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Computer Aided Industrial Design Technology and Central Design System Based on Big Data

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Abstract

Computer-Aided Industrial Design (CAID), based on computer technology, is characterized by digitization and visualization and aims to improve the scientificity and reliability of product design. Specifically, CAID relies on CAD technology and is connected with CNC machining, rapid prototyping and mold manufacturing to make industrial design present a comprehensive development trend. It is widely used in all stages of product design, with high flexibility, high efficiency, low risk, openness and other advantages, focusing on the integration of design factors. Designers can use computers for modeling design, structural design, man-machine analysis, etc., which will be more intelligent in the future. As far as the current research status is concerned, some domestic scholars have made achievements in this field, pointing out that computer image processing technology has improved work efficiency, reduced production costs and changed the previous work mode and production method.

Keywords: *Big Data, Computer-aided Design, Industrial Design;*

1. Introduction

Computer-aided industrial design is a new and comprehensive interdisciplinary subject, which integrates knowledge of multiple disciplines. Therefore, computer-aided industrial design is not only for designing industrial products, but also requires a combination of human, machine and space environment, science and technology and art., The comprehensiveness is very strong and the subjects involved are also very wide: biology, physics, aesthetics, psychology, sociology, engineering, marketing, ergonomics, etc. In 2006, the Council of the International Computer-Aided Industrial Design Association defined computer-aided industrial design as follows: “Design is a creative activity whose purpose is to establish multiple aspects for goods, processes, services and the systems that they constitute throughout the life cycle. Therefore, design is not only an important factor in creating humanization of technology, but also a key factor in economic and cultural exchanges.” The origin of computer-aided industrial design can be traced back to the early industrial revolution in Britain, after which the real arts and crafts movement was born Germany. The industrialization of computer-aided industrial design products is the result of the combination of computer-aided industrial design and technological innovation in the American manufacturing industry[1]. After World War II, other developed countries quickly promoted the use of computer-aided industrial design as a means of revitalizing the manufacturing industry. Computer-aided industrial design in my country started relatively late and the concept of computer-aided industrial design began to be introduced into China in the early 1980s. In recent years, with the continuous improvement of my country's income level, consumers' requirements for product quality, appearance and experience have also increased day by day. my country has also paid

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more and more attention to the development of computer-aided industrial design.

2. Big data processing technology

2.1. Based on user research mode

The social economy is developing rapidly and market competition is becoming increasingly fierce and big data technology has become a decisive factor for companies to increase their market share. Human habits and behaviors are recorded on the Internet in the form of data information through the sensors of smart terminal devices. In particular, social networks, e-commerce transactions and other channels record a large amount of user information, making data collection more convenient and cheap. Through data integration and analysis, companies can further understand user needs and preferences, providing a basis for new product development and product in-depth design innovation. The refinement of the product concept has improved the market influence of the company's products and finally formed a product design centered on the user and the production efficiency of the company's products has been improved accordingly.The current product design positioning, user disposable income and other strong correlation factors are more convenient to summarize and the impact is more obvious. However, the role of big data in my country's industrial design still has a lot of room for improvement. The late start and the slow development speed result in the small application value of big data. In fact, there are many factors that affect users' purchasing behavior, especially perceptual factors. As an uncontrollable influencing factor of product design positioning, it is necessary to strengthen the analysis of various aspects of data and information to provide scientific basis. Big data enables users to collect and analyze weakly relevant factors such as product browsing records, evaluations and user data recorded in product sensors, so as to provide a reference for product improvement. Although the effect of data on user demand analysis is not ideal, when a large number of weakly related factors play a role together, the aggregation of factors can play a practical guiding significance for design innovation[2]. The central design system is in the figure below.

Figure1. Central design system.

