tourism. The notice pointed out that it would promote the effective integration of 5g with technologies and products such as the Internet of things, virtual reality, augmented reality, digital twins and robots, and guide the scale development of 5g+4k/8k ultra-high definition video, 5g smart navigation, 5g+vr/ar immersive tourism and other application scenarios.

In July 2023, the Ministry of industry and information technology and other five departments issued the opinions on the implementation of reliability improvement in the manufacturing industry, which pointed out that the focus was to improve the intelligent products of UAVs, virtual reality/augmented reality (vr/ar) devices and service robots.

In August 2023, the Ministry of industry and information technology and the Ministry of Finance issued the action plan for the steady growth of the electronic information manufacturing industry from 2023 to 2024. The plan pointed out that we should cultivate and expand new growth points, implement the action plan for the integration and development of virtual reality and industrial applications (2022-2026), grasp the strategic window period, improve the core technology innovation ability of virtual reality, and promote the continuous enrichment of virtual reality intelligent terminal products, deepen virtual reality and industrial production Cultural tourism, integrated media and other industries are organically integrated, and the collection of typical virtual reality application cases and industrial docking activities are carried out to promote the deepening and implementation of the virtual reality industry.

3. APPLICATION AND EXPLORATION OF VR TECHNOLOGY IN AUTOMOBILE MARKETING

3.1. Characteristics of the combination of VR technology and automobile marketing

- 1) **Interactive communication:** in terms of marketing, the traditional way for automobile enterprises is to output product value and strive to ultimately convey brand values different from competitors to consumers. With the continuous development of market economy, consumers' position in the market is becoming more and more important. The advent of virtual reality technology has helped consumers gradually regain the dominant position in the market. Virtual reality technology has realized the real-time interactive communication between buyers and sellers. While consumers convey their interest demands, it has also continuously promoted emotional exchanges, thereby enhancing their purchase desire.
- 2) **Sensory stimulation:** virtual reality technology mobilizes all kinds of senses including the viewer's vision, bringing unparalleled immersion to the vehicle experienter. This experience makes the vehicle experienter not only have a more diverse sense of experience, but also more authentic, and have a deeper understanding and clearer cognition of the product than a single visual impact.
- 3) **Personalized Customization:** automobile enterprises can develop virtual reality product experiences of different types and scenes by establishing their own virtual laboratories, so as to provide consumers with more choices. In addition, it can also be customized according to the needs of users, so that consumers can experience differentiated products or services closer to their own needs. [5]

3.2. Application and exploration of VR technology in automobile marketing

- 1) **Ford:** Established a virtual reality laboratory for designing new cars. Over the past 10 years, Ford's virtual reality development department laboratory has utilized VR technology as an auxiliary tool to assist designers in designing vehicle exterior designs. Designers can simulate the overall appearance and interior of vehicles in virtual reality by wearing Oculus Rift helmets, and can inspect specified contents such as sunroof and rear seats to improve the overall and comprehensive design level. Ford has also collaborated with Oculus in the United States to develop a design service. The car design engineers using the service wear Oculus helmets and connect with engineers from around the world to jointly view the appearance, interior, body, chassis, components, and other content of the vehicle, and make design adjustments to the new car.
- 2) **Nissan:** Created VR games for vehicles. At the 2013 Tokyo Auto Show, in order to attract consumers, especially young consumers, Nissan collaborated with a digital marketing agency to develop a customized game for two concept cars. The gameplay of the game requires the player to select one of the concept cars in a scene and modify it. Users can choose between safer hot air balloon scenes or relatively adventurous kayak scenes. Experiencers can wear Oculus Rift helmets and rotate their heads to design their dream cars as if they were in reality. Nissan collected a large amount of data from potential customers at the auto show to improve their vehicles.
- 3) **Volvo:** Volvo is the world's first company to use Google Cardboard for automotive brand marketing. When launching the new XC90 model, it collaborated with agent R/GA and virtual reality content studio Framestore to launch the Volvo Reality, aimed at providing users with a virtual reality based test drive experience. After applying for Google Cardboard and downloading the Volvo app, users can connect their phones to their glasses. In the experience, users can freely browse the internal structure of the vehicle, as well as have a comprehensive view of the vehicle's

exterior and interior design. Most importantly, users can "drive" the new car on the road and navigate smoothly on the virtual roads designed by Volvo.

