

Application of Azure Kinect in home monitoring

Yan Liu, Xingcai Li

College of Artificial Intelligence and Electrical Engineering, Guangzhou College of Applied Science and Technology, Guangzhou, 511370, China

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Abstract: With the development of the times, the problem of aging in our country and even in the world is becoming more and more serious. At the same time, the concept of the left-behind elderly and the elderly living alone has also been proposed by experts. The so-called left-behind elderly refers to the elderly whose children go out to work for half a year or more and are at home by themselves. Under this general trend, the accident of the elderly in the process of home care is also gradually increasing. Video surveillance has become an important part of people's lives. With the continuous development of computer technology, network technology, and image processing technology, video surveillance systems are gradually integrating into multi-functional integration, network management, and convenient and user-friendly operation. Under the background of the elderly living alone, the introduction of the new Azure.kinect technology enables various industrial-grade high-end technologies to monitor the situation of the elderly at home in real time to a certain extent, and for the unexpected situation of the elderly falling Carry out testing for the benefit of the elderly.

1. Introduction

With the improvement of the economic level, the continuous improvement of medical conditions, and the continuous reduction of the birth rate, population aging has become a serious problem that countries around the world need to face [1]. Subsequently, the domestic surveillance industry developed rapidly and formed a certain scale. Install elderly network intelligent terminals in key elderly families living alone, community rehabilitation elderly hospitals and other units that need guardianship [2]. The information is transmitted to the smart terminals of the elderly and children in a timely manner. When the elderly need urgent help when encountering a love prize, the emergency alarm button can be activated, and the information can be transmitted to the relevant service agencies in time [3]. With the development of the economy, the process of smart old-age care is also constantly advancing. Under the background of today's home-based elderly care, more and more elderly groups have their children away from home all year round because of work or family reasons. It is precisely because of this that the safety of the elderly at home is increasingly valued by their children [4]]. Home-based elderly care services rely on the government and social forces in the community to provide living care, housekeeping services, rehabilitation care and spiritual comfort for the elderly at home [5]. With the development of network technology and the increasingly widespread application of monitoring system. There are more and more demands for centralized monitoring and management of the network; the involvement of telecom network operators in the monitoring industry and the proposal of "safe city" have made the development of networked monitoring systems more competitive [6]. Home-based care is a supplement and update to the traditional family care model, and it is an important part of developing community services and establishing an elderly care service system in my country [7]. Comprehensively promoting smart old-age care services is an important way to solve the problems of old-age care in my country and effectively improve the quality of life of the elderly. The development of networking benefits from the continuous updating and upgrading of the main control microprocessor, operating system, and compression algorithm. In recent years, with the rise of many emerging technologies, biometric technology has gradually been integrated into high-end monitoring systems [8].

2. Related Overview

2.1. Research status of intelligent elderly care

Since China entered an aging society, Chinese experts, scholars, scientific research institutions and colleges and universities have begun to explore the application of smart products in home care. Attention, on the other hand, reflects that promoting the development of old-age care in an intelligent way will become the main direction of future old-age care [9]. The intelligent home monitoring system for the elderly uses the "Internet +" model, mobile Internet technology, Internet of Things technology, and relies on existing products and resources to build an intelligent home monitoring system for the elderly, and explore the personalized design of the intelligent home monitoring system for the elderly. However, due to the late development of the concept of intelligent elderly care in my country, there is no complete system to support it, and it is still in the stage of exploration and development. Combining industrial design and human-computer interaction design, seeking to achieve home monitoring under the background of population aging, providing a strong guarantee for the physical and mental health of the elderly, is of great significance for promoting and building a harmonious aging society [10].

At present, most of the interpretations of intelligent elderly care by experts and scholars are analyzed at the level of the whole system, and the knowledge of sociology, information processing, management and other aspects is used to construct the intelligent elderly care system. At present, the existing systems usually use a mobile terminal Bluetooth module combined with software to implement monitoring, the control method is single, the cost is high, and the working class is unacceptable. By researching the entries and papers, it can be found that after a long period of exploration, the combination of high-tech technology and the pension industry has been realized, and more of them start with the entire pension system, and then design and construct one of the furniture. , and then form a complete pension system. The traditional home monitoring system for the elderly uses a large number of solid line connections, which is not only expensive, but also needs to destroy the original house decoration structure during the installation process.

