Proceedings of the 3rd International Conference on Art, Design and Social Sciences
DOI: 10.54254/2753-7064/43/20240157

Research on the Application of Smart Home in Interior Design

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Abstract: With the rapid development of science and technology, the smart home in the field of interior design came to prominence. This paper discusses the application of smart home in interior design in the current environment. Smart home integration of advanced technology, covering intelligent lighting, home appliances, security, and environmental control systems. It provides designers with new creative ideas, challenges the traditional design mode, and promotes the perfect combination of technology, and art to meet people's pursuit of a high quality of life. For the residents, a smart home brings a new life experience, providing a comfortable, convenient, safe and personalized living environment. Therefore, this paper combines the new concepts, methods, and elements brought by smart home to interior design, analyses how smart home injects new vitality and innovative elements into interior design, and finds that the smart home opens up new dimensions, enriches the functional connotation, provides aesthetic inspiration, and changes the design process and method for interior design, that smart home is of great significance in promoting interior design innovation and change.

Keywords: Smart home, interior design, habitat, smart appliance.

1. Introduction

In today's rapidly developing technology, people's lives are undergoing unprecedented changes. Interior design, as an important field in shaping people's living space, is also evolving with the times. When traditional interior design concepts collide with modern technology, the smart home emerges as a builder of new dimensions in interior design[1]. When people step into a well-designed interior space, they no longer expect to see only beautiful decorations and reasonable layout but also desire to experience the convenience and intelligence brought by technology. Smart home is precisely to meet this demand, it will be the traditional living space in a place full of intelligent life. From the first ray of sunshine in the morning through the intelligent curtains into the room, to the night intelligent lighting to create a warm atmosphere; from the remote control of intelligent home appliances to bring efficiency and convenience, to the security protection system to guard the family's safety, smart home every link is reshaping people's perception of life[2]. This study aims to deeply analyse the impact of smart homes on interior design, explore how to use smart home technology to build a new dimension of interior design, and enhance the functionality, aesthetics, and intelligence of interior space. It is of great practical significance to promote the innovative development of interior design and meet people's growing demand for high-quality life.

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2. Concept and Development of Smart Home

2.1. Definition of Smart Home

The smart home is a residential platform, the use of integrated wiring technology, network communication technology, security technology, automatic control technology, audio, and video technology, etc. will be the integration of facilities related to home life, to build a highly efficient management system of residential facilities and family schedules, to enhance home security, convenience, comfort, art, and to achieve environmental protection and energy saving of the living environment.[3].

2.2. The Development History of Smart Home

The early concept of smart home can be traced back to the 1980s, when it was mainly some simple automation devices, such as automatic curtains and lighting control. These devices had a single function and lacked effective linkage with each other.

Into the 21st century, especially in the past decade, with the Internet of Things, artificial intelligence, big data, and other technologies, smart home ushered in a period of rapid development. A variety of smart homes products emerge in an endless stream, the stability of the system and the degree of intelligence continues to improve, the price also gradually tends to be reasonable, and the smart home began to enter the ordinary family [4].

2.3. Key Technologies for Smart Home

Internet of Things technology is the foundation of the smart home, which connects home devices to the Internet through sensors, radio frequency identification, and other devices to achieve information interaction and collaborative work between devices.

Artificial intelligence technology gives smart home devices the ability to learn and make decisions. For example, smart speakers can understand user commands through voice recognition and natural language processing technology, and smart air conditioners can automatically adjust the temperature based on the indoor environment and user habits.

Wireless communication technologies, including Wi-Fi, Bluetooth, ZigBee, etc., provide a convenient way for smart home devices to connect and transmit data [5].

3. Application of Smart Home in Interior Design

3.1. Smart Lighting System

The smart lighting system can automatically adjust the brightness, colour, and colour temperature of the lights according to different scenes and needs. For example, in reading mode, the light will be adjusted to the brightness and colour temperature suitable for reading; in movie-watching mode, the light will be automatically dimmed to create a cinema-like atmosphere.

