Research and Application of "Intelligent Ergonomics" in Industrial Design

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ABSTRACT: In the context of artificial intelligence penetrating into the field of industrial design, "intelligent ergonomics" will occupy an important position in industrial design in the future. Based on this, based on the interpretation of "intelligent ergonomics", this article discusses the relationship between "intelligent ergonomics" and industrial design, and then discusses the application of "intelligent ergonomics" in industrial design. The situation has been analyzed to provide a reference for people who are concerned about this topic.

1 Introduction

Industrial design needs to combine people's product use needs to complete product improvement and innovation, which is closely related to ergonomics. With the development of artificial intelligence, "intelligent ergonomics" was born, which can provide human body size parameters and scientific basis for industrial design, and use intelligent technology to achieve product improvements and promote further integration of human and machine. Therefore, the application research of "intelligent ergonomics" in industrial design should be strengthened in order to further promote the development of industrial design industry.

2 Overview of "Intelligent Ergonomics"

"Intelligent ergonomics" is a discipline formed by the infiltration of multiple disciplines such as artificial intelligence, anthropology, and ergonomics. It can use multidisciplinary knowledge such as human mechanics and labor psychology to complete the study of human body structure and functional characteristics. The function settings match the engineering design with the user. With the rapid development of the artificial intelligence industry, intelligent control technology has begun to extend to the field of engineering design, which can make the designed projects have the characteristics of intelligent manipulation, high coordination, and high efficiency. "Intelligent ergonomics" regards the coordination between people, machinery and the environment at work as the core, and uses artificial intelligence methods to provide guidance for work equipment, and promotes the reasonable transformation of work methods and the environment, thereby improving work efficiency and comfort. , Security, and

more. In engineering design, the use of "intelligent ergonomics" can complete the intelligent analysis of the preliminary design layout and scheme, and complete the design analysis by combining human body structural parameters and functional characteristics, which can reduce the design cost and cycle while avoiding rework problems. Happened [1]. Therefore, although "intelligent ergonomics" is still a marginal subject, with the development of artificial intelligence, it will eventually become an important research area in ergonomics.

3 Research on "Intelligent Ergonomics" and Industrial Design

Industrial design is a creative activity that uses the latest research results and the knowledge of various disciplines to complete the design of the shape, function, and structure of industrial products, and can combine discipline theory with practice. Actually, in industrial design, if we want to make the designed product meet the needs of users, we must also complete the product design in accordance with the conditions of users. The use of "intelligent ergonomics" can integrate human-oriented thinking in industrial design, improve product work efficiency by implementing human-machine system design, promote product functions to be fully integrated with human physiological conditions, and provide reliable human-machine data, such as the human body Scale, range of activity, etc., complete the accurate judgment of human perception through intelligent analysis, and promote human and machine to adapt to each other. Actual artificial intelligence belongs to an important branch of computer science, which can be used to reveal the development law of human intelligence, and make data responses to human intelligence in the form of algorithms in the field of industrial design, so that human needs are better communicated and met. At present, in industrial design, artificial intelligence including speech

recognition, expert systems, etc. have been applied, which promotes the design of products that not only meet the physiological needs of humans, but also can achieve more complex functions by simulating human thinking and promote humans. The sensory and psychological needs of different levels are met. In the context of the maturity of artificial intelligence, "intelligent ergonomics" will also be gradually improved. Applications in industrial design can use artificial intelligence algorithms to perfectly integrate ergonomic design requirements, directions, innovation points and industrial products, helping Designers get rid of the thinking framework to complete product innovation design, and finally get products that are more conducive to social development.

4 Application of "intelligent ergonomics" in industrial design
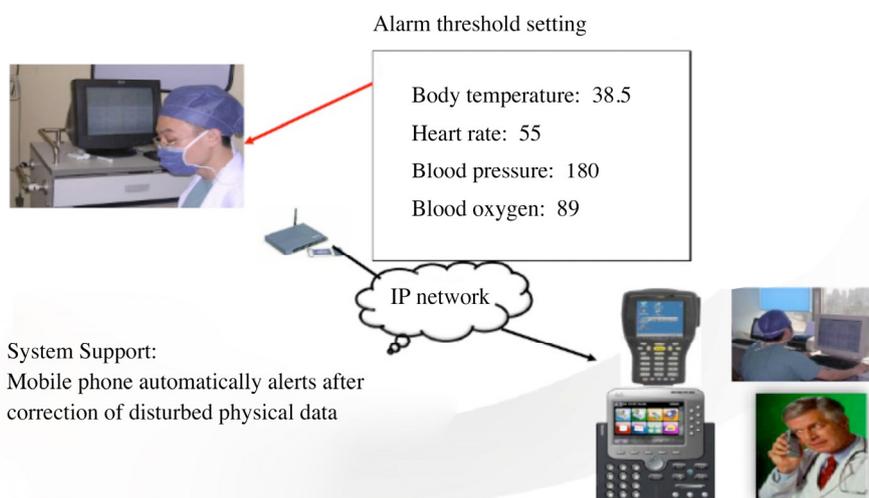
4.1 Application in home product design