2.2. Research Status of Kinect

Kinect is a series of somatosensory devices developed by Microsoft, from 1.0 to the present Azure. Kinect- has undergone three developments in total. The most important feature of Kinect is that, because of its low price and excellent performance, it has received great attention from people since its inception. In domestic research, more KinectV2.0 is used to detect the human body. The spatial position of the human skeleton is measured by Kinect, and then, the descending speed of the human particle is taken as an example to determine. Using the advantages of visual and non-visual research methods to study human behavior can obtain the three-dimensional information of human joint points as accurately as wearable sensors, without causing inconvenience to people's life. Kinect can obtain scene images, and some visual-based behavior recognition technologies can also continue to be used, and the visual processing method combined with depth information can effectively shield the interference of complex backgrounds, which is not easy to achieve with purely visual-based research methods.

For the fall of the elderly, a double-judgment mechanism is implemented, that is, the first step is judged, and the distance between the two bones is used as the second-level judgment basis. Scattered, tend to focus on a single research in an independent field related to the elderly, optimize the design for a certain touch point of elderly care services, and less systematically consider the daily comprehensive life behavior of the elderly; after a long period of research, the use of three-dimensional The three-dimensional box method is used to judge, that is, the human body is built in a three-dimensional box, and it is judged whether to fall through the change of length, width and height. The introduction of Kinect not only expanded the application scope of the original recognition method, but also introduced new research techniques, which played an important role in promoting the research on human behavior recognition. The specific research directions of smart elderly care services are relatively scattered, and tend to focus on a single research in an independent field related to elderly care, and optimize the design for a certain contact point of

elderly care services, while less systematic consideration of the daily comprehensive life behavior of the elderly.

3. Application of Azure Kinect in home monitoring

3.1. Kinect Technology

As the new Azure.Kinect technology, its hardware has been greatly improved. In terms of depth camera, the TOF camera has been upgraded to 1 million pixels, which is more accurate for 3D outline description; the RGB camera has been upgraded to 12 million pixels. The displayed images are more diverse and clear, and can be controlled to every corner of the environment. The core component of Kinect is the PS1080 chip, which can control the infrared light source to project laser speckle, perform image encoding and collect the encoded infrared spectrum to calculate the scene depth information. At the same time, it can process the depth data to obtain user joint point information. The product can pass the 3D dot matrix cloud and bone tracking technology, so the gyroscope has also been updated and improved. The 3D electronic accelerometer and 3D electronic gyroscope are used to measure the speed more quickly and accurately. Kinect provides a new way of human-computer interaction, which enables people to use the hands, feet and other parts of the body to complete human-computer interaction. The related applications can involve entertainment, education, medical care and many other fields, such as somatosensory games, virtual fitting mirrors, robot control, etc. The Kinect data collection process is shown in Figure 1.

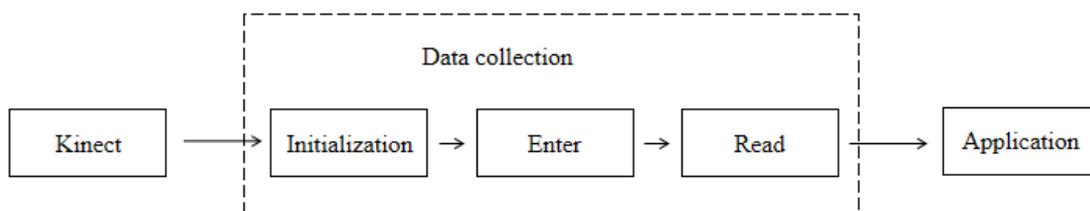


Figure 1 Kinect data collection process

Due to the use of the latest SDK technology, the voice reception has also been improved, using a circular arrangement of seven microphones, which can recognize the language more clearly. Kinect can obtain scene depth information and human body joint point information, and is affected by environmental changes such as illumination. Compared with other depth sensors, its price is lower, and it does not need to be placed on the human body, thus avoiding inconvenience to people's activities. Due to the use of the latest SDK technology, the voice reception has also been improved, using a circular arrangement of seven microphones, which can recognize the language more clearly. This provides a new idea for the study of human behavior recognition. The application of three-dimensional information for behavior recognition has attracted more and more attention. Many scholars have used it in the field of human behavior recognition and achieved remarkable results.

