



Design and Research of Microclimate Sports Shoes Based on User Experience

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Abstract

In modern urban life, people's food and clothing problems have been basically solved, and on this basis, the pursuit of quality of life and physical health protection has become a more urgent need, and such needs are highlighted in the process of urbanization. With the acceleration of the urbanization process, consumer demand for sports shoes has changed, and sports shoes have developed in the direction of humanization, functionality and fun. Based on the research method of user experience, this article combines the phase change energy storage material - polyethylene glycol to design a microclimate sports shoes. The article elaborates from the user experience research of sports shoe design, polyethylene glycol composite phase change energy storage materials, and microclimate sports shoe design strategies, and innovates from the different experience dimensions of user experience, enriches the design connotation, enriches the user's experience level, and provides users with a more complete sports shoe design program.

Keywords

User experience, polyethylene glycol, Microclimate, Sneaker design

1. User experience research based on sneaker design

User experience refers to the subjective feelings that users have in the process of recognizing the surrounding things through behavioral practice (Zhou Kexuan, Yao Jun, & Zhu Zhaohua, 2021). Dr. Bird Schmidt divided the experience into five dimensions, namely sensory experience, emotional experience, thinking experience, behavioral experience and associative experience, through these five experience dimensions, to create an experience for users (Nian Ming, 2019).

In these five experience dimensions, sensory experience, as an instinctive feeling to meet the user's basic needs, is the user's first impression of the product, mainly including sight, taste, smell, hearing and touch, and establishes the connection between the user and the product by stimulating the five senses to stimulate the user's desire to buy (Li Ying, 2021).

Emotional experience is the feeling brought about through sensory experience in the process of use. It is based on the realization of our emotions and the realization of our own needs to balance certain factors in life. In today's stressful, competitive and fast-paced society, a way to balance the cold human-machine relationship (Xu Zilong & Gao Ying, 2021).

Sneaker design should also be combined with thinking experience, behavioral experience, and associated experience, Integrating sensory, emotional, thinking and action experience is an important attribute to enhance the added value of products. The design should comprehensively consider all factors, assume a sense of social responsibility

in the context of the times, and make sports shoes products that cater to social needs and consumer preferences.

1.1 Status of sneaker products

At present, there are two main directions of literature research on domestic sneaker design; On the one hand, focusing on the influence of morphological elements on modeling style, the researchers elaborated the influence of modeling style on the design of sneakers from the perspectives of bionics, national style, architectural design and other related disciplines, supplemented by examples (Niu Dan & Lian Wenru, 2021); Some researchers start from the elements of the design of the footwear itself, and explore the possible impact on the design from the perspectives of color matching elements, pattern elements, and material elements. On the other hand, it is mainly about the functional aspects of sports shoes, such as the research on the functional design and testing methods of sports shoes; Or take physical products as research objects to establish an evaluation system for their subjective comfort. In addition to the mainstream research directions mentioned above, some researchers have explored the front-end technologies of ergonomics such as cushioning and shock absorption, energy regression, and heel control from the aspects of combining the functional design of sports shoes with biomechanics (Sun Yanli, 2019).

1.2 Characteristics of user experience design of sneakers

1.2.1 Design humanization

According to the different experience dimensions of user experience, the design of sneakers is more humanized, different design schemes are formulated for the needs of different customers, and design optimization schemes are made in combination with the different human characteristics of the crowd. In addition, the interaction between design products and users is enhanced, and some sneaker products provide DIY services, such as blank scribbling, removable sneaker styles, etc., to meet the personalized needs of consumers for sneakers. Sneaker design based on user experience, always implement the people-oriented design concept, based on the user's most perfect use experience.

1.2.2 Design functionalization

According to market analysis, the cutting-edge technology of sneakers is still the core competitiveness of sneaker brands, and the functional design of sneaker design is also the top priority of sneaker innovation. Starting from the user's sensory experience, the use of intelligent sensors, new materials and other scientific and technological means to process sports shoes, give more functions, and convey a better experience to the human senses. On the other hand, starting from the structure of sneakers, based on ergonomic research methods, new form design is given to sneakers, which is more in line with the different foot conditions of different human bodies, and accurately positioning to obtain better design products.

