Analysis for Interactive Design in the Elderly’s Residential Space

Ju Qiu and Dan-Qi Yu

ABSTRACT: The paper starts from the elderly residential space in order to cast a comprehensive analysis of residential space with infinite potential from the aspects of “automation” and “efficiency” so that a more convenient space will be built for the elderly with “interaction” as the core.

KEYWORD: Interactive, The Elderly, Residential Space, Intelligent Automation, High Efficiency

1 INTRODUCTION
With the time passing by, the aging is going on the path of globalization and the population of the elderly is shooting up continuously and thus causes our nation to enter the aging society since 1991. The statistics show that most of the elderly are more willing to stay in their “home”—familiar environment instead of pension agencies to spend their later life[2]. In order to improve the living environment of the elderly, our nation has invested in basic pension facilities, but they are more or less inconvenient due to over-rough internal construction. Therefore, how to provide the elderly comfortable and convenient living space has been a hot topic nowadays and a deep research on it seems quite necessary.

2 DEMANDS IN RESIDENTIAL SPACE FROM THE ELDERLY
2.1 Particularity of the elderly
With aging, the elderly has suffered from physical and psychological degradation. In physiology, they have to endure some problems in memory, walking and sleep; vision and hearing, learn and judgement and aging in body organs; in psychology, they are prone to loneliness and self-abasement. Therefore, we must pay more attention to this special group.

2.2 The importance of residential space interactivity
Now the newly-built or renovated residential houses still resort to the traditional design without innovation, substantially the same as ordinary residential houses in the shape and structures without considering the specificity of the elderly thus reducing them to much inconvenience physiological and psychological in daily life. This paper will integrate the interactive design to provide more suitable and flexible space good at a combination of science and technology as well as information for senior citizens through artificial techniques so that they will no longer stay in passiveness and stillness.

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3 INTRODUCTION AND FEATURES OF INTERACTIVITY CONCEPT FOR THE ELDERLY’S RESIDENTIAL SPACE

3.1 The new concept “interactivity”

“Interactivity” is usually used in computer and multimedia areas. In the field of computers, it is divided into human-computer interaction and human-machine interface and its basic approach lies in the process of input and output between people and computers. It does a good job in multi-directional communication and exchanges between the main bodies; in conveying and exchanging information between people and computers[4], thus it is an effective means to enhance the efficiency of the users by means of intelligent design of clear and unique forms.

In the context of new financial market, the present writer gives the “interactivity” new ideas and not just lies on the computers and the media. The interactive design for the building bases on the technology system with the help of sensors and actuators to have a combination with the traditional passive energy to control mechanical systems accordingly with the view of changing the appearance, temperature and layout through perceived changes. Sensors have a position to obtain signals from individuals, groups, frequently used mobile phones and computers and other devices and obtain information from the sensor systems on the wall and ground for the sake of the automatic sensing in temperature and humidity and so on. These sensors-dominated driving machines can cause a range of effects - for example, changing the interior temperature and regulating the energy-saving facilities[1]. Interactivity mainly aims at improving efficiency at the cost of less energy so that people and building can be in harmony in the building.

3.2 Interaction of the elderly residential space

(1) Intelligent automation

(Figure 1. Intelligent communication space).

Intelligent automation combines the high-tech information system control, communications, transport and other techniques into one to obtain accurate data in a comprehensive process through collection, transmission, processing and decision after identification[3]. Each sensor in every corner plays a role in care and supervision for the elderly from the technical management terminal transmitted by the central nervous system so as to make sure of safety for the elderly in time and brings more breakthroughs and innovations for aging development (figure 1).
(2) High efficiency

Another feature of interaction is efficiency which means that more tasks can be completed in the relative terms with the same time or less time gaining good results or better results than others \(^{[6]}\). With an effective use innovative technology, more accuracy will be gained in high efficiency and short time.

