Application Combination of Virtual Reality Technology and Silent Intensifier Technology in Electric Vehicles

Shouqing Lu
College of Intelligent Manufacturing and Automobil, Chongqing Vocational College of Transportation Chongqing, China

*Corresponding author e-mail: lijy@bjtu.edu.cn

Abstract. The development of the current era has also led to the gradual emergence of global issues such as environmental protection and energy. Alleviating these issues has become an aspect that every country has to consider. In terms of environmental protection energy, the vigorous development of electric vehicles is an important aspect of our country as a major automobile country to solve environmental energy problems. For this reason, the country has introduced many favorable policies on the popularization of electric vehicles. Domestic electric vehicle companies have also begun to pay more attention to the technological innovation and development of electric vehicles. With the increasing popularity of electric vehicles, electric vehicle technology has ushered in new challenges for electric vehicle companies in various countries. In exploring the silent intensifier technology of electric vehicles, the mature development of virtual reality technology has begun to play an important role in the breakthrough of electric vehicle technology. The use of virtual reality technology to improve the combination of silent intensifier technology in electric vehicles can expand the advantages of electric vehicles, more effectively and quickly manage the silent effect of electric vehicles, thereby improving the driver and the surrounding environment. The enjoyment effect, and make new contributions to the technological development of electric vehicles. The purpose of the research in this article is to analyze the combined application of virtual reality technology and silent intensifier technology in electric vehicles, and to make innovative developments in traditional electric vehicles. This article starts from the maturity of virtual reality technology, takes the current expansion and popularization of electric vehicles as the background, and promotes the innovative development of electric vehicle mute technology as a specific research object on the basis of relevant reality background and theory, and makes full use of the current rapid The development of virtual reality technology is a breakthrough in the innovative development of mute enhancing technology for electric vehicles. The experimental results show that virtual reality technology can make new developments to the traditional electric vehicle mute technology, and build a new mode of mute booster in electric vehicles.

Keywords: Virtual Reality Technology; Electric Vehicles; Silent Intensifier Technology; Traditional Electric Vehicle Silent Technology
1. Introduction
Environmental degradation, resource crisis, global warming... With the development of the world economy, mankind is facing more and more survival problems, and this survival problem is becoming increasingly acute, which has aroused more and more widespread awareness of protecting the ecological environment and reducing Resource waste and reduction of greenhouse gas emissions have become more and more concerns in the world [1]. Since the reform and opening up, China has undergone earth-shaking changes in economy, politics, and culture. However, behind the rapid economic growth and the urbanization of the population, there are extensive economic models and excessive carbon dioxide emissions [3]. The transportation industry, especially land transportation, has more energy demand growth and carbon dioxide emissions growth than other industries. The transportation industry is considered to be the most difficult to reduce emissions, but also one of the industries with the most potential for emissions reduction, especially in the rapidly developing transportation industry in China [4].

Energy and environmental issues are already the most important issues facing people today. Therefore, the development of electric vehicles is one of the main means to solve this pollution problem, and people are moving towards a very important combination in solving the problem of automobile development and environmental pollution [5]. The concept of providing pollution-free and pollution-free solutions has solved many problems caused by the development of the automobile industry. In this regard, the electric vehicle technology currently being studied in our country is gradually mature, but some key technologies have not yet been broken. Therefore, the technical research of electric vehicles is very important to the development of China's electric vehicle industry, and can become a new growth point of China's economy. In the development and implementation of electric vehicle technology, the research on the mute technology of electric vehicles must also keep up with the development [6].

From the perspective of realistic analysis, electric vehicles are complex high-tech products. Compared with automobile gasoline engines, the silent technology of battery engines has advantages in itself. Therefore, it is necessary to continue to give full play to the high technology that can bring people Come and enjoy more. One of the mute advantages of electric vehicles is that electric vehicles play an important role in providing a good market [7]. Therefore, the mute enhancement technology of electric vehicles is the main vehicle mute technology, and the mute effect is one of the standards to measure the performance of electric vehicles. The powerful silent intensifier technology can fundamentally improve the enjoyment effect of the driver's vehicle, and the combination of the increasingly mature virtual reality technology and the silent intensifier technology can truly unite informatization and the mute of electric vehicles. Reasonably allocated to each basic component of the vehicle, in order to enhance the owner's car experience [8]. The use of virtual reality technology is to realize the visualization of information by using intuitive tools to share between the computer and the user, so that the user can control the information, perform various tasks in the environment, and check for information tampering [9]. The biggest feature of virtual reality technology is that people can process and interact with very complex data through computers. Virtual reality exists as a medium. Thanks to the integration of the three-dimensional environment, people can feel and perceive their attributes and desires freely. The application of virtual reality technology to silent intensifiers for electric vehicles is expected to provide new innovative developments for silent intensifier technology for electric vehicles. This is the research purpose of this article, exploring virtual reality technology and silent intensifiers in electric vehicles. Combination of enhancer technology [10].