2.2. Feedback-based mode

Industrial design promotes the development of smart manufacturing and the practicality of product design benefits from user experience. But the user is not a professional designer. When choosing a product, he pays more attention to the overall beauty, brand and practicality and the product evaluation is mainly based on the experience of use. In the process of users purchasing products, a large amount of data is generated. Strengthening the summary and analysis of dynamic data can help companies collect and organize consumer feedback information in a timely manner, so as to provide a value basis for product production, design countermeasure adjustments, etc. and ultimately meet user personalized customization standards , To achieve continuous improvement of operational efficiency and service quality. In this regard, product innovation and design cannot be separated from the feedback of real evaluation after user experience. Through the analysis of relevant factors in user feedback, the overall evaluation results of product design functionality, practicality, comfort, serviceability, aesthetics and other indicators are obtained, which provides a basis for designers to optimize product design. Product design optimization and user experience feedback are a virtuous cycle. Through the information flow model, companies can be encouraged to design products with rich functions on the basis of meeting user needs. In addition, it is possible to implement personalized and humanized Internet services to

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consumers by extending the big data industry chain[3]. The central wireless system is in the figure below.

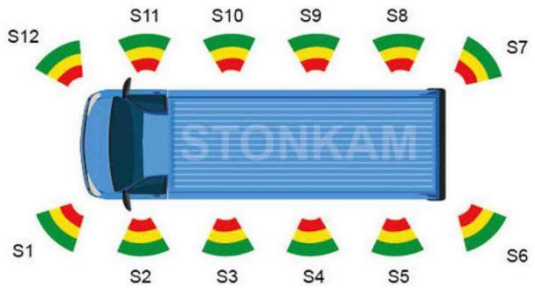

Figure2. Central wireless system.

3. Computer aided industrial design

3.1. Explore the design boundary

The 5G technology with high-throughput features under the big data flow will redefine existing products to a large extent, reconstruct product interaction and modeling language, such as the disappearance of mobile phone physical memory and the disruptive redesign of the interior of driverless cars. The entire product design ecology beyond the product itself will be dissected and reconstructed. Design is no longer the product itself and the entire product ecosystem will become the content and category of design. The "cross-border" attribute of industrial design will be greatly released. The exploration of the boundaries of industrial design and the construction of product design ecology may become the core concern of future industrial design[4]. The central digital system is in the figure below.

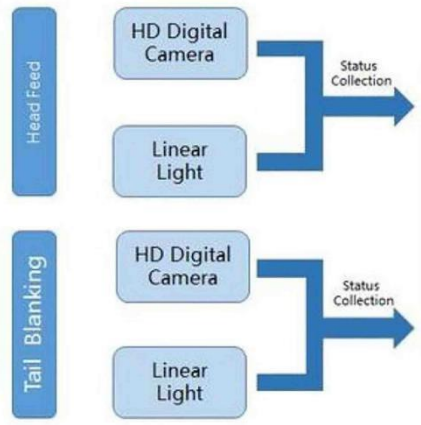

Figure3. Central digital system.

3.2. Strengthen integrated innovation

Industrial design acts as a social accelerator, catalyzing technological evolution and social change and integrating new technologies to promote new quality effects in products. The cloud storage and high throughput of information will lead the design to simplification and integration. The future product design will find the order and standards between the internal and external systems of the product from the cumbersome industrial mechanization. Integrated innovation will break the bottleneck of the existing market and products, subvert the traditional digestion and absorption and re-innovate design models and enlarge the possibility of product design and technology integration, thereby enhancing the competitiveness of products in the future market. The smart service system function planned and designed based on the Internet of Things does not simply integrate the subjective needs of user groups, product terminal functions, measurement technology and the Internet and its service target groups and methods will also undergo extremely obvious changes. The service target is no longer a single consumer group, but gradually expanded to the "things node" in the Internet of Things, such as intelligent driving of cars, intelligent payment in driving state, positioning of pet activities, remote collection of information and security monitoring. The form of service will change from the traditional "receptive" to the "intelligent service" with higher perception, intelligence and individuality. For example, based on the perception of the patient's immediate status, intelligence provides medical consultation and diagnosis and treatment recommendations; combined with the perceived physical information of the types of flowers and plants, humidity and temperature in the home environment to provide them with intelligent management services. The development of the Internet of Things technology and its integration with the design process of industrial products make the service function of the product more powerful, promote innovative design thinking and the integration process of high technology and provide

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strong technical support for the output of intelligent intelligent services[5]. The central design application system is in the figure below.

