



Research on the Practice and Future Trend of Interior Design Based on the Background of Smart Home

Jingjin Liu¹(✉) and Changxin Chen²

¹ East China Jiaotong University, Nanchang, Jiangxi 330013, People's Republic of China
3062824621@qq.com

² Gongqing College of Nanchang University, Jiujiang, Jiangxi 332020, People's Republic of China

Abstract. In the age of intelligence, people put forward more comprehensive requirements for human living environment and space design, thus smart home design was born. The integration of smart home and interior design has become an important trend in the design industry, and as a new design concept for home environment, smart home is gradually receiving attention from all walks of life, and its development prospect is very broad. This article analyzes the role and application limitations of smart home performance in interior design based on the development status of smart home in interior design; combines the basic functions of smart home with the concept and practice of interior design, systematically analyzes the application of smart home in interior design; and proposes the development trend of smart home in interior design.

Keywords: Smart Home · Interior Design · Practice · Future Trends

1 Introduction

The world today is at an inflection point where the influence of technology is being fully realized [1]. In the design sphere, the integration of interior design and high technology is triggering a new industrial revolution: from the office space to the home. With the advent of the Internet of Things, computer-based information technology is being widely used in all walks of life, including the home. The basic concept of “smart home” is to combine various modules in interior design, with the help of Internet technology, so that home appliances, network communication and other equipment to achieve full intelligence, providing comprehensive information interaction, so that people can enjoy a more environmentally friendly, healthier, more convenient and smarter life. Its quality lies in the systematic and deep intersection of intelligence and interior design, which will enable interior design to be refined under the conditions of intelligent development and knowledge innovation, and become a new way of living that focuses on the interaction between people and the environment.

2 Integration of Smart Home and Interior Design

Technology changes the environment, in interior design smart home as an emerging category, representing the future development trend of technology residential, it represents a new design concept. At present, with rapid shifts of people's living needs, the style of interior design is transformed as a result. Therefore, the introduction of smart homes in interior design should think about this question. Both should consider both the material aspect and the synergistic development of art and technology, which requires the use of a variety of creative design activities such as materials, design, craftsmanship, and Internet of Things technology, which puts forward comprehensive requirements for its construction process and brings a higher design added value to interior design. As one of the important components of interior design, smart home design is a style of interior design that aims to meet the growing physical and mental experience and control of habitant, shifting in the direction of intelligence, and is favored by more and more habitant. From a macro perspective, contemporary interior design has evolved from traditional decoration design to a new form that integrates environmental design and living design, and shows a spiraling and rapid development trend. As the characteristics of each habitant vary, resulting in different needs for residential functions, how to better serve habitant through the introduction of intelligent home devices is a key consideration in interior design [2]. In general, the design of modern smart homes has the following main characteristics.

2.1 Focus on the Physical and Mental Experience of the User

Humans are the owner of indoor space, and their living feeling in indoor space is the mark of success or failure of interior design. Intelligent home should not only provide people with a comfortable and convenient, green living environment, but also bring people a pleasant physical and mental experience and improve the quality of living. However, as China's urbanization process accelerates and growth in the living standard, the traditional "home"-centered functional model can not fulfill the habitant's living. Therefore, smart home was born. So, what is meant by smart home? This requires the following three conditions to be fully considered in the design of smart home: First, the design of residential intelligent system should meet the needs of physical environment (such as sound environment, light environment, temperature and humidity environment and air quality, etc.). In addition, the relationship of each person in the home should be fully considered in order to achieve the maximum potential of each family member. During that movement, the users' psychological needs should be paid attention to. For example, how to let users get more emotional enjoyment; secondly, the product appearance and interior design style should be simple and clear to avoid giving a sense of abruptness; thirdly, the smart home should conform to the daily habits of habitant. The above three aspects are complementary, interrelated and interact with each other to meet the most intuitive experience of residents.

2.2 Art and Technology Merge

Interior design reflects the aesthetics of modern life - the art of styling and furnishing and collects a lot of material technologies and construction techniques to achieve certain

concepts and needs. This has resulted in a new area of interior design in which intelligent home technology leads interior design life. Home intelligence has more human characteristics compared with traditional home, and this personalized and multi-functional characteristics also bring us a new experience. Interior design to create a collection of audio-visual communication, living, learning, rest and other functional design disciplines, is no longer a simple space decoration, but a complex system containing a variety of construction processes, so that interior design can eventually become a collection of space aesthetics, decorative modeling aesthetics and today's technology in one ideal space.