2. Method

2.1. Laplacian Pyramid Registration Algorithm Based on Silent Decibel Decomposition
First filter the image with decibel Gaussian $G_i$. Perform hierarchical and decimated node sampling operations to calculate multi-layer low-channel filtered images $G_i$. The decibel value of the layer
image is the corresponding low layer image. The \( G_s \) layer corresponds to the weighted average distribution of decibels in the 6×6 transitional stage of decibels, so that each value is iterated repeatedly to obtain a representative low-pass filtered decibel image \( G_0 \ldots G_s \). Then the decibel image distribution map is filtered by Gaussian low-channel, where the decibel image of the L-th layer image is defined as:

\[
G_L(i, j) = \sum_{m} \sum_{n} w(m, n) G_{L-1}(2i + m, 2j + n)
\]

(1)

Then, the Laplace Pyramid is built by calculating the bandpass filtered image layer obtained by calculating the difference between the two Gaussian filtered images. For this reason, the low-decibel image needs to be expanded to the same size as the high-resolution image. Denote the Kth layer of the Laplace pyramid, then

\[
L_K = G_K - \text{EXPAND}(G_{K+1})
\]

(2)

2.2. The Indicates that the L-layer Image is Expanded K times, then:

\[
G_{L,K}(i, j) = \text{EXPAND}(G_{L+1})
\]

(3)

The EXPAND function is defined as:

\[
G_{L,K}(i, j) = 4 \sum_{m} \sum_{n} G_{L+1}(\frac{2i + m - 1}{2}, \frac{2j + n - 1}{2})
\]

(4)

The multiple sample tables for the scattered decibel image are decomposed by using the Laplacian pyramid respectively, and then the combined operation is combined according to a certain scale factor to calculate the fused decibel image pyramid, and the final decibel combination is obtained by re-calculating and combining image. Using the characteristics of the transform domain, it is calculated that it is insensitive to noise and the calculation speed is fast. It can be seen that the transformation domain method used for the Laplacian pyramid operation can provide a standard and accurate configuration calibration parameter for the decibel image stitching combination.

3. Methods and Experimental Research Design

3.1. Application of Virtual Reality Technology in the Structure Cognition of Electric Vehicles

In a virtual scene composed of a combination of virtual reality and the displays of helmets, headsets and other devices, students can see the shapes and hardware connections of electric vehicle parts, input devices, data transmission gloves and position trackers, which can be operated manually. Equipment such as rotating or detachable components. Searching for parts through virtual reality technology not only makes work easier without causing damage, but also can update electric vehicle models through software, which reduces the cost of electric vehicle equipment, maintenance costs and eliminates parts loss.

3.2. Application of Virtual Reality Technology in Electric Vehicle Inspection

Mature virtual reality technology can be used for electric vehicle detection. With the use of virtual reality technology, the error information provided by the diagnostic computer and the special mode, the user can view the 3D color image of the real vehicle, the image is mainly used to indicate the inspection location and the new direction of the tools to be used. The use of virtual reality technology is mainly integrated computer modeling, and then based on image display, network parallel processing and sensors, and the use of computers to model three-dimensional space, giving virtual reality to enable users to create real experiences, such as watching, listening and touching. And can input the
information about its body movement into the computer, and provide feedback information to the user, making the user feel immersive.

3.3. Application of Virtual Reality Technology in Disassembly and Assembly of Electric Vehicles
In the disassembly and maintenance of high-voltage components of electric vehicles, the risk to users can be avoided, so as to avoid the risk of electric shock caused by improper operation for maintenance engineers, and virtual reality technology can allow practitioners to safely power off high-voltage and components in a virtual environment. Practice dangerous operations such as disassembly and assembly. Therefore, in the application of virtual reality technology, users can boldly learn threatening and risky operations in an absolutely safe environment. This can not only avoid the risk of damage to maintenance tools and personnel injury, but also allow maintenance personnel to have more careful and innovative operations, thereby making a breakthrough in the development of electric vehicle technology.

3.4. Experimental Investigation Object
In order to be able to analyze the feasibility of combining the current virtual reality technology with the silent intensifier technology of electric vehicles in a more in-depth manner, this paper conducts a special survey on the development of electric vehicle technology through virtual reality technology. First, the investigation and research method is adopted, and the case is specific. It is necessary to conduct meticulous and in-depth investigation and research, research data, research rules, and refine and summarize first-hand information. This article selects a number of domestic electric vehicle companies to investigate the application of virtual reality technology, from the application of virtual reality technology to electric vehicle structure recognition, electric vehicle detection and electric vehicle disassembly and assembly, and then to different technical personnel for virtual reality technology. Carry out practical investigation and research on the expected effect of technology applied to the combination of silent booster technology for electric vehicles.

| Questionnaire issue and recovery | Virtual reality technician | Traditional electric vehicle technicians | total |
|----------------------------------|---------------------------|------------------------------------------|-------|
| Issue                            | 33                        | 57                                       | 90    |
| Recycle                          | 33                        | 56                                       | 89    |
| Effective                        | 32                        | 55                                       | 88    |
| Efficient                        | 96.9%                     | 96.5%                                    | 97.8% |

In the investigation report for this experiment, this article issued a total of 90 experimental investigation reports, and conducted a questionnaire survey on virtual reality technology for different electric vehicle companies of the 90 technicians (as shown in Table 1). The technology masters the application of electric vehicle structure recognition, electric vehicle detection and electric vehicle disassembly and assembly, so as to explore the feasibility of combining virtual reality technology in electric vehicle silent intensifier technology.

