Explore the Smart Home Design and Realization in the Era of Information Technology

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Abstract. With the progress and development of modern science and technology today, human society has already entered the information society accordingly.The digitalization and intelligence of information technology have been widely spread, convenient for people's daily life, but also make the use of information, so that people's life quality and efficiency have been greatly improved.In this way, information technology gradually enters people's vision. This article is starting from people's daily life demand for home design, and explores the impact, application and realization of artificial intelligence "A I" (Artificial I ntelligence) on home design in this era of information technology.

Keywords: smart home; information technology; home design.

1. Background and development of home design in the information age

In the context of today's era, "seeking innovation is seeking the future", and the first step of innovation is scientific and technological innovation. The information era provides designers with digital design tools, such as 3D MAX, B IM, Sketchup, etc., and also facilitates the communication between people to understand the parameterization of products.

With the decline of the agricultural era and the industrial era, human society is entering the information age, computer, network communication, sensing, automatic control and other technologies, have all begun to connect with family life, into the tide of era civilization-information society. This time, the era is no longer based on labor and factories, but based on intelligence. Including the engineering theory and qualitative method proposed by Mr. Qian Xuesen, the comprehensive integrated method can also be reflected in the smart home.

With the development of intelligence in today's society, the available scope of information technology can be said to be big to smart earth, small to smart family, has brought a simple, convenient, fast and efficient life to people. The use of wireless network "WiFi", Bluetooth communication connection, safety identification technology, regulatory detection and fire prevention technology, information collection and processing technology, etc., so that the home equipment for unified management and control, is more conducive to improving the quality of life, comfort and safety of users.To make it highly harmonious between people and things, provide high-quality experience, and enhance emotional satisfaction is to promote the construction layout of smart family, smart city, smart country, and smart earth.

2. Smart home design reflects information

2.1 Virtual interactivity

Virtual reality, also referred to as V R, is a widely used high-tech technology in recent years. It is unreal and also belongs to the artificial environment. Use computer equipment to create a realistic virtual place with three-dimensional and three-dimensional mode, to stimulate the user's view, listening, smell, touch, etc., and then through the rest of the technical accessories, to experience the virtual world, as if immersive. Virtual is a multi-category technology of disciplines, through simulation, sensing, interaction, display, computer processing graphics, network operation and other joint operation.

Figure 1. Virtual processing process. From the production made by the author

Virtual technology has four characteristics: 1, many aspects of perception, with the perceptual function of people.2. Field nature can simulate the authenticity of the environment for the user, and can create an ideal environment.3 Interactivity, which can be operated in an environment that gives feedback.4. Autonomy, it will do it according to the laws of physics. Figure 1 shows the composition of the virtual system.

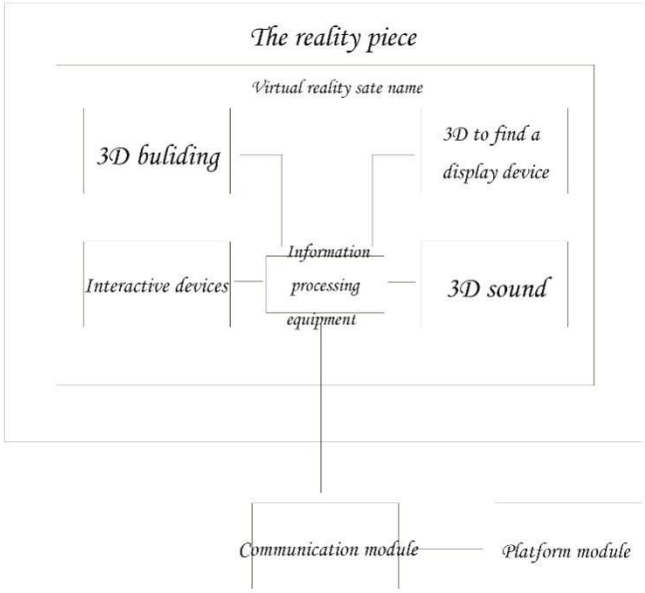

Fig. 1 For the composition of the virtual system. Photo source is produced by the author

Now, in order to meet the needs of consumers, enjoy the private cinema, KTV, dynamic games and smart home has become a necessary element. Disney " through the horizon, with V R glasses, as if immersive, experience the moment of time and space, bring people's vision and listen to the huge sensory enjoyment. Virtual reality technology made a good way for smart home, through the application of virtual reality technology, users can experience and experience from the first perspective, also can have more breeding needs to modify, so as to get personalized home, design and implementation, can also through the virtual technology can also simulate, more intuitive display, meet the use feeling, promote the consumption, also let the user experience more rich and more realistic, so smart home more implementation.

