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Research on the Application of Virtual Reality in the Construction of Ageing-Friendly Environment

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Abstract

In order to better meet the needs of the elderly, we provide them with a safe, comfortable and convenient living environment. We conducted a study on the application of virtual reality in the construction of ageing-friendly environment, from the perspective of ageing-friendly design with the concept of "ageing-oriented" design, to study how to adapt the environment to the physiological and psychological needs of the elderly through virtual reality technology and improve the quality of life of the elderly. By studying the impact of virtual reality technology on the aging-friendly environment, we conclude how virtual reality technology can be applied in the construction of aging-friendly environment. Although VR technology has been applied in the medical field, there are few studies that provide services and help for the elderly; the ability to enhance the comfort of the environment for the elderly through virtual reality is a major innovation of this project, which provides a new way of exploration for the field of aging-friendly research.

Keywords

Virtual Reality; Aging-Friendly Environment Construction.

1. Concept and Research Significance

1.1. Virtual Reality (VR) Technology Overview

Virtual Reality (VR) technology is an emerging technology that integrates electronics [1], computer science, optical technology, sensor technology, mechanical technology, human-computer interaction technology, and other technologies, whose main feature is to create a virtual computer-generated environment that provides users with a non-real sensory experience.

Virtual reality technology uses computer technology as technical support, and through various peripheral devices (such as helmet-based displays, glove sensors, etc.) [2], the user is placed in an artificially constructed three-dimensional virtual space, and computer graphics, dynamics simulation, and multimedia technology are used to simulate a realistic scene, so that the user seems to be in it and can interact with it.

Virtual reality technology can be widely used in the military, medicine, education, entertainment, manufacturing and other fields, with advantages such as full immersion, interactivity, promote innovation, etc., and is gradually gaining widespread attention and application.

1.2. Overview of Aging-Friendly Environment

Age-friendly environment is a kind of concept designed and modified for the elderly, also known as age-friendly environment. It refers to the design of buildings, interiors and public

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spaces into an environment suitable for the living and activities of the elderly, in order to meet their living needs and provide a safe, comfortable and convenient living environment.

The aging-friendly environment has the following characteristics:

1. Safety: The aging-friendly environment should have safety features, such as anti-slip, anti-fall, clear walkways, spacious doorways, etc., to improve the safety of the elderly and prevent accidents.

2. Accessibility: Elderly people usually have difficulty moving around, so the aging-friendly environment should facilitate their movement, such as setting up barrier-free passages, elevators, handrails, etc. in buildings and public places to make it very convenient for them to enter and leave and move around.

3. Comfort: The aging-friendly environment should be comfortable and difficult to generate tension, such as suitable temperature, soft light, and ergonomic principles, such as door handles with less grip.

4. Convenience: The daily life of the elderly needs convenient facilities, such as convenient equipment and easy-to-handle appliances.

5. Sociality: The aging-friendly environment should also have community communication facilities, such as cafes, karaoke, study rooms, etc., so that the elderly have social interaction opportunities.

In short, the aging-friendly environment should be safe, accessible, comfortable, convenient and socially friendly to enhance the quality of life and happiness of the elderly.

1.3. Significance of Research

The construction of aging-friendly environment refers to the provision of comfortable and safe living and service environments for the elderly to meet their living and health needs. Virtual reality can help improve the quality of life of the elderly by simulating the aging-friendly environment and providing their living, health and entertainment needs.

2. The Application of Virtual Reality Technology in the Construction of Ageing-Friendly Environment

In the construction of ageing-friendly environment, virtual reality technology can be applied in the following aspects:

2.1. Architectural Design

When designing aging-friendly buildings, virtual reality technology can help designers show the actual effect of the building when used by the elderly more intuitively, so as to ensure the rationality and usability of the building design. Through the visualization effect, the elderly can feel the design plan more intuitively, so as to give targeted feedback, and the designer can adjust and improve the design plan according to the feedback in time. Virtual reality technology can also help designers better consider the facilities and functions needed by the elderly during the design process, and better adjust and improve them during the experimental and testing stages to ensure the building's aging appropriateness. In addition, virtual reality technology can provide progressive stimulation for older adults to gradually adapt and adjust to new environments, thereby reducing their fears and discomfort and improving their quality of life[3].

2.2. In Elderly Facilities and Services

Virtual reality technology can be applied in the design and implementation of facilities and services for the elderly, such as in the design of nursing homes, virtual reality technology can be used to help the elderly understand the various facilities, services and activities of nursing

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homes more intuitively and practically. By creating a realistic 3D model to simulate the overall environment and various facilities of a nursing home, seniors can experience all aspects of a nursing home in virtual reality and explore and understand different areas and functions of a nursing home through virtual reality equipment. The elderly can freely control the perspective and movement in the virtual environment to better understand the various facilities and services of the nursing home.