2.3 Be Forward-Looking

With rapid development of technology, people's living standards have improved. The modern interior design update cycle is shorter and the interior design gradually develops in the direction of diversification. With the general application of Internet technology in various fields, people's requirements for home products are no longer just to meet the basic use, but begin to focus on the comfort and functionality of the home environment. With the rapid entry of new technologies into people's lives, people's interior design style and living requirements are changing more rapidly. Therefore, the design thinking of interior design styling and home intelligent products should be more predictable and adopt ecological design and standard design, so that interior design can inherit and develop under the condition of continuous integration with new functions and concepts.

2.4 Raise the Level of Quality and Added Value of the Residence

Smart home creates a new living environment through a lot of new materials, detection systems, self-control technology, and network technology. The equipment must have a certain proportion of technology, and the construction process is not limited to traditional technology, thus improving the overall quality and added value of interior design and space.

2.5 Reflects the Individual Needs of Occupants

As an open system, interior space should not only meet people's physiological needs, but also provide them with mental pleasure. The change of its decorative style will also directly affect people's psychological feelings, so there are more factors to consider in interior design, among which the use of personalized elements is particularly important. To avoid the traditional design in the space in lighting, furnishings, color and other aspects of homogeneity and homogeneity, the design process should consider let user to take part in the process, and the design means to be flexible, in order to more comprehensive and detailed to reflect the user's attitude to life and aesthetic taste.

3 Problems in Indoor Smart Home Design

The development of smart home is relatively slow, and the application of smart home is not mature (Fig. 1). Experts' research on the market isn't deep enough, and the developed

smart products are advanced in technology level, but some of them are poor in practicality, leading to the disconnection between products and market; domestic smart home industry is still in the initial stage, the number of enterprises is small, the scale is small, the industry concentration is low, the phenomenon of product homogenization is serious, there is a lack of professional R&D personnel and talents, the independent innovation ability is weak, and there is no sign of smart home. Even home appliance chain enterprises do not plan and build smart home as a separate plan, resulting in a low degree of intelligence; the integration of smart home devices is low, there are various product with a lot of function in the market, but due to technical reasons these smart home appliances are not well integrated together, resulting in its practicality and intelligence difficult to be given full play; smart home is mainly for specific the function configuration of people, most manufacturers only provide basic smart home services, only individual brands use network technology to achieve intelligent remote control of certain furniture or home appliances, and the control system is cumbersome to operate, the smart home system contains a large number of operating buttons, the user needs to control by manual means.

Now there is no unified industry standard for smart homes, and there is a lack of integrated management of the overall system, which will result in a lack of compatibility between products and cannot solve various problems in the preliminary design, making it difficult to form a good presentation between the later living experience and interior design [3]. Many devices can only be used in pairs, and once problems arise, they need to be replaced on a large scale. The existing standards also cannot well support the rapid development of home intelligence. Therefore, smart home must conduct standardization research and develop unified technical standards to align with international standards and provide more convenient and effective services for consumers. Firstly, it is necessary to solve the communication problem between home system and other related systems; secondly, we need to solve the data communication problem between smart home system and other subsystems, so that they can be accessed and controlled remotely through the Internet; finally, we should to solve the problem of user authentication and information security and confidentiality. As the smart home focus on technology whether wireless transmission or other interconnection means way on the development is not mature, in the home, intelligent interaction, data preservation and mutual guidance and other dimensions, there is no fast, low energy consumption, low-cost technology support. Therefore, corresponding network communication technology needs to be established to ensure the transmission of information, and a complete standard system needs to be established to regulate the relevant technical standards and behavior.

4 The Application of Smart Home in Interior Design

In interior design, the application of smart home is mainly in the following aspects:

Active fire alarm system; one of the most important components in fire protection, it provides the necessary data and information for the automatic alarm system and automatic fire extinguishing system, and transmits it to the user after pre-processing. The fire control room is set up with alarm control devices, including fire alarm system control host, spark and smoke detectors, fire intelligent call system, automatic fire extinguishing equipment, cathode ray visualizer, fire call telephone and other equipment.

