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# Application of Augmented Reality Technology in Industrial Design

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**Abstract.** Augmented reality is an interactive experience of a real-world environment where the objects that reside in the real-world are augmented by computer-generated perceptual information, sometimes across multiple sensory modalities, including visual, auditory, and haptic. With the full integration of augmented reality technology and industrial design activities, new and breakthrough changes can be brought to industrial design. This paper takes augmented reality technology as the research object, expounds the development status of augmented reality technology, the related content of augmented reality technology, and the application related problems of augmented reality technology in industrial design. Finally, it describes the application strategy and direction of augmented reality technology.

## 1. Introduction

Augmented reality is an interactive experience of a real-world environment where the objects that reside in the real-world are augmented by computer-generated perceptual information, sometimes across multiple sensory modalities, including visual, auditory, haptic, somatosensory, and olfactory. The overlaid sensory information can be constructive or destructive and is seamlessly interwoven with the physical world such that it is perceived as an immersive aspect of the real environment. In this way, augmented reality alters one's ongoing perception of a real-world environment, whereas virtual reality completely replaces the user's real-world environment with a simulated one. Augmented reality is related to two largely synonymous terms: mixed reality and computer-mediated reality. Augmented reality, by calculating the position and angle of the camera image in real time and adding the corresponding image technology, the physical information which is difficult to experience in a certain time and space in the real world is superimposed through computer science and technology simulation, so that the real environment and virtual objects appear in the same picture or space in real time and are perceived by human senses, and achieve transcendence. Augmented reality technology comes into being with the development of augmented reality technology, but there are great differences between them. First of all, they have different requirements for the sense of submergence and different emphasis in the application field [1-7].

In the three-dimensional space simulated by computer technology, users can strongly feel the simulation of vision, hearing and touch. When applying augmented reality technology to the field of industrial design, it highlights the incomparable application advantages and performance of augmented reality technology. It can realize the observation and operation of things in three-dimensional space without obstacles and blockages, and vividly simulate. The actual industrial production scenario can be well applied in manufacturing, assembly, safety monitoring, architecture, interior design and other fields, which has extremely important practical functions and significance [8-12].



## 2. Development of Augmented Reality Technology

Based on computer network technology and modern information technology, augmented reality technology realizes the integration of virtual reality technology and modern advanced manufacturing technology [13-15]. It is a highly realistic simulation human-machine interface technology, which can achieve human-machine interaction system based on natural skills and real experience. Industrial design of virtual reality technology has its special performance and characteristics, which are embodied in the following aspects: In the concurrent design structure system supported by network technology, the unification and integration of design, engineering analysis and manufacturing are realized. It can quickly respond to market demand, generate digital prototype in virtual manufacturing environment, and predict and evaluate it. In the industrial design of virtual reality technology, the integration of design, engineering analysis and manufacturing is realized. Constructing three-dimensional virtual digital model can give people a real experience, modify and operate it in the sense of immersion, and better realize human-computer interaction. In the industrial design of virtual reality technology, it can better reduce the modification of design, save the design cost, and improve the design accuracy. Thus, virtual reality technology can be seen. Industrial design can greatly improve the efficiency of capital use.

The influence of augmented reality technology on industrial design is very obvious, mainly reflected in: Influences on the concept of industrial design. Once augmented reality technology is promoted in industrial design, industrial designers will participate more extensively in the whole process of enterprise production and provide services for their own design products. From the current definition of the concept of industrial design in academic circles, industrial design should include not only the shape and function design of traditional industrial products, but also man-machine design. Engineering, product function definition and other aspects, so in order to enable the final quality of industrial design products to achieve expectations, we need to define the application of virtual reality technology from the overall perspective, timely change the design quality evaluation criteria, pay more attention to product innovation and science. In traditional industrial design, designers always use two-dimensional plan to express their design ideas, and use specific computer three-dimensional software to obtain three-dimensional effect maps from different perspectives. In fact, the three-dimensional effect maps cannot fully express the designer's intentions; in contrast, virtual representation. The real technology can take the digital three-dimensional model as the core of the design idea, display the work perfectly in the way of multi-dimensional model, enlarge and rotate the product through software, and deepen the understanding of the relevant personnel to product design.

## 3. Application of Augmented Reality Technology in Industrial Design

Augmented reality technology can enhance user's visual perception and expand the function of user's visual system. Because of its combination of virtual and real advantages, augmented reality technology has good application prospects in medical, mechanical, design, entertainment, military and other fields. At present, the application of augmented reality technology in various fields mostly focuses on browsing and display functions, and lacks interaction with users. Augmented reality technology is applied to landscape design system. Real environment and virtual design objects interact with each other. Designers need to constantly modify and improve the design scheme according to the comprehensive effect of design objects in real scene. The application of augmented reality technology including: Virtual design, education and entertainment, safety training, advanced manufacturing field, architecture and art design.