1.2.3 Design Fun

With the development of the times, consumer demand changes, users' demand for products has changed from the material level to the spiritual level, and the design of sneakers has also developed towards fun. At present, many domestic sneaker designs from the perspective of bionics, get inspiration from animals and plants, and integrate fashion elements into sneakers through styling design, which is full of fun, resonates with users, and wins the favor of consumers from the emotional aspect. The fun of the appearance of sneakers builds a bridge of communication between products and consumers, is an important expression of designers, and is also the main purchase factor of consumers.

2. Phase change energy storage materials

2.1 Introduction to phase change energy storage materials

Phase change materials refer to an energy storage material that absorbs or releases latent heat with temperature change phase state changes (Chang Zhao & Chen Baoming, 2021). When selecting a phase change material, its heat storage performance should be comprehensively considered, and the following principles should be met (Li Bingmeng & Han Huifang, 2018): the phase change temperature range is appropriate; Stable thermal performance; High thermal conductivity; Stable chemical and physical properties; The phase change process has little volume change; Non-toxic, non-corrosive, antioxidant, non-flammable (Li Bingmeng, 2018); Low cost and easy access to raw materials; Low subcooling and less prone to phase separation; Meet technical requirements.

2.2 Development status of phase change energy storage textiles

The main problems of current phase change textiles have the following 4 aspects (Dan Xiahui, 2015): 1. Due to the relatively low proportion of phase change materials (PCM) embedded in textile structures, the cold and warming effects produced are relatively weak; 2. PCM has a high demand for packaging materials, and PCM leakage will greatly reduce the temperature control performance of the product; 3. The stability and packaging efficiency of PCM microcapsules during packaging will have a certain impact on the structure and performance of the fiber; 4. The stability of intelligent temperature-adjustable fabrics in dyeing and finishing processing, serialization and industrial production, and the durability of reuse of phase change materials still need to be improved.

3. Microclimate sneaker design strategy analysis

3.1 Design significance of microclimate sneakers based on user experience

With the acceleration of China's urbanization process, people's consumption level has gradually increased, and they are no longer satisfied with the basic functions of traditional footwear and clothing products such as body covering, cold avoidance, and beauty, and functional and intelligent shoes and apparel have become another life pursuit for young consumers to show themselves (Xu Yang & Wu Shuwen, 2013). Microclimate sneakers take user experience as the base point, considering the impact of different factors on human feet to improve the comfort of sneakers. Comprehensively consider different experience dimensions to create the sneakers that users like (You Kai, 2009). Phase change temperature control intelligent sports shoes are reflected in the intelligent temperature control function of sports shoes through the action of phase change energy storage materials, so that the sports shoes always maintain the most suitable temperature of the human body, microclimate sports shoes.

3.2 Innovative design of microclimate sneakers based on user experience

The human foot is uncomfortable due to the local temperature of the surrounding environment or sports, which affects the wearing experience of sneaker users. To solve this problem, design a smart constant temperature microclimate sneaker. When the temperature of the human foot rises due to the surrounding hot environment or exercise, the phase change energy storage material absorbs heat to promote the cooling of the foot, and when the human foot feels cold due to external cold or its own factors, the phase change energy storage material releases heat to heat up the foot. Realize the intelligent control of the microclimate of the human foot and maintain a comfortable environment of about 27°C.

Functional design combined with appearance design, attracting attention, highlighting the characteristics of sneakers, and arousing users' emotional resonance.

4. Summary

Under the trend of rapid urbanization, urban people have an increasingly strong demand for quality of life and sports experience, and existing products cannot meet such urgent needs, so it is urgent to develop innovative sports shoes products that meet the user experience. Based on the development of the times and consumer needs, it is of great significance to design a micro-climate sneaker around the user experience.

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