Based on the Value of the Smart Home and the Investigation of Product Interaction Design

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Abstract: The real smart home is not merely moving from the original remote control and panel to a smart phone app to make products intelligent or to control consumer electronics in one way, but is built based on interconnection and automation. The smart home of the future can not only achieve integrated control, remote control, scene control, timing control, intelligent linkage and security measures, but also support "self-learning" and "self-optimization", and will "manual" and "automatic" control. "This paper aims to change the value of smart home products into "active". Therefore, this paper relies on the realization of the value of smart home products, describes the principles of smart home products and product interaction design, analyzes the needs of the target users, and proposes a product design scheme for reference by relevant personnel.

Keywords: Smart Home, Value Embodiment, Product Interaction Design

1 The value of smart home products

The personalization and differentiation that smart homes bring emphasize the value of achieving taste and realizing a variety of life experiences; intelligent home lighting systems, shading systems, media music and many other subsystems are needed to bring family members together and promote family harmony, as well as bring comfort and pleasure to people. Smart systems ensure comfort, one-touch field calls and self-recognition, independent analysis and the use of other advanced technologies can achieve the comfort requirements; intelligent home protection against intrusion, elderly and child monitoring, social and facility monitoring this is the value of safety and security[1]; smart home by integrating various types of panel switches of different styles and sizes into one layout, while ensuring comfort, convenience, and Under the premise of safety and aesthetics, the waste of useful resources is minimized as much as possible to achieve environmental protection, energy-saving and high efficiency.

With the improvement of economy and technology level, people want to have a higher and better living environment and comfortable living environment, and the appearance of a smart home just solves this problem. Based on solving this problem, people want to be able to develop the operation further, to be able to achieve the desired action in one click, using the smart app then, through the intelligent app[2], to control the use or not of the home at home, for example, adjust the temperature and wind direction of the air conditioning, change the cooling and heating, or change the content of the TV program, switch on and off the TV, lamps, etc., which can be intelligently controlled, which It undoubtedly provides people with a comfortable living environment and living place. Each scene can be by the user's own needs and ideas, a key to change the content of the stage, not only convenient and quick, more in line with the requirements of the times, the advent of the smart home era, is to achieve a higher value of the

home embodiment.

2 Interaction design and product design principles in smart home products

2.1 Interaction design principles in smart home products

2.1.1 Usability goals and user experience goals

The purpose of interactive design is to meet the user's need for ease of use. In the concept of an interactive map, design goals can be divided into usability goals and user experience goals, as follows.

Usability goals refer to products that are easy to operate, efficient, safe, multifunctional and enjoyable, ultimately enabling users to perform operations more conveniently and efficiently, including people's driving habits and conventional methods of interaction, all the needs of the user can be achieved, and meet the specific needs of the user[3].

The so-called user experience goals refer to the psychological characteristics of the user's experience and internal feelings when interacting with the product, user experience goals are different from usability goals and focus more on the subjective opinions of the user, allowing the user to use the product and feel comfortable using the product. In this process, the emotions, enjoyment, satisfaction and other feelings of the user when using the product can be collected, and the design of the product can be improved through this process.

2.1.2 Specific attributes of interaction design in smart home products

A specific attribute refers to the height of the entire home ecosystem and the designer's product design linking the use of the environment, people, machines and surroundings to an integrated whole and specific services. Specify a goal and use this goal attribute to design a household product. Studies of this target attribute are divided into.

(1) All designs are intended to serve people, and it is clear that they follow the principle of "human-centred" design. In the design of household products, the user's needs for use and aesthetics must be met, and the size of the household product should be ergonomic[4]. The appropriate size of the home makes the user feel comfortable while using it.

(2) Meet the functional requirements of the product. A qualified product is one that has a complete design content of technical sections, such as a payment section and a selection section, and cannot separate the functions in two or more products that are paid for commercial gain. This approach violates the service concept of a smart home product.

(3) Rational use of colour, as a recognizable interactive approach, should be applied to smart product design sensibly and effectively (e.g., red for the warning, danger, serious; yellow, for attention) [5], not ignoring excessive buffering, green for health, safety, healthy, etc. Since it represents these factors, it is essential to follow the principles of colour vision and product functionality in smart home product design.

(4) Interaction form should meet the needs of all users as far as possible, in the interaction design can not take into account the main consumer groups, and can not ignore a few special user groups, the plan to meet the needs of multiple users as far as possible. The product is designed to serve different people, such as each member of the family so that everyone in the family can equally share and participate in the use of the household product.

(5) The product should make the user feel as warm and comfortable as possible. This warmth and comfort are mainly reflected in the ability to assist people who are unable to use the product on their own, such as the elderly, children and disabled users, and these groups can complete the operation of the product without assistance[6].