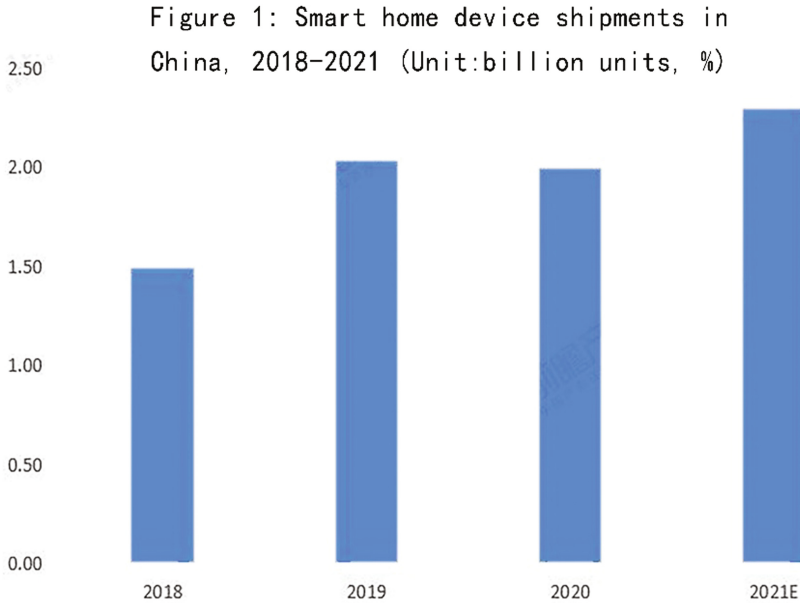


Fig. 1. Smart home device shipments in China, 2018–2021 (Unit: billion units, %)

Wired video system design and implementation; the system uses 860 MHz network interconnection technology to conduct television signals, and is equipped with special amplifiers and wiring boxes, for the “four-channel” type structure. In the residential community, there are several home network nodes, each equipped with wired or wireless transmission modules, and users are equipped with TV sets, recorders, VCRs and various home electronics. Users can realize remote access through telephone lines, and users can choose different types of equipment according to their needs, such as: the most important rooms in the home - living room, bathroom, kitchen, etc., or they can set up an independent space in the home to be used as a master bedroom or study, which provides a TV user terminal with a residential broadband access network connection, thus realizing a multifunctional information service.

The telecommunication network system is designed to connect the telephone and TV equipment in each room to the network through the information distribution box, and an independent host is installed in each room, which can communicate with the corresponding sub computer and provide various services to the users in the corresponding room, such as remote monitoring of the bathroom and data terminal, and management of the main terminal of the house through the data terminal, thus achieving the true meaning of “one mobile device for one mobile device”. The system can control the whole family with one mobile device. The system consists of three main components: wired network access, video monitoring and remote control, which transmits the image signal from each home to the central computer for processing and analysis, and then transmits it to the control center.

The security alarm system and access control system are designed in combination; the access control uses a combination of intelligent face test and fingerprint test to identify user identity information and provide information feedback to the public security department through the house alarm system. One or more alarm controllers are set up in the house to transmit alarm information to the security control center through the network and send alarms to the users according to the set conditions [4].

Home security monitoring management system; the main function is to monitor the home security situation. Alarm machines can be set in any security center to achieve data aggregation and networking, to facilitate user inquiries, retrieval and other functions. This part mainly uses the cable TV network as the information transmission channel to achieve intelligent management, which has the following functions: ① video monitoring function; ② image/sound synchronous transmission function; ③ remote monitoring function; ④ voice call function.

Design of automatic control system; the system is mainly composed of centralized control system, central monitoring center, video monitoring system and other auxiliary facilities.

Air conditioning and ventilation system; cooling is achieved through various forms of cooling. The whole ventilation system is an automatic control system, which is integrated in the BAS building automation control system for monitoring, including the display and adjustment of relevant indoor and outdoor parameters and control parameters, the display and operation control of equipment operation status, the start-up status of equipment transmission lines, and the recording of faults, alarms, relevant linkage control, energy metering and operation data.

Closed-circuit television monitoring system; mainly includes emergency broadcast communication, image acquisition device, video surveillance terminal and computer monitor composition.

Lighting system design; public area LED lights are illuminated and all lamps are set with self-extinguishing switches to save energy, except for elevator room lighting.