Smart lighting systems can not only meet people's basic lighting needs, but also through the changes in lighting divide the space, create an atmosphere, and enhance the sense of hierarchy and artistic sense of indoor space. For example, in the living room, different colours and brightness of the lights can be used to distinguish between different functional areas [6].

3.2. Smart Security System

Smart security systems usually include devices such as smart door locks, surveillance cameras, smoke alarms, door, and window sensors. These devices can monitor the security of the home

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environment in real time, and once abnormalities are detected, they will immediately sound an alarm and notify the user.

In interior design, the layout of smart security devices needs to take into account aesthetics and functionality. For example, surveillance cameras can be hidden in the ceiling or decorative paintings, and smart door locks should be installed in a location that is easy to use and does not affect the overall aesthetics of the door [7].

3.3. Smart Appliance Control System

Smart appliances such as smart TVs, smart refrigerators, smart washing machines, etc. Users can control these appliances remotely and operate them intelligently through mobile APP, voice control, or smart remote control.

The emergence of smart appliances has changed the way of using traditional home appliances and space layouts. For example, smart refrigerators can realise ingredient management and shopping recommendations through linkage with other devices, reducing cumbersome operations in the kitchen; smart washing machines can automatically select washing modes according to the material of the clothes and the degree of stains, improving the efficiency of washing [8].

3.4. Smart Curtain and Sunshade System

Smart curtain and sunshade systems can be motor-driven and sensor-controlled to achieve automatic opening and closing, timer control, and remote control. It can automatically adjust the degree of opening and closing of curtains according to the light intensity and indoor temperature to achieve the effect of sunshade, heat insulation and energy saving.[9].

In interior design, the material, colour and style of smart curtains need to be coordinated with the overall decorative style. For example, in the interior space of the minimalist style, you can choose simple white smart curtains with smooth lines and simple modelling to enhance the overall beauty of the space [10].

3.5. Smart Environment Control System

Smart environment control systems can monitor indoor temperature, humidity, air quality and other parameters in real time, and automatically adjust them through air conditioners, humidifiers, air purifiers and other devices to create a comfortable and healthy living environment for people.

The smart environment control system can automatically adjust the indoor environment parameters according to people's living habits and needs. For example, in sleep mode, the system automatically reduces light brightness, adjusts temperature and humidity to provide people with a quiet and comfortable sleep environment.

4. The Impact of Smart Home on Interior Design

4.1. Changes in the Spatial Layout

With the miniaturisation and wirelessness of smart home devices, the constraints of traditional wiring are reduced, providing more flexibility in the layout of indoor spaces [11]. For example, wireless smart speakers can be placed anywhere in the room without the constraints of a wired connection.

Some smart devices can be integrated into furniture or decorations to achieve hidden design and make the indoor space more neat and beautiful. For example, smart sockets can be hidden behind furniture, and smart curtain motors can be installed in curtain boxes without affecting the overall visual effect of the interior space [12].

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4.2. Improvement of Function and Experience

Smart home brings great convenience and comfort to people. Users can easily operate home devices through mobile APP or voice control, eliminating the need to manually operate various switches and remote controls. For example, in the cold winter, users can turn on the air conditioner and heater via mobile phone APP before going home, so that they can feel the warmth as soon as they return home.

The smart home system can be customised according to the user's personal preferences and needs. For example, users can set different scene modes according to their living habits, such as wake-up mode, sleep mode, party mode, etc., to meet the functional requirements in different scenes [1] .

4.3. Changes in Aesthetic Concept

The appearance design and technological elements of smart home devices bring a new visual impact to interior design. For example, some smart lamps adopt unique modelling and lighting effects, which become the decorative highlights of the interior space; the simple design and touch screen operation of the smart control panel also enhance the sense of technology in the interior space.

In the era of smart home, people are more in pursuit of the design concept of simplicity, intelligence and humanisation. Interior design no longer focuses only on decorative, but pays more attention to the integration of functionality and intelligence. Designers need to create a comfortable, convenient and beautiful indoor space through simple design language and intelligent technical means on the basis of meeting the functional needs of users [13].