- 4) Audi: Introducing VR car selection for consumers. Audi collaborates with Oculus to bring users a brand new experience. After wearing the Oculus Rift helmet, users can set the scene, select the interior of the vehicle, change the color of the vehicle, and switch between in car music by looking around. Since 2014, Audi has been laying out virtual reality technology and has assembled and tested VR technology devices in some of its direct stores. In terms of automobile production, Audi's CAVE studio has developed virtual assembly line verification technology, which combines 3D projection imaging and MYO forearm ring detection gesture technology to help vehicle assembly workers pre process vehicle assembly in virtual reality space, including parts estimation and calibration.
- 5) Toyota: Using virtual reality systems to help drivers improve their driving skills. In 2015, Toyota and Oculus jointly created a virtual reality driving experience content called TeenDrive 365, which helps to effectively improve driving safety for the youth population. This system is placed on a stationary real vehicle, simulating various real traffic scenarios with the addition of harassing text messages, phone calls, and noise interference, testing the driver's ability to concentrate on driving and not be disturbed by irrelevant distractions. This is equivalent to a VR racing game, but the difference is that the system will give the user a real, as if they are in the streets and alleys, a brand new experience.
- 6) Chrysler: Assisting vehicle factory visits with virtual reality systems. At the New York International Auto Show, Chrysler used virtual reality technology to invite visitors to visit Chrysler's entire vehicle factory. Chrysler offers the Chrysler 200C device, and after wearing a VR helmet, the user feels like they are in a real vehicle. After the system automatically introduces it, the user can embark on a journey to the Chrysler car factory, which will last about 4 minutes. At the beginning, no matter which direction the experimenter is facing, a car will appear in the center of their field of view, and the vehicle will be disassembled into components and float in front of the experimenter after a few seconds. And as long as you stare at a certain component, the manufacturing video of that component will be played to the user.
- 7) Roewe: The application of virtual reality technology in the new car launch event. Roewe once held a unique VR new car launch event at the Chengdu Auto Show. With the support of VR glasses, all the guests present only need to face a specific direction, and various information such as power, body parameters, fuel consumption, appearance, etc. of the Roewe new car can be seen and displayed in 3D in their eyes.
- 8) Chang'an: Virtual branches lead a new model of car buying. Chang'an Cloud Store is a revolutionary consumption mode exploration of Chang'an Auto based on Internet plus. In addition, the cloud store creates a 24-hour car showroom and provides offline on-site experience services. Through virtual reality technology, users can open WeChat to view cars in all directions without blind spots, without being limited by space and time. Some specific models also offer comparisons with competing models, and even some models without existing cars can be previewed in the cloud store first.
- 9) CATARC Media: Panoramic Technology Marketing Output Content. Produce the industry's first VR panoramic content for car (collision) testing, and create a multi platform immersive 3D experience with PC+VR+mobile phones. We carry out dynamic and static VR panoramic collection and processing for different types of technology marketing projects such as automotive testing and selection exhibitions. Relevant cases include the Euler Lightning Cat driver's female dummy intersection serial collision, the third row side collision of the WEY brand Blue Mountain, EXEED Peak Rolling Challenge, and the SAIC Roewe D5X side collision overlapping rear end collision. We have produced VR panoramic videos to assist automotive brand marketing.

3.3. The Development Trends of VR Technology in Automotive Marketing

- 1) Technological innovation: Future development will focus on continuous technological innovation, including higher resolution displays, lighter and more comfortable devices, and more intelligent interaction methods. New sensing technologies, more advanced eye tracking and gesture recognition technologies will further enhance the user experience.
- 2) Content creation: Solving the challenges of content creation is one of the future development directions. Investing in the production of virtual reality and augmented reality content will become an important link in the industry chain. Promoting the creation of more high-quality and diverse virtual and augmented reality content will stimulate user interest.
- 3) Real time cloud rendering: In the future, cloud services are expected to play a more important role in VR and AR. Through cloud computing, more efficient content rendering, real-time collaboration, and larger scale virtual worlds can be achieved.
- 4) Mixed Reality: In the future, VR and AR may tend to merge, forming a more comprehensive experience of Mixed Reality (MR). This will further break the boundary between virtual and reality, allowing users to interact with virtual elements in the real world, creating a richer and more diverse environment.
- 5) Smart glasses and wearable devices: In the future, smart glasses and wearable devices are expected to become the mainstream form of VR and AR. These devices will be more lightweight and portable, becoming tools for users to experience augmented reality anytime, anywhere. Compared to traditional headsets, smart glasses are more in line with the trend of future intelligent daily life. [6]

4. SUMMARY

After experiencing rapid development, the Chinese automotive market has become the world's largest consumer of automobiles. In the near future, the automotive industry will still be in a situation of stock competition, and its marketing target audience will also be diversified and refined. Therefore, using advanced virtual reality technology to improve the driving experience of consumers has become a key area of marketing competition for car companies. More and more car manufacturers are seeking diversification, combining VR technology with marketing to bring users a more immersive experience. VR, as an emerging technology that is constantly fermenting, has gradually penetrated into every aspect of our lives. Its realistic experience and infinite possibilities have continuously attracted widespread attention from car manufacturers, demonstrating enormous potential, allowing them to see more marketing gameplay, providing more trendy experiences for car users, and bringing numerous disruptions to the automotive industry. More importantly, It has created more convenience for our lives.

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