Research on Virtual Reality Technology in the New Media Environment

Xiaoyu Deng\(^\text{a}\), Minghui Li\(^\text{a}\) and Guosheng Su\(^\text{b}\)

School of Mechanical & Automotive Engineering Qilu University of Technology (Shandong Academy of Sciences) Jinan, China

*Corresponding author e-mail: 632822302@qq.com, \(^{a}\)742542608@qq.com, \(^{b}\)sgs@qlu.edu.cn

Abstract. Aiming at the problem of traditional product display packaging’s carrier is confined to a two-dimensional or animation form, which leading the problem that message is single and interactive experience is weak, the necessity and feasibility of the application to virtual reality technology in contemporary information convey is proposed, and its feasibility is studied. The virtual reality display system of motor vehicle product 3D model is taken as a research carrier, and the effect of virtual reality technology in product display packaging and information convey is verified by the method of visual effect, double scene switching and repeatable program. The system provides a new application effect for the product display process during the online to offline mode “online-creating momentum” and “offline-experiencing”, playing a role in promoting product display packaging and information conveying. Virtual reality technology can be used maturely in the new media environment and play an active role in the efficiency of information delivery.

1. Technical advantages and research situation

1.1. The Advantages of Virtual Reality Technology

Virtual reality technology is one of the Internet highlights and hot technologies that has emerged in recent years. It not only has important value in tourism, tourism, cultural relic’s exhibitions and other fields, but also has good prospects for development and great potential for development in new product launches, real estate development and other industries. In addition, virtual reality technology also plays an effective role in sales of auxiliary products. Normally, the promotion of the product is achieved through the form of product pages, mechanical animation, and realistic model of the hand to achieve display design effects [1]. Each of these traditional display methods has its own advantages and disadvantages, but they have one common disadvantage: They can't involve stakeholders from the point of view of users, users are not allowed to have a full range of observation and experience effects, and the display effect is one-sided. It is difficult to fully adapt to the consumer psychology and sense of participation in the era of experience economy.

The multimedia display technology centered on virtual reality ensures that stakeholders do not need to simulate real-life reasoning, nor do they need professional knowledge to display space or products to
consumers in an unprecedented and intuitive way, assure consumers' comprehensive observation and experience of the product [2].

Most virtual reality systems are built under the scripting control of related software. The commonly used software scripts are mainly Java Script and C#. The realization of the virtual reality system is controlled by the scripting program in the virtual software to control the imported 3D model, realizing the real-time interaction effect [3]. The successful design of a product or service is only a part of its value, and it can be used to display the appearance, color matching, style, and performance of the product to consumers in an efficient manner. The key to the realization of the commercial value of publicity is the significant increase in product sales or the improvement in the experience of the service. Therefore, the design of virtual reality system will become an important technical support for the promotion of product display packaging, which has a high practical value.

1.2. Research Status at Home and Abroad

Britain and Japan are leaders in the research and application of virtual reality technology. In Britain, applied research and virtual reality technology support equipment have unique advantages. Japan is mainly committed to the establishment of large-scale virtual reality knowledge system research. Meanwhile, Japan’s research in virtual games is also leading [4].

Although the research on virtual reality technology started later in China, it has recently received extensive attention. Currently, the R&D staff of the shopping platform is accelerating the application of virtual reality and augmented reality [5]. Universities and relevant departments have taken measures such as the construction of virtual reality labs to vigorously develop virtual reality technology.

As a national key laboratory, Computer Aided Design and Graphics Laboratory of Zhejiang University has made remarkable achievements in virtual reality. The laboratory has developed a real-time virtual roaming system based on a desktop-based virtual building environment. It also has a breakthrough study of fast generation algorithms and fast roaming algorithms. In Harbin Institute of Technology, where mechanical engineering is relatively powerful, researchers have successfully simulated the synthesis of human faces and the synthesis of facial expressions in high-level human behavior [6].

1.3. The main content and methods of the study

The application of virtual reality technology in product display mainly has two aspects: On the one hand, with the development of virtual reality (hereinafter referred to as VR) technology, the hardware requirements of VR technology are lower than other large three-dimensional software, making it possible to use in the commercial field, especially in product display; On the other hand, the combination of VR technology and the Internet, enabling product display or service enhancement can achieve cross-regional network sharing [7].

