



# Research on Intelligent Design of Community Public Facilities Under the Background of Population Aging

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**Abstract.** With the deepening of the aging degree of the world's population, the traditional way of pension is difficult to meet the needs of modern pension, community pension has gradually become one of the mainstream pension models. At the same time, the requirements for the design of public facilities in the community are also constantly improving, that is, the use of high technology and new technology to design public facilities, so as to create a more suitable living environment for the elderly [1]. This paper summarizes the current situation of population aging. On the basis of analyzing the research status of intelligent public facilities at home and abroad, it integrates the characteristics and needs of the elderly, summarizes the intelligent design principles of public facilities in the community under the background of aging, and puts forward operational design strategies from different perspectives, so as to provide reference for the intelligent development of community public facilities under the background of population aging.

**Keywords:** suitable for aging · Community pension · Public facilities · Intelligent design

## 1 Introduction

The aging of the world's population is becoming more and more serious, and all countries are facing the problem of aging to varying degrees. According to the 2019 World Population Data Outlook report of the United Nations, the proportion of the world's population aged 65 and above will be about 9% in 2019, nearly 12% in 2030, and 16% in 2050. According to the results of the 7th National census released by the National Bureau of Statistics of China on 11, 2021, there are 264.02 million people aged 60 or above in China, accounting for 18.70% of the total population, among which 19.064 million people aged 65 or above account for 13.50% of the total population. Compared with 2010, the proportion of the population aged 60 or above increased by 5.44 percentage points, and the degree of population aging was further deepened [2].

As an emerging pension model, community elderly care is popular in recent years. However, in the process of research and development of public facilities in most communities, insufficient consideration has been given to suitable for aging, resulting in many

obstacles for the elderly in use. The design level of public facilities suitable for aging in communities needs to be improved.

## 2 Research Background

### 2.1 Research Status in China

In 2017, Design Standards for Intelligent Buildings classified community public facilities, and pointed out that community public facilities should be equipped with corresponding intelligent systems to meet the needs of informatization application and cultural exchange in the community, and provide convenient, efficient and reliable intelligent services for the elderly [3]. From 2018 to 2022, The State Council of China successively proposed to promote the Internet, medical and health care, and promote the development of elderly care services, taking technological innovation as the driving force and strategic support to deal with the aging population.

Chinese scholars Wang De and Lu Yintao proposed in their works that public facilities are inseparable from People's Daily activities, and reasonable and comfortable facility design can promote the formation of intelligent life circle [4]. Scholars such as Qin Jingyan and Dou Jinhua have conducted design studies on intelligent health care for the elderly, and proposed design research strategies for the elderly from multiple perspectives and directions [5]. Hu Gangyu and other scholars put forward the view that community public facilities are the most important carrier of the daily life of the elderly, and believe that whether the allocation of community public facilities can meet the needs of the elderly is the key to determine the quality of the daily life of the elderly [6]. However, in the design practice, the development of community public facilities for aging in China is still in a relatively simple and basic state. Relevant studies on intelligent community public facilities for the needs of the elderly are rarely seen, which requires more attention and exploration.

### 2.2 Research Status in Other Countries

The British Life Trust has established its own fully intelligent elderly system. It plans to build intelligent elderly apartments and public facilities through scientific and technological means, so as to help elderly people improve their quality of life. Marie Chan and other scholars proposed to help the elderly improve their old-age care by using intelligent devices such as actuators, sensors and biomedical monitors. The University of Washington in the United States uses VR technology to design a VR game that creates an atmosphere of "ice and snow world". Through the atmosphere created by the game, the pain of patients can be reduced. The technology can also be applied to the design of community public facilities, so as to provide a more intelligent life for the elderly.

## 2.3 The Existing Problem of Aging Public Facilities

### Humanized Design Needs Further Improvement

According to the living habits, physiological structure, psychological characteristics and other needs of different groups, explore and carry out targeted design, which can make the design works bring more convenient and comfortable feelings to people [7]. Traditional community public facilities mostly focus on the design of form, function and safety, and fail to consider the needs of the elderly in the context of population aging [8].

### The Level of Intelligent Experience and Interaction Design is Low

At present, the design form of the public facilities suitable for aging in the community is fixed, and the experience is relatively boring, and the interaction with the elderly is poor. The interactive intelligent public facilities design can help the elderly get a full sense of experience, and make it easier for them to integrate into the intelligent system of the community.