4. Results

4.1. Current Application Analysis of Virtual Reality Technology in Electric Vehicles
The data shown in Figure 1, from the data shown in the figure, we can understand that in the new era of rapid development of virtual reality technology, there are many combined developments in the application of virtual reality technology to electric vehicle technology, especially in Electric vehicle structure recognition, electric vehicle detection and electric vehicle disassembly and assembly play an important role, and the application range is very wide. This shows that the application scope of virtual manufacturing technology involves the entire life cycle of automobiles, and plays an important role in the entire process of automobile production, assembly, use, and after-sales. Virtual reality technology can make more efficient and accurate modeling, analysis and optimization of electric vehicle production and manufacturing processes in new electric vehicle production equipment, tooling and molds. In particular, virtual reality technology is widely used in the design and use of automotive flexible production systems and computer integrated manufacturing systems.

4.2. Electric Vehicle Technicians on the Prospect of Combining Virtual Reality Technology with Silent Intensifier Technology

It can be seen from Figure 2 that among the electric vehicle technicians interviewed, those in virtual reality technology believe that virtual reality technology has a large share of "very excellent" and "effective" in the technology of electric vehicle silent intensifiers. For traditional electric vehicle technicians, traditional electric vehicle technicians are not optimistic about the application of virtual reality technology in electric vehicle silent intensifier technology in terms of "little effect" or even "no
effect”. This shows several problems: First, it shows that virtual reality technology has not been popularized in China, and electric vehicle technicians engaged in professional aspects do not know much about virtual reality technology, or that the technology prospects are not optimistic. Therefore, it is not optimistic about its combination in the technology of silent booster for electric vehicles. Secondly, although technical personnel in virtual reality technology are eager to understand and be more confident about virtual reality technology, they are still not very ideal for its prospects. For virtual reality technology, there are still difficulties and technical barriers in the technology of silent intensifiers for electric vehicles. barrier. Finally, the domestic electric vehicle industry is not very hot in the development and innovation of electric vehicle silent intensifier technology. The degree of in-depth exploration of new international development and breakthrough new technologies is too low, and the speed of technology integration development is not fast enough. This should reflect and make new innovative developments in domestic electric vehicle technology.

5. Conclusion
Although the application of virtual reality technology is still in the exploratory stage for the combined development of silent intensifier technology, with the gradual improvement of multiple core technologies, its advantages will be more obvious. While saving costs, virtual reality technology has also changed the previous electric vehicle model, which is of great significance for realizing further breakthroughs in the intelligentization of electric vehicles. Therefore, while enriching the diversification of electric vehicle technology, we also pay attention to the new direction of simultaneous development and breakthrough of technology integration. The fusion of virtual reality technology and silent intensifier technology will also become an important direction in the mute effect of electric vehicles, and has good application prospects.

References
[1] Aliyu F , Talib C A . Virtual Reality Technology[J]. Asia Proceedings of Social ences, 2019, 4(3):66-68.
[2] Donghui C , Guanfa L , Wensheng Z , et al. Virtual reality technology applied in digitalization of cultural heritage[J]. Cluster Computing, 2017, 22(4):1-12.
[3] Lai P , Zou W . The application of virtual reality technology in medical education and training[J]. Global Journal of Information Technology Emerging Technologies, 2018, 8(1):10-15.
[4] Li C G . Application of three-dimensional reconstruction and virtual reality technology in liver surgery[J]. World Chinese Journal of Digestology, 2020, 28(13):515-518.
[5] Niu M . Application of intelligent virtual reality technology in Clothing virtual wear and color saturation after COVID-19 epidemic situation[J]. Journal of Intelligent and Fuzzy Systems, 2020(4):1-9.
[6] Loeb B , Kockelman K M , Liu J . Shared autonomous electric vehicle (SAEV) operations across the Austin, Texas network with charging infrastructure decisions[J]. Transportation Research Part C Emerging Technologies, 2018, 89(APR.):222-233.
[7] Song Z , Li J , Hou J , et al. The battery-supercapacitor hybrid energy storage system in electric vehicle applications: A case study[J]. Energy, 2018, 154(JUL.1):433-441.
[8] Lv C , Liu Y , Hu X , et al. Simultaneous Observation of Hybrid States for Cyber-Physical Systems: A Case Study of Electric Vehicle Powertrain[J]. IEEE Transactions on Cybernetics, 2018, 48(99):2357-2367.
[9] Lin B , Wu W . Why people want to buy electric vehicle: An empirical study in first-tier cities of China[J]. Energy Policy, 2018, 112(jan.):233-241.
[10] Melo D F R , Trippe A , Gooi H B , et al. Robust Electric Vehicle Aggregation for Ancillary Service Provision considering Battery Aging[J]. IEEE Transactions on Smart Grid, 2018, 9(3):1728-1738.