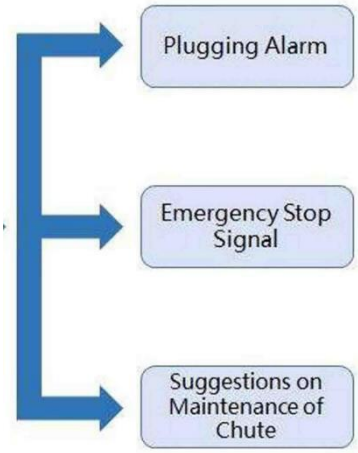

Figure4. Central design application system.

3.3. Control design quality

The current market context itself has the characteristics of rapid iteration, complexity and change. The expansion of content and the ultra-high-speed circulation of circulation make the current context more complicated. How to ensure design quality in the manufacturing and sales process will become an important focus of the product system ecology. The noise interference of product design mainly comes from the information loss between the manufacturing workshop groups and the information distortion in the business communication process. The future industrial design ecology cannot be separated from related communication concepts, so as to suppress the noise interference in the product design and communication process. The following methods can be used to control the quality of the design: First, increase the redundancy of the information carried by the product and use a greater margin for information reception for manufacturing, sales and consumers; second, do not blindly believe in new technologies and focus on Solve the problems existing in existing products and establish a design concept that regards technology as a design tool rather than a design goal; third, adapting to the high-speed and flow characteristics of information flow and grasping the scale of human reception experience in information transmission, Design products that can be perceived by users to ensure high-quality expression of products[6]. The central design connect system is in the figure below.

Figure5. Central design connect system.

4. Central design system analysis

In the process of demand analysis of industrial design, the use of Web pages in the central design technology to carry out market surveys can increase the interest of the respondents and the final survey information obtained is more comprehensive and accurate. For the investigator, it is also possible to more accurately grasp the actual situation of market demand. In addition, through the use of the virtual design environment of the Web, the features and functions of the product can be better displayed to users and users can also provide timely information feedback, so that more diverse demand information can be obtained and the rationality of the product can be further improved. improve. In the process of conceptual design, through a variety of virtual environments, users can personally participate in the model modification process, or select the product's shape, style, color and other content through the touch screen and form a more realistic three-dimensional model . The designer can modify the corresponding content of the product through effective combination with expert opinions based on the user product experience obtained. According to the technical application requirements in industrial development, the relevant technical application control and detailed design in industrial design can be effectively combined, so that the practical effect of the overall design can be more effectively played and the practicality of the overall design application can also be obtained. Further improve. For example,

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in the application process of industrial design technology, the practical analysis of assembly design technology and human-computer interaction application is carried out in time according to the application of central design technology. The more detailed and realistic the design completed in the detailed design stage, the more detailed and practical, the prototype production and The smaller the chance of problems in the testing phase, which improves the efficiency of product development. The central design system is in the figure below.

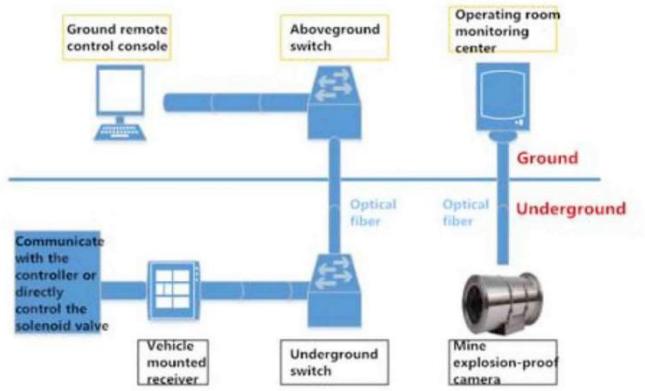

Figure6. Central design system.

5. Conclusion

Infiltrating the Internet of Things technology into the construction process of the industrial service system can significantly strengthen the system's perception service capabilities. After the service object enters the service area, the intelligent system formed based on computing technology and the network can intelligently identify the entering object and then provide services for it accurately and quickly. For example, the current scenic spots in Beijing, Chengdu and Hangzhou are all An intelligent tour guide system is installed, which combines the functions of an intelligent multimedia tour guide with the GPS system, which can dynamically perceive the specific location of tourists in the scenic spot, intelligently explain the characteristics of the scenic spot and spread the regional culture. Although the implementation of this service model is only the prototype of the service formed by the Internet of Things technology, we can still clearly see its rich "wisdom".

Acknowledgments

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