

Research on the Design of Intelligent Mobility Aids for Seniors

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Abstract: With the rapid development of society and the progress of technology, a large number of intelligent products have emerged. At present, we should consider the mobility needs of the elderly when designing intelligent products, and design intelligent mobility aids for them. This paper analyzes the design of intelligent mobility aids for Seniors—hereinafter referred to as IMAS—, introduces the concept of intelligence, sorts out the design status of mobility aids for Seniors and the design principles of IMAS, and finally describe the content of product design.

Keywords: Seniors; tourism; intelligent products; design principles

When designing mobility aids for the elderly, it is necessary to understand their needs, highlight the diversified attributes of the products and cover all their needs for IMAS, so as to introduce corresponding products to meet their personal demand for these products. The development of intelligence has laid the foundation for the improvement of product functions, and adding more technology in the design of IMAS can offer better services for the elderly and satisfy their practical needs.

1. What is intelligence?

After the emergence of the Internet, big data, artificial intelligence and other technologies, the realization of intelligent development can meet the multifaceted needs of human beings, facilitate their lives and replace manpower to carry out production activities. Intelligence relies on information technology, which can be regarded as a symbol of the development of human civilization. Intelligentization endows products with certain functions through technical means to meet some human needs. In the development of the times, the emergence of technologies such as the Internet of Things, the Internet and big data provide conditions for the development of intelligence. Following the emergence of technologies such as cloud computing, the Internet of Things, and the Internet, many intelligent products have sprung up, which are active in people's lives, changing their lifestyles, and making their work and life simpler. Since intelligent products are of great use to people's life and work, their importance has increasingly drawn the attention of the public, and the number of institutions and groups researching intelligent products is gradually growing as well, which paves the way for the development of intelligent products.

2. The design status of IMAS

In the development of the market, some products are designed according to the needs of the elderly population. According to the available feedback, so far, the supply mechanism of products targeting at the elderly is still in an unbalanced state, few companies pay attention to the needs of the elderly, and the services enjoyed by them are relatively monotonous without obvious service features. As a result, the elderly is not willing to buy new products in the market unless necessary. The types of products catering for the elderly tend to lack variety, which cannot match their demand, and this huge gap between the supply and the demand for products from the elderly means that it can hardly bring vitality to the elderly market.

Meanwhile, the elderly group also has a lot of criticisms of the products in the market. Thus, to satisfy the needs of elderly people, it is necessary to collect information about their specific requirements for products, consider their actual needs, and classify people with different needs. However, although the current products in the market, such as wheelchairs, rollators, canes, etc., can assist their daily travel, most of the canes and wheelchairs on the market are bulky and difficult to move freely in front of steps, which limits their areas of activities. Likewise, other similar elderly products, after being launched into the market, failed to analyze products from the perspective of the elderly group as well. In such a case, the product they offered may not be able to meet the actual needs of the elderly.

3. Design principles of IMAS

i. The principle of invisibility

Many elderly people cannot make accurate judgments about their mobility, which may result in a mismatch between their behavior and their abilities. When designing mobility aids for the elderly, it is necessary to consider their common behaviors and mobility needs, and use technology to launch intelligent products. The elderly may resist most of the intelligent products on the market in their hearts because they do not know how to operate these products. For example, if the product looks complicated and is cumbersome to operate, the elderly will be unwilling to use such products. In addition, they tend to avoid being noticed by others that they are using the relevant mobility aids.