4 THE INTERACTIVE DESIGN METHODOLOGY

As our nation is becoming stronger, there have been more and more welfare policies in health care, insurance and other aspects for the elderly. However, the policies for their housing have not been fully carried out and improved. The elderly characteristics, preferences and mental mind demand more from the residential space, so the paper sets about from the perspective of interaction to explore the elderly’s residential space.

4.1 From closed to open \(^{[3]}\)

The traditional residential space layout seems formal by just separating one section of wall to divide into big rooms and small ones for people's working, studying. But the elderly's house design must take privacy, sociability, functionality, safety, comfort, selectivity and participation into account. To this end, technological interaction will provide a better service for them.

(1) Walls

The sensing system with hidden wheels mounted on the walls can add something to the interaction so that they can walk at their will with mobility and fun, the house no longer a boring template unit. Besides, they can arrange their rooms at ease for preferences to judge their activity space and private space so that fresh combination and layout can meet variability in the constant space.

(2) Image projection

The interior walls and floors are in need of permanent and projected material so that the image projection technology through visual images to show space ductility and scalability by different dislocation and illusion can get the elderly more services and help so that they can enjoy the virtual local customs and culture they long for.

(3) Doors and Windows

The doors and windows should be designed to enable the elderly to open them in a proper angle in accordance with the illumination. When they need private space, they can control the sensor to change the windows into opaque color; when they need partners, they can also do according operation so that the windows and doors can follow the according changes. At the same time, windows and doors in different states will send different signals to inform the outside world what the elderly inside need in real-time in that the sensor can work to change the colors of windows which indicate different functions. This feature with interaction is convenient for the administrative staff and neighbors’ care.
4.2 From the tediousness to convenience

In life, the furniture system can receive the elderly’s mobile phone signals and electrical equipment so that they can control the temperature and humidity and so on easily with the help of sensors. For instance, when the elderly leave the room, the power will be turned off, the water supply will be cut and the doors will be closed automatically. The entire system targets at the spatial variation so that the elderly’s meet can be med in a state of a long-term operation of the system[1].

In safety, the sensor can start the fire system inside the rooms in terms of changes in temperature and humidity efficiently and automatically to in time notify security room and fire brigade for a fast and effective measure in case of fire. This is because that alarms and emergency maintenance devices have a connection to special devices and can timely feedback to the appropriate management personnel thus effectively avoiding the accident in case of fire, natural disaster, emergency or burglary.

4.3 From mechanization to intelligence

Because the template mechanized mode of operation brings monotony in ordinary houses, intelligent technology which the sensor system for test and evaluation and the house space system combines is added so that the whole system can get the best performance with more sensitivity, more accuracy, more safety and less maintenance. In case of fault, the system can go into self-diagnosis and recovery so that the elderly can live in with the most reasonable layout in that the indoor thermal sensor has a position to monitor temperature, humidity, physical condition, and also automatically adjust the heating and air conditioning system. Moreover, an introduction to new technologies with much more convenience, fun and accuracy is conducive to improving the elderly’s living standards by providing them safe, comfortable, convenient, warm, harmonious and interactive rooms (Figure 2).

(Figure 2. Intelligent resting room).

In addition, some hidden buttons in the bedrooms and bathrooms and other places are in an easy reach without destroying the sense of beauty to connect to a nearby hospital, public security, family members, caregivers etc., for a call in case of illness or emergency[11] thus making a contribution to reducing the life risk of aging people and alleviating concerns of adult children about their aging parents.
5 CONCLUSION

The paper has a prospect for the interaction development in the elderly’ living houses from the view of intelligent automation and efficiency in brief in order to effectively solve problems that aging people fail to support themselves without the their adult children. For this, China should attach more importance to pension to improve the elderly’s living.

To realize the above interactive design methods requires sufficient economic base and perfect management mechanism. Nevertheless, poor economic situation of aging people and poor strength of nation fails more money and benefits to the elderly cause. Therefore, there is still a long way to go in exploration and development to arrive at the objective.

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