In terms of intelligent industrial design, the home industry is at the forefront, and a variety of smart home products have been developed. These products can meet the communication needs between users and the environment and products through human-computer interaction, and create a comfortable and safe home environment through intelligent control, bringing a new life experience. By designing intelligent buildings, you can realize the human-computer interaction planning of various types of residences, while enhancing the communication of the neighborhood, while ensuring the privacy of the residence and meeting the fast-paced living needs of modern people. The use of intelligent means can ensure that users live comfortably at home and can be assured when leaving home. For example, the design of the fresh air memory system can complete the intelligent analysis by inputting the data of family members' sex, physical condition, work and rest rules, etc., and start the fresh air system in advance according to the time when the family members return home, and achieve system adjustment based on the local air quality

and outdoor temperature obtained from the network. , So as to provide users with appropriate air volume and indoor temperature. Design intelligent wall surface, can carry out intelligent analysis according to user preferences and spatial color theory, comprehensively consider various factors such as temperature, member fatigue, etc. to modify the wall color, and help people to complete memory adjustment through effective interface patterns. The human retina and nervous system bring appropriate stimulation to improve the interaction of members while improving the function of the human body [2].   In terms of home environment safety management, the Internet can be used to strengthen linkages with home products to ensure that users can obtain environmental information at home at any time, and remotely activate the product to achieve environmental regulation and strengthen space safety management, thereby greatly improving the quality of life. In the future, through the application of "intelligent ergonomics", various industrial product designs such as intelligent lighting, intelligent sofas, and intelligent bathrooms can be completed in accordance with the needs of people's lives. While reflecting the scientific and intelligent home life, it will also improve the artistic environment. Provide users with a good life experience.

4.2 Application in Medical Product Design

Although the domestic medical level has been continuously improved over the years, compared with western developed countries, the domestic medical and health system has not been improved, and the problems of uneven distribution of medical resources and lack of supporting facilities have brought about an increase in the development of the industry. As shown in Figure 1, using an automatic surgical anesthesia alarm system, by setting the upper limit of body temperature to 38.5 ° C, the heart rate threshold to 55 / min, and completing the blood pressure and blood oxygen threshold settings, the system can monitor the An alarm is issued when patient indicators are found to be outside normal.

Table 1. Automatic alarm system for surgical anesthesia

The application of "intelligent ergonomics" to achieve medical product design can adhere to the people-oriented concept. By designing easy-to-learn and easy-to-operate medical products to meet the product use needs of patients of different ages, complete intelligent monitoring of patient conditions with intelligent equipment to ensure that medical staff can Provide timely treatment and scientific guidance to provide humanized services to patients. For example, the design of the health monitoring system reflects this idea. As long as the button is clicked, the pregnant and fetal health data can be sensed in real time for 48 hours, and real-time monitoring and analysis of various information is completed with the support of artificial intelligence to generate personalized health reports. Provides support for 1: 1 data communication between clinicians and mothers. In 2019, China launched the world's first telesurgery operation, which was listed as one of the top ten events in intelligent manufacturing. Doctors used 5G networks and robotic arms to remove livers from experimental animals 30 miles away. In the future, in the design of medical products, by strengthening the application of various intelligent technologies such as 5G networks and virtual reality technology, intelligent devices that can remotely and comprehensively monitor the patient's condition can be designed, and advanced medical technologies can be adopted in time when patients have problems. Provide assistance to relieve the threat to the health of patients. The design of intelligent medical products needs to maintain close human-computer interaction and embody the people-oriented design principle. Therefore, it is necessary to strengthen the application of "intelligent ergonomics" and complete the design of high-end and humanized medical products in accordance with the diverse medical needs of patients., While strengthening the integration of medical resources, provide patients with high-quality medical services in all aspects.

4.3 Application in Engineering Product Design

In the design of engineering products, the application of "intelligent ergonomics" promotes the integration of industrialization and intelligence, and provides a new space for product design. With the help of artificial intelligence algorithms, engineering products become more efficient and powerful. With the improvement of product functionality, product design has started to develop in an emotional direction, focusing on the user's sensory experience and aesthetic experience. At present, in the design of construction machinery products, Volvo, Komatsu and other companies have strengthened intelligent applications, established intelligent control systems to improve operational comfort, and at the same time bring rich emotional experiences to users through software human-computer interaction to ensure users' deep-seated psychology. Needs can be met. In terms of monitoring and monitoring product design, considering the needs of people who want to extend their vision, various intelligent monitoring technologies have been applied, such as using remote information change technology of target objects to implement remote monitoring product design, which can meet the needs of locust disaster monitoring and forecast management in agricultural production. In the design of industrial products, by integrating artificial intelligence technology with advanced manufacturing technology, robot products can be obtained through all links of design, production, management, etc., and can realize self-perception, self-learning, and self-decision to meet the control of modern industrial production. Demand [3]. With the development of various technologies such as big data, cloud computing, machine vision, human beings have entered the era of intelligent manufacturing. Strengthen the use of "intelligent ergonomics" in product design, can realize the anthropomorphic design of production equipment such as CNC machine tools, robots, and promote the product to have a human-like intelligent nervous system, which can capture production requirements by interacting with human information And management ideas to meet the information interaction needs between users, equipment, and the environment.

5 Conclusion

In summary, the application of "intelligent ergonomics" in industrial design can make the designed product more humane and intelligent. With the development and improvement of related theories and technologies, "intelligent ergonomics" can be widely used in the design of household products, medical products and engineering products in the future, which promotes the development of industrial design in an intelligent direction.

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