Therefore, when designing IMAS, it is necessary to minimize people's attention from the product itself, which can show the humanistic care of the designers for the elderly group. Furthermore, realizing the invisible setting of mobility aids can also relieve the psychological burden of the elderly, allowing them to be more willing to use such products.

ii. The principle of gradualness

Most elderly are extremely sensitive to changes in their daily lives due to the gradual decrease of this age group in their psychological space and living space. As a result, they are not able to grasp new things quickly. When given a new product, most elderly will spend a certain amount of time getting used to the product before knowing how to use it. Therefore, when it comes to the design of IMAS, it is vital to take into consideration the actual situation of the elderly, introduce advanced technology and take a more gradual approach. In terms of the product appearance and its forms of language expression, it is advisable to continue the habits of the elderly when using previous products, while at the same time, meet their requirements for the products. In this way, the elderly can master the functions of products based on their previous experience and use the products according to their needs, thereby improving the utilization of intelligent products.

iii. The principle of universalization

Intelligent products need to be designed under the principle of universalization, combined with moderate use of new technologies to improve the functional value of products. The products should target the places where the elderly often spend their time, thereby satisfy their needs of using a specific environment during their daily travel. Designers should provide general-purpose products that can be applied in different environments and occasions. Such products should be storable and foldable, thereby facilitating the use of intelligent products by the elderly.

iv. The principle of humanization

Since the product users are the elderly, we need to be clear about the needs of this age group for IMAS. The products should be designed based on the concept of humanization and meet people's needs. It is important to consider the specific environment in which the elderly use the product, and combine new technologies to meet the needs of the elderly both physically and psychologically. If intelligent products are designed under the principle of humanization, the elderly will not feel uncomfortable when using these products, which can provide convenience for their lives.

v. The principle of safety

As intelligent mobility aids cater for the elderly market, it is necessary to improve the degree of product intelligence while at the same time analyzing the function of these products from the perspective of safety and adjusting the design scheme according to the uniqueness of target users. The human-machine size is the focus of the design scheme. Sufficient tests should be carried out to ensure that there are no hidden dangers with the equipment and that no safety problems may occur when being used by the elderly.

4. Design practice of IMAS

i. Market and target customer

The products available in the market generally come with multiple functions, such as a flashlight, one-key emergency call, real-time positioning, ultrasonic detection and other functions. But correspondingly, products will become extremely complicated to use due to the increase in functions. Therefore, it is necessary to make some adjustments according to the uniqueness of the people receiving the service to simplify the product functions, make sure it is user-friendly, and design a product with simple but practical functions. Questionnaires can be distributed to the elderly who are in the stage of physical recovery, so as to acquire information about their desirable functions and appearance for mobility aids. After that, categorize these requirements in order to offer products with distinct personalized features.

ii. Man-machine elements

To create a comfortable user experience for the elderly, while ensuring that the product has a high degree of safety, the size of the product needs to be regulated. For example, based on ergonomic knowledge, we can design a cane that can make the elderly's elbow bend at 20 degrees when they are standing upright. This allows the elderly to maintain a good balance when using the cane. The length of the handle should be in a good grip with the hand of the elderly. Considering that the elderly applies different pressure on a cane when they are standing and walking, the handle of a cane should be able to be adjusted slightly, and the upper and lower part of the cane should also be made adjustable to meet the needs of elderly people ranging from 140 to 180 cm in height, thus giving them a comfortable user experience.

iii. Material elements

It is necessary to pay attention to the selection of product materials. Aluminium, bamboo, rattan, wood, etc. are all optional materials for product design. Based on the demand of the elderly for intelligent mobility aids, we should ensure that the products have good stability and load-bearing capacity. For example, we can choose the aluminium alloy material in the design of a cane, and improve various parts of

the product to make it more tactile when being used by the elderly.

iv. Technical elements

We should center on the actual needs of the elderly group to come up with a design scheme. It is advisable to use GPS technology , which is a radio navigation system relying on space satellites. It can provide all-weather positioning services for the travel of the elderly group. Besides, we can also use photoplethysmography, which can convert light into electrical signals, so as to reflect the blood flow of the elderly. This technology can realize automatic adjustment of product functions to provide better services for the elderly.

Conclusion:

The rapid development of technologies such as the Internet and cloud computing provides technical support for intelligent products. When designing products according to the mobility needs of the elderly, we should come up with a design scheme based on their living habits and thinking patterns, while at the same time creating products that can meet the needs of the elderly so that they can have a better experience in using the products.

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