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Research on intelligent home appliance design based on youth sensory recognition and experience

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Abstract: The design and interaction of smart home appliances directly affect the user's experience and satisfaction. The key to the design of intelligent home appliances lies in the proper positioning of product function and shape. Based on the perception and user experience of Chinese young users, this study proposes a method for modeling, interaction design and optimization of smart home appliances by extracting data such as user experience and satisfaction through their sensory recognition characteristics and combining interactive evolutionary design. This method is used to assist the design and research of intelligent household appliances.

1. Preface

At present, the modeling of smart home appliances lacks differentiation and individuation, which is difficult to meet the diversified needs of consumers; The poor user experience of some products has affected the market competitiveness of the products. An analysis of the literature found that a great deal of research has focused on improving the performance of technologies such as interactive genetic algorithms, but few studies have been conducted from the perspective of improving user perception.

This paper aims to obtain the design methods of smart home appliances from the perspective of user perception, and evaluate the impact of young users on the availability and satisfaction of smart home appliances by analyzing their preferences and views on smart home appliances, so as to develop smart home appliance design methods that meet the evolutionary needs of young people.

2. Young people's expectations and requirements for smart home appliances

This generation of young people has been exposed to the Internet since childhood, and they are heavy users of technology and see it as their tool[1]. They are able to skillfully navigate communication devices, smartphones, tablets and other electronic products, with innovation and creativity.

Young people attach more importance to the convenience and intelligence of smart home appliances, hoping that home devices can be controlled anytime and anywhere through smart

phones or voice assistants to achieve automated and intelligent home management; Young people have a high degree of cultural confidence, national confidence and institutional confidence, pay attention to personalization and self-expression, and hope that smart home appliances can meet their personalized needs and preferences; Young people are used to connecting home devices to the Internet, so they have high requirements for Internet connectivity and data security of smart home appliances[2]. Young people like multi-functional products and pursue economic value, they hope that smart home appliances can not only achieve basic functions, but also provide entertainment experience.

3. User perception design in smart home appliance design

Kevin Desouza and K. Datta[3] proposed that PQ Mode is used to measure users' perceived quality of products or services. Peter Pirolli and Stuart K. Card[4] proposed that user perception should be understood from four perspectives: perceived usefulness, perceived security, perceived ease of use, and perceived pleasure. The Technology Acceptance Model (TAM) proposed by Davis[5].

The research on the perception of smart home appliances of young people needs to fit the situational characteristics of such groups' purchase of smart products. From the dimension of perceived value, the perceived emotional value and perceived functional value, which have a greater impact on the purchase intention of smart home appliances, are selected as andexanent variables by referring to the definition in the study of Sweeney&Souttar[6].

4. Factors and designs affecting user perception and recognition in smart home appliances

The feeling and experience of smart home appliances are not only reflected in the appearance of the product, but also reflected in the user's easy to use, easy to use, understandable, easy to operate and other links in the use process.

4.1 Appearance design elements

Young users have a strong perception of product shape, which can be considered from the following factors:

First of all, the shape should fully consider the user's preferences for the product. Young users are very familiar with smart products, and according to the results of the survey, the design of smart home appliances needs to conform to their visual elements. Secondly, based on the nature of the safety of intelligent electronic products themselves, through its shape, function and other needs to pass to the user's safe, reliable, trustworthy emotions, the selection of safe, reliable, high trust characteristics[7].

Secondly, the choice of color should be combined with the characteristics of the target population, preferences, product functions and subjective feelings conveyed to the user. For young users, they often prefer stimulating colors, and auxiliary colors can be appropriately added to harmonize the details of the product, and play a role in attracting users' attention[8].

Then, in the selection of materials, it is also necessary to follow the psychological and physiological characteristics of the user, and consider the characteristics of the product environment and the relationship between the user and the product. [11] For wearable products, it is necessary to ensure that the surface of the product and the user contact is soft and comfortable[9].

In addition, the common surface treatment processes of intelligent products are frosting, painting, electroplating and so on. Based on the needs of young users, the surface treatment process of smart home appliances should especially retain the sense of science and technology of smart home

appliances. For example, the information conveyed by smart home appliances is safety and trust, so the surface treatment should convey safety information, and be treated with anti-slip and anti-bump.