2.2 ZIGBEE sex

Compared to the traditional simple understanding of Zigbee is wireless Bluetooth, which can meet the needs of acceptance and transmission. It features the following six points: 1 Low power consumption, most are in the standby state, no power consumption.2 Low rate.3 Short latency, ZigBee reacts faster and fast network access, not only energy efficient but also efficient.4 Close up, meet the home, office area coverage, enough to get use.5 Large capacity, many network nodes, can connect multiple equipment points.6 Low cost. Especially with the combination of low power consumption, high economic benefits, in the reliable smart home application space.

2.3 RFID sex

RFID is a wireless RFID technology that is easy to read, fast recognition, large data capacity, long life, dynamic real-time tracking, and better security. It belongs to the wireless local category, can achieve cross-region, while low-cost technology and high reliability. RFID can be seen in today's logistics, retail, medical, manufacturing, transportation, etc. In the use of home life, the home electrical equipment operator can integrate an operator, can achieve remote control, such as the lights in the room unified off or want to control one of the lights often on, such as home to

receive guests, can open the air conditioning or humidifier in advance, according to the space temperature and humidity induction, automatic adjustment.

3. Development based in the information age

3.1 The current situation of a smart home

After the world war, such as the United States, Canada and other economically developed countries realized the relationship between design and technology and the importance of design, after the launch of smart buildings, it began to widely propose smart home design, and it was subsequently used in Japan. In Bill Gates' private home, all homes (doors and Windows, lamps, appliances) are controlled by computer, with a high-performance server as a platform, regarded as a typical "21st Century Future Home. "Intelligent home furnishing has become widely promoted in developed countries, a part of which has also passed the international quality testing. It is because of intelligence into the design of home products, with these "smart home" constantly updated, presenting an endless way of modern life.

In recent years in China, people's living standards and needs have been constantly improving, and the emerging development of the design industry and intelligent design have also been introduced. Intelligence has entered our life and experienced a long journey at the same time. Since 1998, the concept of "smart home", people have a certain understanding, mainly in lighting, electrical control and safety prevention. In terms of policy, in 2012, the Internet of Things was listed as a strategic industry in the 12th Five-Year Plan. In 2016, the Guidelines for the Construction of a Comprehensive Standardization System for Intelligent Families were formulated. It is expected that a standard system for the development of China's smart family industry will be initially established in 2020.In 2018, The State Council also proposed to focus on the development of smart home products suitable for consumption upgrading. Smart home will become a system to continuously expand the frontier. Although from the current point of view of China's smart home development is relatively slow, not extensive use and popularization, to achieve the so-called real intelligence, understanding is relatively vague, the development of smart home is still has a long way to go.

3.2 The concept of a smart home

Smart home "smart home automation" originated in the United States in the 1980s, using housing as a platform, using wiring technology, security prevention and control technology, network communication, audio and video technology and other comprehensive disciplines and means of integrated development. Art is now more than just painting, Is a broad basic discipline, Yet home design is just like art, Smart home is on the basis of the modern home, Using comprehensive disciplines and means, Mainly will be some electric remote sensing technology, Network information drawing, Color processing technology, Virtual technology makes accessories transplanted to furniture, Species are shown in Figure 2, Complete the intelligent home life, Changing the way people live, Provide a humanized and intelligent environment, You can connect your own personal information platform with the furniture pc end, Offering tailored life solutions, Improve the safety of the furniture simultaneously, amenity, convenience. It can also link the public network to play a real-time safety, full supervision and health monitoring, to provide a green, sustainable, comfortable and safe living environment for life.