3.2. Design of security monitoring system based on Kinect technology

From the perspective of home security, the goal of the system is to design a video surveillance system with network functions. Through this system, users can monitor the internal area of the home in real time through the human-computer interface, and store and playback video data. . As Azure.Kinect has its own SDK system, after configuring the corresponding development environment, the personal information of the elderly can be customized, and the key data can be adjusted according to the change of the age of the elderly. The system uses wired network and wireless network as the carrier of video data transmission, and uses embedded equipment to realize remote video monitoring. The architecture of the network intelligent video surveillance system is shown in Figure 2.

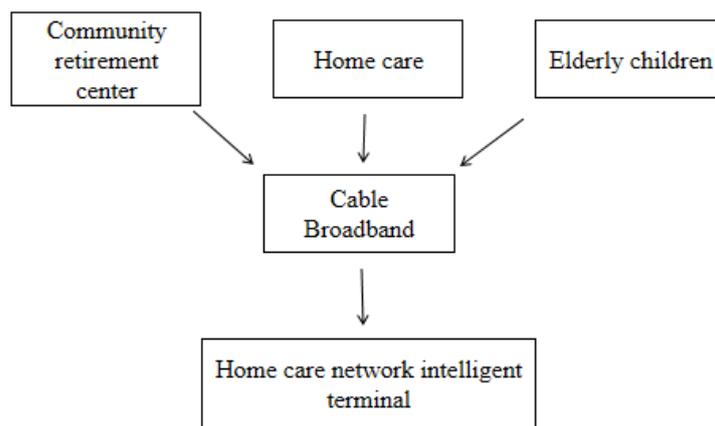


Figure 2 Network intelligent video surveillance system architecture

At present, whether at home or abroad, the home use field of Azure Kinect is almost in a blank state, and the existing smart home is combined with it. Based on the web server, users can use the terminal (PC or mobile phone) to conveniently conduct video surveillance on the home through the web browser, because the client/server architecture has the advantages of fast client response, suitable for wired and wireless LAN, etc. Therefore, the system adopts the C/S structure, and designs the human-computer interaction mode for the monitoring system. The application of Azure Kinect in home care life is a method of applying new technology to daily life. The client sends out user request information, so that the CPU main controller starts the camera to collect real-time video data, and collects, compresses, and transmits the video data through the corresponding video server software, so that the video data stream is transmitted to the user through the network cable and wireless network terminal. Azure.Kinect has the characteristics of self-editing and strong program stability, which is enough to provide elderly care services for most of the elderly who have the ability to take care of themselves. This elderly care model does not mean that the elderly provide elderly care services consciously. , but refers to the timely treatment of the elderly in the event of an accident.

4. Conclusions

With the continuous acceleration of the informatization process, the old-age care models at home and abroad are gradually changing, from child care to informatization services. As the only child gradually has his own life, there is not enough time to take care of the daily life of the parents. Therefore, the number of elderly people living alone is increasing, and the safety of the elderly at home is becoming more and more important to children. The home monitoring system can meet the application requirements of the actual monitoring of the elderly at home. At the same time, the system has the characteristics of high reliability, good versatility, strong anti-interference ability and low price, and has high promotion value. However, its design still needs to be improved. With the increase of functions, the original designed experimental system needs to be properly optimized to enhance the readability and scalability of the program. It is necessary to seek product design and modeling methods that can make the elderly use convenient, psychologically comfortable and safe, so that they can integrate with the information society. With the advancement of science and technology and the continuous development of the Internet of Things, it is believed that in the near future, more economical, practical and intelligent home monitoring systems will go to the homes of the public.

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