(6) The design of smart home products must comply with standardized mass production methods, product structure, moulding process and other methods must also be scientific and reasonable, aimed at accelerating the use of smart home products in the user's home, to enhance the smart home in the market share, and quick home penetration in the family, as well as to promote rapid market acceptance of the emergence of the smart home.

(7) The interactive design of the smart home product must conform to the operating environment of different user homes. The product can be used in a variety of user home environments and ensures safety in the process, so users do not have to worry about security issues during use. Finally, the smart home product needs to have an appearance and colour that is compatible with the home environment.

(8) It is necessary to meet the requirements of product design aesthetics to ensure ease of use and comfort when using the product, as well as to beautify the home environment and enhance aesthetics when not in use.

Also, it is necessary to respond to future aesthetic trends as much as possible.

2.2 Principles of smart home product design

The product design principles of the smart home should be categorized and designed from different service groups, according to various service groups, the design focus is not the same, mainly divided into the following four areas.

2.2.1 Product design for the elderly

Consideration should be given to the characteristics of older users in terms of their reaction time and their vision and hearing, which are impaired by declining physical abilities, and the design of the product should be controlled by considering the use of graphical control interfaces, increasing font size and clarity, and increasing the appearance of the product. With the help of design points such as area size and colour highlighting, pure subjective judgments can be made to facilitate control by the elderly, simplify the operation steps and increase the type of interactive design so that elderly users can use the product independently to achieve the purpose of ease of use. For example, in the case of voice interaction, the various controllers used in the product must generate sound feedback that is large enough to be heard by people with hearing impairments. To control responsiveness and touch intensity, the product's internal processor needs to store, record, and analyze this data to automatically match options that are appropriate for future user actions and to reduce the number of steps that need to be reset each time.

2.2.2 Product design for children

First of all, you need to ensure that the appearance of the product is safe. For example, care should be taken not to compromise aesthetics, sharp edges should be avoided, internal components of the product should not be exposed, and the product should be waterproof, splash-proof, wear-resistant and drop-proof. Also, identify whether the user is a child based on sound quality and timbre, automatically switch to a child-mode interactive interface, and set the features and other functions that the child can use in the product settings mode if the parent does not want the child to use a particular product. Also, it is essential to ensure that children are safe and that the product works independently.

2.2.3 Product design for persons with disabilities
Users with physical impairments and lack of functionality need to take this into account when the product is designed to be used, and can control the

use of the product through interactions such as mobile phone positioning, by voice or other means, and can be precisely located and controlled while ensuring safety.

2.2.4 Product design for young people

As the primary user group of smart home products, younger users have higher aesthetic characteristics and higher functional requirements. Portable products and simple interactions should be designed with care to meet the needs as much as possible and remain stylish, avoiding simplicity and old-fashioned style as much as possible.

3 User research and demand analysis

3.1 Classification of target users

Since the smart home product is targeted at public housing, the target audience is all members of the household and is faced with the same type of smart home due to differences in family members (e.g., age, gender, education level, etc.). There are slight differences in both the perception and operating habits of the product, so these sensitive elements must be taken into account during the product design process. Therefore the initial design phase must be based on the corresponding requirements. To better understand the user needs, a smart home product that makes users more satisfied is designed based on detailed classification of each user group based on the following aspects: gender, age, occupation, the purpose of use, usage behaviour, usage habits, and some unique individual user of smart home products as a way to demonstrate the value of the smart home.

3.2 Target user needs analysis

Today, LCD TVs with "AI" technology advertised on the market have no other method of interaction than pressing and holding the remote control's voice button to issue a voice code. The only voice recognition is not very accurate. After a period of experience, users abandoned voice interaction and used essential button interaction, which can be considered as the first AI test in the home products sector. Products sold with artificial intelligence slogans are not artificial intelligence technology; these products are only supposed to interact to satisfy certain products. The goal is to meet the deep colours and large volumes preferred by male users at the expense of the bright colours and small masses preferred by female users and to lose other goals, such as the inability to achieve human-centred design concepts.
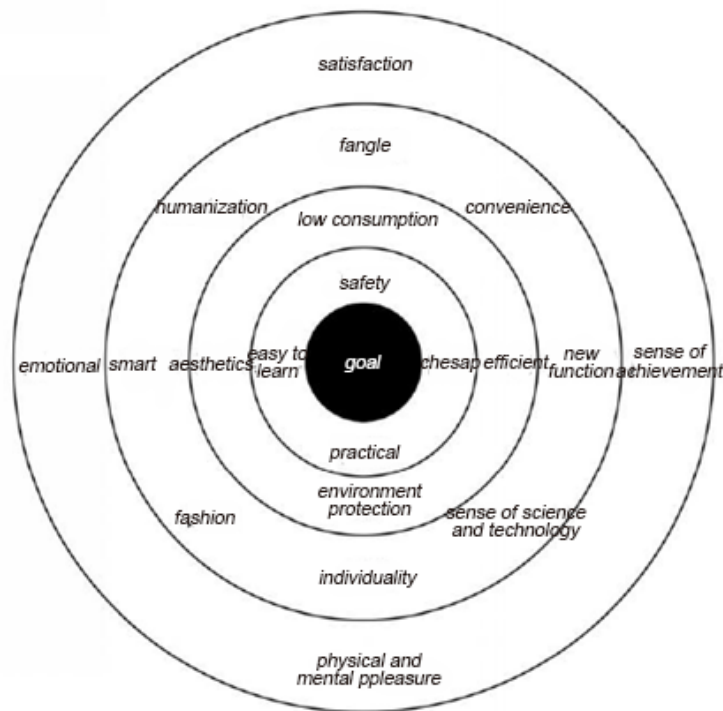
Figure 1. Classification of user needs