4.2 Multi-sensory interaction element design

In order to get a good user experience, for the interaction elements of smart home appliances, it is necessary to use a good multi-sensory human-computer interaction interface and interaction mode to improve evaluation efficiency and alleviate fatigue.

The most important interaction mode is visual, in addition to tactile interaction, voice interaction, gesture interaction.

For the main elements of visual interaction, the design for young people needs to pay attention to the interactive interface, including modeling, symbols, colors, page elements, etc. Such as page layout, font, size, symbol, color, etc. as well as interactive logic level research, such as page switching mode, pop-up position, etc[10]. The attractiveness and comfort of visual design can increase the user's good impression and attraction of the product[11].

In terms of tactile interaction, at present, the tactile interaction devices in home appliances display simple and monotonous glass texture, and the tactile expression of information resources is extremely limited or even lacking.

The main carrier of voice interaction of smart home appliances is smart audio, which combines virtual assistant with speaker with voice command to provide phonetic interactive operation.

Gesture interaction is not affected by information level and is less affected by spatial scope, so it has the characteristics of high efficiency and strong sense of interactive experience. For young people, it is necessary to analyze their living habits and interaction needs, and try to use gestures that are easy to be understood and accepted by them, and reasonably set 2D gesture interaction or 3D gesture interaction in smart home appliances.

4.3 Intelligent elements in user perception and recognition design

High degree of automation and strong adaptability are typical characteristics of smart home appliances, therefore, some functions with high degree of automation and adaptability belong to intelligent elements, such as the automatic identification of food ingredients in the refrigerator, and the automatic adjustment of the wind direction by the air conditioner. Therefore, product function actually belongs to the intelligent elements of product design, at least the application effect of the product has intelligent characteristics[12]. The realization of product intelligence function depends on human-computer interaction. It is at the core of smart home appliance design, and it is also the most intelligent module. Human-computer interaction is the way to achieve product functions, smart home appliances break through the traditional single mode of operation, and the interaction between users and smart home appliances can be changed and improved.

Taking smart TV as an example, voice technology and gesture interaction in addition to the traditional remote control operation, give users a variety of human-computer interaction ways and different user experience. Making home appliances more usable and easy to use is one of the main goals of intelligence.

To sum up, the function, appearance and interactive interface of smart home appliances are the key elements of their product design, which together constitute the entire user experience process of a product from outside to inside, from external perceptual perception to actual use.

5. Influence of user experience based on sensory recognition on smart home appliance design methods

Product quality directly affects their satisfaction, and the quality of the product is reflected in the appearance, functionality and interaction process of the product. If users perceive the quality of the product or service to be high, then user satisfaction is usually high. Therefore, these factors in product design will have an impact on user perception, evaluation and experience, and thus affect user satisfaction.

A clear information architecture can make it easier for users to find the information they need and reduce their search time and cognitive load. Design shapes the brand image and emotional experience of the product[13] ,which can enhance the emotional connection and loyalty of users to the product; Good service experience can enhance the user's trust and loyalty to the brand or enterprise; The relationship between the price of the product or service and the value obtained is reasonable, and the value obtained is greater than or equal to the cost paid; Large degree of personalized and customized service; The ability to respond to user needs and feedback in a timely and effective manner will improve user satisfaction.

When the product design has a good interaction design, the user can feel smooth and intuitive operation when using the product, which directly affects the quality of user experience, and then increases the user perception, and the trust and satisfaction of the product[14].Good interaction is reflected in the intuitive interface and operation logic, timely feedback to the user's operation results, clear guidance and tips, personalized and customized support.

6. Conclusion

As the young user group has gradually become the main force of the consumer market, for the design of smart home appliances, by studying the characteristics and needs of young users, such products can maintain a strong competitiveness. Technological innovation is one of the driving forces for smart home appliance design in areas where technology has a large impact, such as smart home appliances. However, as the functions of smart home appliances become more and more rich, the design has become more complex, both to meet the change in shape, but also to meet the interactive experience in use. Starting from the user perception theory, with the goal of improving the usefulness, safety, ease of use and pleasure of user perception, the author focuses on the analysis and research of the real needs of young users, emphasizes the full consideration of the physiological, psychological and emotional characteristics of users, and realizes the overall improvement of user experience of this group through interactive evolutionary design.

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