Infrared sensing, the use of intelligent sanitary ware; using infrared reflection theory, when a part of the human body is in the infrared sensing area, infrared emitters emit infrared rays covered by the human body, the signal of the integrated circuit is transmitted to the pulse solenoid valve, the pulse solenoid valve receives the signal, and then opens the spout of the faucet as instructed. When the human hand or body out of the infrared induction range, the solenoid valve does not receive the signal, the solenoid valve spool through the internal spring back to the control position, close the solenoid valve, control the water.

5 The Future Trend of Smart Home in Interior Design

The use of living space and furniture has become more flexible. Now the application of the Internet of Things for wireless smart home and interior design interior design can realize the wireless interconnection, while having movable and strong expandability, successfully avoiding the problem of wiring and greatly improving the flexibility of the interior space. In addition, the way of transmitting information through wireless network also enables various devices inside the home to coordinate with each other, thus

better meeting people's requirements for home life; on the other hand, this technology also has strong compatibility with different types of terminals. For example, storage furniture and home audio-visual platforms can also be played through the TV curtain installed on the white wall, bringing people a better viewing experience. Nowadays, interior design pays more and more attention to the improvement of space utilization, and designers are no longer satisfied with simply arranging houses, but hope to provide people with a comfortable and convenient environment. Smart home brings unlimited space for people's imagination, and designers can meet the needs of different users through proper use of interior space, so as to better serve the users. Smart home also provides interior designers with more new design thinking and enriches design elements.

More use of modern high-tech means is inseparable from the development of smart home technology. High-tech makes smart home more diversified and promotes the multi-axial development of smart home. Intelligent control technology is the most important key technology in smart home system. With rapid development of information technology, both computer technology and artificial intelligence technology have been developed greatly and have become an indispensable part of people's life. Computer applications in smart homes are used to control lights, utilities and switches, and the spread of the Internet has made it easier for home appliances to connect to the network. And these are the benefits that modern technology brings to us, saving manpower and improving efficiency, plus reducing some unnecessary expenses.

Smart home is widely used in the design of interior space, which is a continuation of the concept of sustainable development of green housing and ecological housing [5], and it make people to enjoy more convenience and comfort in home life, and also improves people's quality of life, so smart home has become the current development trend of the home industry, and the concept of energy saving and environmental protection is deeply rooted in people's hearts. Smart home mainly adopts a variety of control methods, which itself consumes very little energy. The comprehensive control power of smart home can appropriately control lamps and household appliances, so as to reach the control and disposal of energy, alleviate or exclude the unconscious waste in daily life, and thus realize the energy-saving effect.

6 Conclusion

Smart home interior design is becoming more and more widely used in the future, which will drive a new round of regulation and innovation in the home industry. From the current application effect of smart home in the field of interior design, its main development directions include regulating household resource consumption through the integration of smart home and power grid and other energy facilities. Actively advocate the concept of safe and green design; promote the sustainable development of intelligent building, intelligent care, intelligent medical and other intelligent monitoring technologies; create a safer and healthier security living environment, effectively control intelligent electrical equipment systems through Internet communication, mobile Internet devices and other devices, and tune to different home scenarios. With the help of Internet of Things and Internet technology, home information will be fully integrated and managed, and timely feedback to users. The combination of interior design and intelligent technology, and

the inclusion of convenient intelligent technology in the artistic design environment, can not only make the life of residents more colorful but also promote the combination of technology and art, and stimulate the creativity of designers.

References

1. Lin Juanjuan. The evolution of intelligent development of interior design in China and future trends [J]. Journal of Quanzhou Normal College, 2019, v.37; No.188(02): 99–102. <https://doi.org/10.16125/j.cnki.1009-8224.2019.02.018>.
2. Han Jialui. The art of living and technology-application research of smart home in interior environment design [D]. Beijing Institute of Fashion, 2018.
3. Tang L. The integration and penetration of smart home elements in teahouse interior design [J]. Fujian tea, 2018, v.40; No.202(10):104.
4. Li Shuang, He Fugui, Zhang Wei. IoT-based smart home door and window control design[J]. Wireless communication, 2018,8(4):170–183.
5. Feng K, Tong SH. The origin of smart home and its development trend[J]. China New Technology and New Products, 2010, No.172(06):7. <https://doi.org/10.13612/j.cnki.cntp.2010.06.190>.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