## 3 Analysis of Characteristics of the Elderly

### 3.1 Physiological Characteristics

- (1) Degradation of sensory ability, mainly manifested as vision loss, light perception ability weakened, color discrimination ability weakened; Hearing, taste, smell and touch are correspondingly degraded. It greatly affects the elderly's judgment of the outside world and weakens their ability to obtain information about the surrounding environment.
- (2) The physical ability is degraded, the physical flexibility of the elderly decreases, the action ability becomes weak, it is difficult to carry out large movements, and the reaction ability is relatively slow. Specific performance for the elderly often appear hand shaking phenomenon, easy to fall, slip and other accidents.

### 3.2 Psychological Characteristics

- (1) The elderly adapt to the surrounding environment is slow, thought and emotional communication is relatively missing, and thus prone to loneliness.
- (2) The elderly confidence is weak, mostly passive, obedient, easy to produce dependence.

## 4 Analysis on the Application of Intelligent Design in the Public Facilities of the Aged Community

### 4.1 The Ease of Use of Community Intelligent Elderly Facilities

Due to the cognitive decline of the elderly, it is difficult to quickly understand the emerging intelligent technology. The touch interface of community public facilities based on the characteristics of the elderly should be organized and integrated, so as to improve the efficiency of the elderly in recognizing and using community intelligent public facilities.

## **4.2 Universality of Facility Functions**

In view of the diversity of elderly groups, community public facilities should meet the needs of more different types of elderly people as far as possible, to meet the use of different situations, while taking into account the common and personalized way of use, to meet the physiological, psychological and other needs of the elderly to the greatest extent.

## **4.3 User Psychological Behavior Perception Difference and Sensory Compensation**

Intelligent community public facilities should fully consider the physiological characteristics of the elderly. The degradation of one of the elderly's senses can be compensated by other senses. For example, the degradation of visual ability can be compensated by tactile sense and raised keys.

# **5 Intelligent Design Strategy of Community Elderly Public Facilities**

## **5.1 Compact Design with Diversified Functions**

With the deepening of aging in the future, the number of elderly population is bound to increase significantly, but the situation of limited community space will not change greatly. In order to achieve functional diversification and intensification of community public service facilities, intelligent design techniques can be used for compact design [9]. The compact design reduces the difficulty of use by integrating different functions of public facilities, and can make the overall space planning of the community more reasonable and orderly.

For example, the public facilities of intelligent walking system in some cities organically combine the rest function of public seats with the functions of guidance and street lighting. This public facility can not only serve as a seat for a short rest, but also is equipped with LED integrated electric street lamp at the top of the facility, which has the function of lighting at night, inquiring traffic lines, providing mobile phone temporary charging station and street WIFI micro-base station [10]. The intelligent public facilities with diversified functions and compact design give people a sense of convenience and comfort.

## **5.2 Enhance Interactive Design and Participation of the Elderly**

Interactive design means that two or more individuals communicate with each other and cooperate with each other through intelligent means to achieve a common vision, whose goal is to improve the "usability" and "user experience" of the design object, so that users can get more sense of participation [11]. Using intelligent design techniques to enhance interactive experience can make it easier for the elderly to understand and use community public facilities, greatly enhance the sense of participation of the elderly, and make up for the weakness of sensory degradation and slow acceptance of new things.

### 5.3 Inclusive Design Through Intelligent Means

Elderly groups can be subdivided into many small branches, which can be divided into self-care elderly, facilitators and helpers, facilitators and caregivers, disabled elderly, mentally retarded elderly, etc. In terms of their physical ability of life and behavior, the psychological characteristics of different elderly people are more diverse. Therefore, inclusive design is very important. Inclusive design was first proposed by architect Richard Hatch in 1984. It is a design attitude and value orientation with humanistic care spirit. It requires that the design focus of community public facilities should be “people”, with the purpose of satisfying the old people of different ages, genders, physiological characteristics and psychological characteristics. Community public facilities can collect various characteristics of different elderly people by intelligent means and store them in the cloud, and make corresponding adjustments when different elderly people use the public facilities.

### 5.4 Build a Sustainable and Harmonious Relationship Among People, Public Facilities and Environment

Intelligent community public facilities for the aged should not only consider the needs of the current elderly, but also reserve possibilities for future sustainable development [12]. Sustainable design requires the harmonious development between human and environment. The design should not only meet the current needs of human, but also take into account the sustainable development of the future environment.

Through intelligent design, the consumption of non-renewable resources should be reduced as far as possible, so as to build the harmonious development between human, public facilities and environment.

## 6 Conclusion

Intelligent public facilities for the aged are an important element in the community and an inevitable product under the background of population aging. They play an indispensable role in the daily life of the elderly. In the era of rapid development of science and technology, the public facilities for the aged in the future community will not only be designed intelligently through the combination of technology, function and form, but also need to pay attention to the perception, participation and individual difference of the elderly, so as to realize the benign and sustainable development of the public facilities for the aged in the future community.

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