Smart home product	Function
Intelligent lighting	Remote control and other intelligent control methods can be used to control the lighting scene effects such as house switch and dimming.
Smart camera	With remote monitoring, automatic alarm function, sound and light active defense, effective deterrence, two-way voice real-time communication for uninvited guests.
Intelligent patch panel	With USB charging port and international jack, it is compatible with various electrical equipment, supports mobile phone control, and has the functions of leakage monitoring, energy saving and power metering.
Intelligent door lock	It can unlock with password and remotely switch the lock of mobile phone. When it is illegally opened, the alarm notification will remind the owner.
Intelligent curtain	The electric curtain with certain self reaction, adjustment and control functions can automatically adjust the light intensity, air temperature and balanced room temperature according to the conditions in the indoor environment. It has three outstanding characteristics: intelligent light control, intelligent rain control and intelligent wind control, and can be remotely controlled by mobile phone.
Intelligent air conditioner	It can remotely open, close or adjust the specified temperature state. The system can customize the opening or closing of the air conditioner according to the returned value of the temperature sensor.
Intelligent toliet	Automatic flushing, intelligent adjustment of toilet cover temperature, automatic distribution of soft light, solve night lighting, massage function, etc.
Smart refrigerator	Automatically change the refrigerator mode, always keep the food in the best storage state, know the quantity of food in the refrigerator anytime and anywhere through the mobile phone or computer, keep fresh first and quality information, provide users with healthy recipes and nutritional taboos, and remind users to supplement energy regularly.
Smart tv	The TV can be remotely controlled by mobile phone, and the content on the mobile phone tablet can be viewed on the large screen wirelessly to realize screen interaction.
Smart bed	It can automatically adjust and control the raised part, such as the raised part, which is convenient for leisure and entertainment such as reading in bed and watching TV. It does not have a rolling massage system. It can relax the body, adjust the body and mind, loosen the muscles and bones, ensure the sleep quality, and record the user's sleep.

Fig. 2 Pictures of a smart home are made by the author

3.3 The advantages and disadvantages of smart home

The problems encountered in the development at this stage are: high price, fast replacement, and operation inconvenience. Figure 3, the factors affecting the choice of smart home, the figure shows that the higher price is the first.

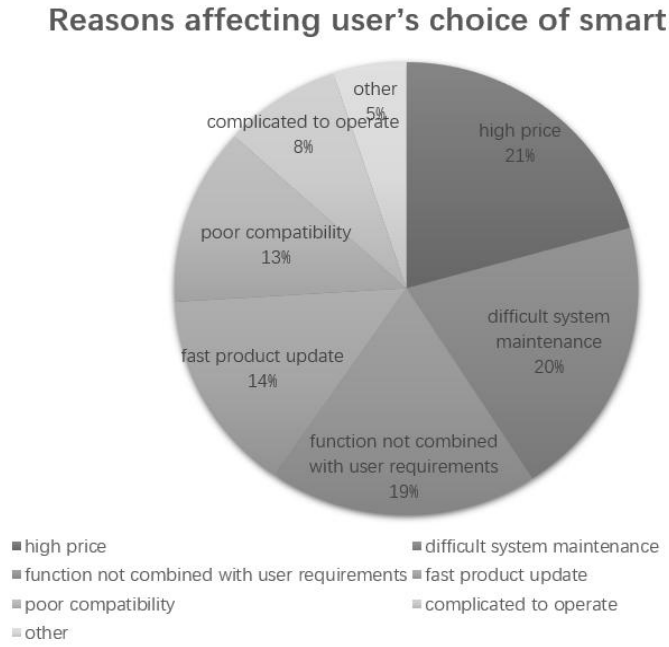

Fig. 3 Factors affecting the choice of smart home pictures come from the production

However, the advantages of smart home are actually also reflected in the disadvantages. For example, in the tedious life now, intelligence pays more attention to the experience of living. Information technology interspersed in the home design, can create a green, scientific, comfortable living environment, which is a quality of life improvement; to realize the integration of technology and design, national support, industry change, these are more in line with the development requirements of the current information economy era. We will increase scientific and technological innovation, increase international competitiveness, and promote economic development.

4. Smart home design principles

Smart home, as an industrial product, should meet the function, structure, modeling, human body, environment and other basic factors, to better reflect the intelligence. Function is at the core, Giving function is to better serve people, Part of the replacement of people's daily activities, Meet the user needs; structure, Improve and design on the basis of functions; modelling, Subject Process, Various influence constraints of the material, In not affecting the implementation of function and structure, Try to meet the shape of the beautiful product; human body, In the furniture design, Above important is comfort, Not only the size, The fit between the structure and the people, And also psychologically, Psychological needs and aesthetic needs need to be met; environment, In another way, it is sustainability, Not only the green and environmental protection of the materials, And to reduce the damage to people during the use cycle, Meet the "green" requirements.