The application of augmented reality technology in architecture and art design is in the field of architectural design. Augmented reality technology greatly expands the creative mode of graphic art design. Through the application of virtual roaming technology in architectural design, it can present three-dimensional simulation of urban landscape, residential landscape, interior design and historic building. It can make designers from multiple perspectives. The roaming technology of virtual reality in architectural display space has been greatly expanded to solve the dull and tedious communication defects in the design process. The virtual reality design of three-dimensional modelling and panoramic

virtual reality display design can be used to fully demonstrate the innovative thinking of designers and flexibly apply it to different architectural design projects. Using virtual reality technology in interior design can create a virtual interior space of a building and visually express and transmit the designer's design intention and design thinking. It has more advantages than the traditional sand table model. It can realize the full-scale model design of the design space. Users can roam, modify and adjust in the virtual space at will to make it more effective. Humanization and fidelity greatly enhance and enhance the overall control and design level of interior space.

Augmented reality technology can be applied in automobile manufacturing system to find and solve the problems of automobile whole or parts in advance. Through the construction of three-dimensional model of automobile, designers can better experience the comfort degree, driving simulation degree, fault simulation of automobile interior, and improve the rationality and science of design index. Moreover, in the process of virtual development and design of automobiles, we can also realize the three-dimensional and virtualization of automotive modelling, die-making, stamping, welding and assembly processes. With the support and support of network data, we can realize the real-time design of virtual collaboration, and implement virtual experiment testing to predict the overall safety and dynamic performance of automobiles.

As augmented reality technology is more and more widely used in industrial design, it has been gradually applied in augmented reality racing simulator, aviation simulator and other related fields. Augmented reality racing simulator is a 3D racing simulator integrated with augmented reality technology. It uses VR and augmented reality technology in racing game, which makes the game have a new control mode and scene effect. In the mode of operation control, players no longer need to use keyboard to control the car, but to control the car through the specific logo pattern in the camera image; In the scene effect, augmented reality racing simulator is no longer in the virtual scene as traditional games, but the combination of real scene and virtual object, these characteristics will bring new interactive game experience to players. Such a change undoubtedly increases the authenticity and experience of the game process, which is no longer immersed in the virtual environment to experience, but to the direction of human-computer interaction. The injection of this interactive approach allows augmented reality to fully consider how to integrate with this technology when designing their appearance. This is the breakthrough point that the augmented reality racing simulator will ultimately be acceptable to everyone. This orientation, which originates from augmented reality technology and its use characteristics and specific environment, promotes the orderly development of creative activities between people and environment, between people and objects, and enables designers to explore more breadth of thinking. While creating and meeting new needs, it also creates a unique overall style of augmented reality ontology appearance. Feeling the most real three-dimensional scenes in the cognitive and experiential fusion of mind and object, making its concept more vividly interpreted, and integrating virtual into the real world, is precisely a variety of possible materialization processes in the context of human complexity and times.

The integration of augmented reality technology and aviation intelligent manufacturing fully demonstrates the status and effectiveness of the "intelligent window" of virtual reality technology. Based on the actual needs of aviation manufacturing in China, virtual reality technology can be applied to process design, workshop execution, management and other aspects of aviation manufacturing, which has extremely important practical significance. The core of aircraft manufacturing is process design. In this invisible hand, the standardization, controllability and expandable application of manufacturing process can be realized. Specific application items and contents include: immersion process audit. In the application of virtual reality technology in aircraft manufacturing, the first step is to carry out the audit of aircraft assembly process in order to design aircraft drawings. Data model, document and so on are the auditing contents, coordinating opinions and suggestions from all sides, and doing a good job of auditing and evaluating process design in an all-round way. Process designers can completely immerse themselves in the virtual and highly simulated environment without any interference and influence, and realize the interaction with virtual objects. With the application of virtual reality technology, aviation aircraft manufacturing has

achieved a breakthrough in "scientific design mode based on Modelling and simulation". In the simulation virtual environment system of multi-source information fusion, simulation analysis of aviation manufacturing process design is realized, such as: digital prototype simulation of aircraft process, spatial analysis and roaming, virtual assembly, interactive virtual reality.

#### 4. Conclusions

Supported by computer technology and network information technology, augmented reality technology realizes virtual and highly simulation of the real world through three-dimensional modelling. When this brand-new technology is grafted with industrial design, it can see the real function and significance of this "intelligent window". Under the integration of network, information and data, it can be clear. To present all-round details of products, realize the networking, systematization and intellectualization of industrial design, enhance the interaction of industrial design, make full use of industrial design resources, shorten the cycle of industrial design and improve the efficiency of industrial design. Augmented reality technology plays an important role in industrial design. By constructing the model structure of industrial design, this technology can further deepen the understanding of industrial design content of relevant personnel, and make relevant personnel further understand the content of industrial design in the way of model virtual presentation. Therefore, in the future work, it is necessary to further study the content of augmented reality technology. Finally, it lays a foundation for further improving the design quality.

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