2.3. Rehabilitation for the Elderly

Virtual reality technology can be applied in the rehabilitation training of the elderly, such as using virtual reality technology to simulate various rehabilitation training scenes, helping the elderly to feel the effect of rehabilitation training more realistically, so as to enhance the effect and interest of rehabilitation training. On the one hand, virtual reality technology can be used to simulate various rehabilitation training scenarios, such as various daily life actions, transportation riding experience, outdoor walking training and so on. The elderly can conduct these trainings in the virtual reality environment and master the relevant skills and movements more naturally and intuitively through real visual and auditory sensations. Compared with traditional rehabilitation training methods, virtual reality training can be safer and more practical to avoid injuries or adverse consequences due to lack of relevant skills.

On the other hand, virtual reality technology can increase the participation and interest of the elderly through gamification. By setting various game goals and challenges, older adults can experience the joy and sense of accomplishment of rehabilitation training in the virtual environment, which makes them more willing to participate in the training and improve the effectiveness of the training[4].

3. Advantages and Challenges of Virtual Reality Technology in the Construction of Ageing-Friendly Environment

3.1. The Main Advantages of Virtual Reality Technology in the Construction of Ageing-Friendly Environment

1. High design efficiency. Virtual reality technology can help designers understand the needs and usage of the environment of the elderly more intuitively, so as to carry out architectural design in a more scientific and reasonable way. For example, virtual reality technology can simulate different types of elderly people, including the differences in physical condition, cognitive ability and cultural background. Architectural designers can combine the characteristics of the elderly with virtual reality scenes to understand more deeply the needs and usage of the elderly, so as to carry out architectural design more scientifically and objectively.

2. Good training effect. The use of virtual reality technology for rehabilitation training can better fit the actual rehabilitation needs of the elderly and improve the effect and interest of training.

3.2. The Main Challenges of Virtual Reality Technology in the Construction of Aging-Friendly Environment

1. High technical cost. The hardware and software equipment of virtual reality technology need high cost, which will cause the cost of aging-friendly construction projects to increase. The hardware equipment needed for virtual reality technology is relatively expensive, such as head-mounted displays, handles, trackers, etc. In addition, in order to ensure the quality of VR user experience, virtual reality technology also requires high-performance computers and graphics cards, all of which will increase the cost of aging-friendly construction projects. In addition, software development for virtual reality technology requires extremely high skills and experience. Developing high quality virtual reality applications requires a lot of programming

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and design work, which will waste a lot of manpower and time and increase the cost of the project.

2. Large differences in user habits and cognition among the elderly. Due to the objective differences and subjective consciousness differences of the elderly, it is more difficult for the elderly to accept and use virtual reality technology. First of all, the objective differences of the elderly, such as vision, hearing and responsiveness, may bring challenges to the use of virtual reality technology. For example, older adults may need brighter screens and larger fonts to facilitate reading, which virtual reality technology may not be able to achieve. In addition, differences in subjective awareness among older adults can affect the acceptance and difficulty of using virtual reality technology. Older adults may be used to traditional writing and operating methods and may find virtual reality technology difficult to operate or even resist. Moreover, the cognitive habits of the elderly may also affect their acceptance of virtual reality technology, such as the preference of the elderly for textual descriptions rather than pictorial ones and their relatively low acceptance of new technologies.

4. Future Prospects

As an emerging technology, virtual reality technology will play an increasingly important role in the construction of aging-friendly environment. The future development trend mainly includes.

4.1. Reduction of Technical Cost

First, the cost of virtual reality technology related equipment and software will be reduced as the market expands. Or despite the high cost of virtual reality technology, it can be considered to reduce the cost of the project by combining the application with other technologies. For example, the technology of smart homes can be used along with virtual reality technology applications. In addition, in-depth communication with site personnel can be conducted to better understand how the elderly use the building to reduce the high costs associated with virtual reality technology.

4.2. Awareness Enhancement of Elderly Users

One way is to improve the awareness and acceptance of virtual reality technology among the elderly through publicity and training, so as to increase the usage and effectiveness of this technology among the elderly. Another way is to enhance the human-machine interaction and convenience of virtual reality technology, and improve the operation experience and process. At the same time, we can also consider designing suitable virtual reality applications for the cognition and habits of the elderly, so that they can accept and use this technology more easily.

4.3. Wide Application of Virtual Reality Technology

With the continuous development and improvement of virtual reality technology, its application scenarios in the fields of design, training, education and entertainment will become more and more extensive, and the construction of ageing-friendly environment for the elderly will also benefit from it.

5. Conclusion

The construction of age-appropriate environments is becoming increasingly important, and virtual reality technology can play an important role in this regard. Virtual reality can simulate aging-friendly environments, train cognitive abilities, provide social entertainment and rehabilitation therapy. These new technologies can improve the quality of life of older adults and enhance their well-being. Future research should use VR technology more extensively to

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provide more innovative solutions for the construction of age-appropriate environments to achieve long-term care and healthy development of the elderly[5].

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