VR technology involves a large number of disciplines and technologies and belongs to multidisciplinary technology. In engineering design, two kinds of engineering design methods based on virtual reality are proposed: One is the use of existing Computer Aided Design (CAD) systems to generate 3D models, through software exporting, converting it into a file format supported by the used virtual reality software, and then input the model into the virtual display software's internal display environment to complete the design, rendering, and baking of the virtual product. The user makes full use of various enhanced effect devices, such as VR glasses and other device assists to create a sense of realism and real experience. The other is the Virtual Reality-Computer Aided Design (VR-CAD) system [8], [9] that introduces virtual reality into a computer-aided design environment makes it has information on shape, weight, material properties, surface hardness, and some intrinsic physical properties, functions etc.
2. Product model creation and VR Analysis

2.1. Product 3D Modeling Creation
Motor vehicle modeling is only used as the controlled role of the virtual reality system in this paper, therefore, the product performance method is used to create the basis of the model only. The advantages and characteristics of parametric software were analyzed and used to complete the design of the automotive hub. Suitable software was used to complete the design of other parts of the vehicle except the wheel hub. The description of the car shell part is the difficulty in the entire modeling construction. Carry out refinement of each part of the car body, separate the headlights, hood, trunk and other parts, and import the wheel part into the software to achieve the integration of the car (Figure 1).

![Figure 1. Model build of motor vehicle](image)

2.2. VR software comparison and selection
At present, there are many kinds of software that can produce VR systems on the market, among which the functions are relatively complete. The software with a large number of users is Cult 3D, Unity 3D, etc. Software such as VRP and Flash 3D Creation are used in Chinese VR system design applications [10], [11]. We choose Unity 3D software in the design of VR system in this paper. Unity 3D is a software that uses game development as the main function and can be controlled based on both C## and Java Script algorithms. Its advantages lie in its powerful rendering and baking functions, its user-friendly interface, and the ability to control most commands with scripts.

The three most basic features of VR are three-dimensional, presence and interactivity [12]. From the perspective of the composition of the system, virtual reality systems can be divided into four categories: desktop virtual reality systems based on workstations or computers, fully immersive virtual reality systems, distributed virtual reality systems, and telepresence systems.

3. Product models and virtual reality systems contacting

3.1. Tips for Importing 3D Modeling into Unity 3D
In order to import software into Unity 3D, it is possible to achieve faster software operation and no error during interactive design. It is necessary to handle the shell part of the motor vehicle with an additional command to ensure that the entire vehicle shell is equipped with glass windows, cooling holes, and lamp lights, other same material attached as an object. The separated faces are smoothed and converted into editable meshes or editable polygons to realize the compression of operation commands and the smoothing effect of the surface.

After processing all model surfaces, export the model to FBX or obj format. We use FBX format in this paper. Because Unity 3D has its own lighting effects and cameras during export, it is not necessary to import lights and cameras in the original software. When the model is successfully imported into Unity 3D, the first step in the formation of the virtual system is to clear the x, y, and z coordinates of the imported model, and note that the model's own coordinate axis direction should be consistent with the world coordinate axis in Unity 3D. Add a camera to the model and adjust the camera's angle and distance to ensure that the model is at a more appropriate display angle (Figure 2).
After adjusting the position of the camera, adjust the material of the displayed motor vehicle: The color of the car shell can be replaced with the color value of the car body, and the color switching can be realized through the effect of the Cube-map. Add an animated component to the car shell. Select the Animation in Miscellaneous under Component. Open the Animation window in the system and animate the color conversion button Cube-map of the car shell. The default animation conversion value is 0 or 1.

3.2. VR Scene Effect and Virtual System Export

Motor vehicles show switching in two different usage scenarios (Figure 3 and 4):

When the design of the VR system is completed, it needs to be exported for publication. At present, the export methods supported by Unity 3D are mainly export to web page, operation program and Android mobile phone APP. The specific parameters are set according to the actual needs of the designer. Among these three types of export methods, the web page has a strong ability to spread, but due to a lot of compression, the image quality is the worst; Exporting the operating program and exporting for the Android phone APP is better, but there is a certain amount of space to store the data necessary to display the system. If you want to export Android phone APP, the computer needs to install the relevant plug-in.
4. Technical innovations

1) This system uses the language algorithm and Unity 3D's own animation function ingeniously to achieve a better effect compared to using the animation function alone, which is more flexible and easy to use than using a language algorithm alone;

2) The VR effect meets the consumer experience in the era of experience economy, upgrades the experience, and increases user stickiness;

3) Combining the advantages of various implementation tools in computer-aided design, it intelligently integrates display of product models, display of interactive effects and animations, avoids difficulties in design, and achieves ideal virtual reality effects.

4) Demonstrate the way of propaganda and break the tradition, present the ideal effect of virtual reality through the form of cases, prove the feasibility of the theory with examples, and provide some reference for the realization of other similar effects.

5. Conclusion

The realization and application of VR technology in computer-aided design fully guarantees the display effect of products or services and achieves the realistic feeling that the products should have in the display. The product model and the display system formed by the virtual reality software are perfectly matched to each other in common scene. The VR system of this paper realizes the color change of the car shell, the simulation of the car in different scenes, the simulation movement in the virtual environment, the switch lighting, etc. The design of the VR system in this paper grasps the development direction of product display. Its flexible interface design, free information interaction, multiple scenes to choose the interactive ability and realistic lighting effects are beyond the traditional display methods. We can see the VR technology has great potential for technological development and research needs.

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