Secondly, safety, reliability also needs to attach great importance to, to ensure the normal use at the same time, the need to deal with a variety of possible environmental changes, should be in accordance with the national design standards, specifications.

Finally, the simplicity and convenience of the wiring installation are related not only to the cost but also to the user's use of the equipment. For example, intelligence will be debugging and maintained through the network platform. If convenient and simple, it may reduce the investment of human and material resources, improve the response speed, and also realize the control of home intelligent system.

5. Conclusion

From the background of the era of information technology, with the development of society, people's living standards are constantly improving, the demand for intelligent life increases, promote the general application of intelligent design of modern home design, cause the change of traditional home design, should maintain the selection of integrated system and advanced mature technology. In this way, the smart home will have a broader development prospect, and at the same time, the modern furniture design will be green environmental protection, practical functions, safe and convenient and other factors, which is more suitable for the sustainable development of our present society.

References

[1] Pohl Johanna; Frick Vivian; Hoefner Anja; Santarius Tilman; Finkbeiner Matthias. Environmental saving potentials of a smart home system from a life cycle perspective: How green is the smart home?. Journal of Cleaner Production, Vol.312(2018).

[2] Montanaro Teodoro; Sergi Ilaria; Bisanti Giovanni Marco; Cambò Alessandro; Patrono Luigi. Fast-prototyping Approach to Design and Validate Architectures for Smart Home. Journal of Communications Software and Systems, Vol.17, Iss. 2,PP 177-184(2018).

[3] Xu Rongxu; Jin Wenquan; Hong Yonggeun; Kim DoHyeun.Intelligent Optimization Mechanism Based on an Objective Function for Efficient Home Appliances Control in an Embedded Edge Platform.Electronics,Vol10, Iss 12. 2021. PP 1460-1460(2021).

[4] ItenRaphael; WagnerJoël; Zeier Röschmann Angela.On the Identification, Evaluation and Treatment of Risks in Smart Homes: A Systematic Literature Review..Vol.9, Issue 6,PP 113-113(2021).

[5] tolojescuCrisan Cristina; Crisan Calin; Butunoi BogdanPetru. An IoT-Based Smart Home Automation System.Sensors.Vol.21, Iss.11.PP3784-3784(2021)

[6] Shank Daniel B.; Wright David; Lulham Rohan; Thurgood Clementine Knowledge, Perceived Benefits, Adoption, and Use of Smart Home .ProductsInternational Journal of Human-Computer Interaction.Vol.37, Iss.10. PP922-937(2021)

[7] De Nicola Antonio; Villani Maria Luisa. Smart City Ontologies and Their Applications: A Systematic Literature Review. Sustainability.Vol.13, Iss.10, PP5578-5578(2021)

[8] Choi Wonyoung; Kim Jisu; Lee SangEun; Park Eunil.Smart home and internet of things: A bibliometic study. Journal of Cleaner Production,Vol301(2021)

[9] Ma Zipin. Development Status of Smart Home System in the Era of Internet of Everything. Journal of Physics: Conference Series.Vol.1881, Iss.3(2021)

[10] Aldossari Mobark Q.; Sidorova Anna. Consumer Acceptance of Internet of Things (IoT): Smart Home Context. Journal of Computer Information Systems.Vol.60, Iss.6. PP.507-517(2020)

[11] Mayub Afrizal; Fahmizal Fahmizal; Shidiq Ma'ruf; Oktiawati Unan Yusmaniar; Rosyid Nur Rohman.Implementation smart home using internet of things. Telkomnika (Telecommunication Computing Electronics and Control). Vol.17, Iss.6,PP.3126-3126(2019)

[12] Fazilah Ismail; Sabrina Ahmad; Ummi Rabaah Hashim.An Exploration to Determine Essential Requirements for Smart Home Application. International Journal of Innovative Technology and Exploring Engineering. Vol.8, Iss.12. PP.1760-1764(2021)