5. Interior Design Comparison between Traditional Home and Smart Home

5.1. Space Layout

Traditional home space division is more fixed, usually relying on walls and other hard partitions to distinguish between different functional areas, such as the living room, bedroom, kitchen, etc., once built it is more difficult to change the layout.

The fixed layout may lead to some space utilisation is not high, for example, in some small homes, the traditional layout may not be able to meet the diverse needs of life.

Smart home space layout is more flexible and can be realised through smart devices for virtual partitioning. For example, using smart projection screens and movable audio equipment, you can switch to home theatre or office mode in the same space according to different needs.

With the help of intelligent furniture, such as deformable sofa beds and lifting desks, the use of space can be quickly changed according to different scenarios to improve space utilisation [14].

5.2. Function Realisation

Traditional homes are relatively single-function, relying mainly on manual operation of various types of home appliances and furniture. For example, lighting requires manual switching of lamps and lanterns, and temperature adjustment requires manual operation of air conditioning or heating.

Security mainly relies on traditional door locks, window guards, etc., and the response to emergencies is relatively slow.

The smart home has diverse functional integration. Through the intelligent control system, it is possible to control multiple devices with a single button, such as adjusting the light, temperature and sound at the same time.

Powerful security features, including smart door locks, surveillance cameras, smoke alarms, etc., can monitor the home environment in real time, send alerts to the user and take appropriate measures in case of abnormalities.

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5.3. User Experience

Traditional home users need to carry out more manual operations in the process, more cumbersome. For example, they need to manually turn on the lights and the TV when they come home every day. For special people (such as the elderly, the disabled) is not convenient enough, may need the assistance of others to complete some daily operations.

Smart home provides a more convenient user experience, through voice control, mobile phone APP remote control and other ways to operate home equipment, without the need to manually cumbersome operation. More humanised functions are designed for special groups, such as smart wheelchairs with automatic navigation, smart toilets with automatic lifting functions, etc., which improves their quality of life.

5.4. Aesthetic Style

The Traditional home design style is more traditional, focusing on the material, colour, and shape of the collocation, in order to create a warm, comfortable living atmosphere. Decorative elements are relatively fixed, such as murals, ornaments, etc., and the update is relatively slow.

The smart home emphasizes the integration of technology and modernity in its aesthetic style, creating a unique visual effect using intelligent lighting systems, transparent displays, and other equipment. Decorative elements can be adjusted at any time according to the user's preferences and needs, such as replacing the wall pattern through intelligent murals or projection technology to achieve personalised home decoration [15].

6. Conclusion

With the rapid development of science and technology, the application of smart home in interior design has become increasingly widespread and important. With its integration of advanced technologies, including intelligent lighting, home appliances, security and environmental control systems, smart home brings a new creative idea and development direction for interior design. Smart home has a profound impact on interior design in many aspects. In terms of spatial layout, the miniaturisation and wirelessness of its equipment bring more flexibility and can achieve hidden design; in terms of function and experience, it brings convenience and comfort to people, and can be customised to meet the needs of different scenarios; in terms of aesthetic concepts, its appearance design and technological elements prompt people to pursue the design concepts of simplicity, intelligence, and humanisation. Compared with traditional homes, smart homes have obvious advantages in terms of spatial layout, functional implementation, user experience and aesthetic style, providing people with a more flexible, efficient, comfortable and personalised living environment. There are also some shortcomings in this study, one of which is that this study has not conducted sufficient interdisciplinary empirical research. Smart home involves many fields such as science and technology, design, psychology, etc. An in-depth interdisciplinary discussion would provide a more comprehensive understanding of the role and impact of smart home in interior design. Future research can build on this foundation for interdisciplinary exploration.

In conclusion, smart home has great potential and development prospects in interior design. It not only opens up new dimensions for interior design, enriches the functional connotation, provides aesthetic inspiration, and changes the design process and methodology, but also has great significance in promoting innovation and change in interior design. With the continuous progress of technology and in-depth research, smart home will play a more important role in future interior design, creating a better living environment for people. In conclusion, as a builder of new dimensions of interior design, smart home has a broad development prospect and research value. Researchers should continue to deeply explore its application in interior design to create a better living environment for people.

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