The user needs are shown in Figure 1 from the most central to meet the user's purpose of use to the changes in life brought about by economic development, there is a need in the second ring for products that are safe, easy to learn, practical and inexpensive, after which it is developed at a lower level. The new demand for consumer, aesthetic, environmental and efficient products shows that the user's need for products is growing and this range is also expanding. As the pace of society increases and the stress of life increases, science and technology are continually evolving, while users are presented with new products that are user-friendly, smart, stylish, personalized, technologically aware, with new features and convenience needs. Through research, it is possible to design the most satisfying products that perfectly express the needs of future users. Emotional factors, physical and mental enjoyment, achievement and other perceptual factors, i.e. smart home products must meet not only the reasonable needs of the user but also the psychological needs of the user.

If each ring in the diagram corresponds to the user group, it is shown as follows: the innermost ring is elderly users, then outward is young users, children and other age decreasing trends.

4 Smart home product design solutions

Design a smart app that, when bundled with all smart home products, allows for "remote control", eliminates the fear of losing the remote control at home when multiple apps can be used together, and various products should have various remotes. "Smart Home Apps use simple operations, including artificial intelligence technology and three or more methods of interaction. For example, users can not only control the app through voice input but also control the product from the app using text input formats and gestures. And in another way, this form of interaction covers the operation of various products and follows the general habits of the user. The smart home application interface is refreshingly interactive. Visual product illustrations open up, and the user can quickly adapt to the task without having to learn. Older users can rely on recognition even if they are unable to view text, very advanced images can be used to identify the product to be used, or users can open products, features or services directly through voice interaction on the home page or by opening the home page. You can add as many features as you like and then proceed to place an order to promote next time and improve the efficiency of use.

The smart phone app, taking into account some of the user's needs, also allows the user to personalize the app by selecting photos according to their preferences, pictures to use as background wallpaper in the app, as well as customize the app theme colours and more.

5 Summary

The smart home market is developing rapidly, the intelligent technology that can be applied to the home market has progressed, and gradually tends to mature. Still, the smart home products that appear on the market today, the form is relatively single. The function is not complete, there is a particular gap in the experience, do not have the comfort, at the same time there is a specific gap in the appearance of the product, the overall sensory experience is weak, on the whole, the design philosophy of "people-oriented" and "technological aesthetics" has not been implemented into the actual design, resulting in the use of smart home products and market share are relatively low, not only that, smart home products on the market, mostly for young people, without considering the use needs of all age personnel, ignoring the use needs of many individual groups, has certain shortcomings and needs constant improvement.

References

[1] Li C. An Chengshuang. Emotional Design Exploration of Smart Home Products[J]. *Computer Knowledge and Technology,* 2020, 16(09):187-188.

[2] Zhu T. Dong Fan. Application problems and trends of artificial intelligence in-home service industry[J]. *Zhongzhou University Journal,* 2020,37(01):22-26.

[3] Wang RZ Development status and trend analysis of smart home products[J]. *Technology Wind,* 2020(04): 21.

[4] Zhang K. The application of artificial intelligence in the design of household products[J]. *West Leather,* 2019, 41(23): 98.

[5] Hou TT. Decoding smart manufacturing: make the smart home more meaningful[J]. *Household Appliances,* 2019(12): 99.

[6] Yang Q. Product design of a smart home for pet cats[J]. *Hubei Agricultural Mechanization,* 2019(22): 159-160.

[7] Cai WQ, Liu YG, Huang XZ, et al. Introduction to the development of home intelligence[J]. *Science and Technology Innovation,* 2019(32): 83-84.