

Design of Intelligent Elderly Care Platform Based on Intelligent Perception Technology

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Abstract. Pension is a very important social problem. At present, the pension industry is still in the development stage, and there is an urgent need for a comprehensive service platform to help its development. With the rapid development of artificial intelligence, Internet of things and other emerging technologies, the construction of intelligent elderly care platform becomes possible. The intelligent elderly care platform designed in this article comprehensively utilizes technologies such as intelligent perception, wireless communication, big data, and artificial intelligence. This platform has functions such as information sharing, daily care, medical and health care, humanistic care, and safety monitoring. This platform can promote the healthy development of the elderly care service industry.

Keywords. Intelligent Perception Technology, Internet of Things, intelligent elderly care

1. Introduction

With the rapid development of emerging technologies such as the Internet of Things and artificial intelligence, intelligent perception technology has been widely applied in many scenarios of human production and life. Intelligent perception has made great progress in various industries such as smart homes, smart cars, intelligent industry, wearable devices, intelligent battlefields, intelligent robots, etc. It has brought new opportunities to traditional industries. Similarly, intelligent perception technology has also penetrated into the elderly care service industry, and forming a smart and healthy elderly care system.

With the continuous development of life science and medical technology, the average life span of mankind is getting longer and longer. The number of elderly people is increasing. The problem of providing for the aged has become a social problem that can not be ignored. The current pension models are mainly divided into family pension, institutional pension and community pension. But each pension model has some shortcomings. The pension industry is still in the development stage. The available pension resources are relatively scarce. The pension information is difficult to share. But the demand of the pension industry is increasing. So the pension industry is facing great challenges. In recent years, emerging technologies such as artificial intelligence, cloud computing, big data and the Internet of things have developed continuously, bringing new vitality to the elderly care industry. This article intends to build a intelligent elderly care platform, utilizing emerging technologies such as intelligent perception and artificial intelligence to serve the elderly care industry. It can break down information

barriers between elderly care services, achieve intelligent elderly care and personalized services, It can enable the elderly to enjoy their old age in peace and reduce the burden of social elderly care.^[1]

2. Functions of intelligent elderly care platform

Intelligent elderly care is an intelligent elderly care system that applies modern information technologies such as the Internet of Things, cloud computing, big data, and artificial intelligence. It can provide daily care, diet and daily life, medical and health care, safety assurance, and humanistic care for the elderly. It provides refined care, personalized services, and comprehensive protection for the elderly. The intelligent elderly care platform needs to have the functions of information sharing, daily nursing, health detection, health care service, emotional communication, safety monitoring and so on. Information sharing refers to the interconnection of elderly service demand information, elderly care service organization resource information, community medical institutions and government management department data information through the intelligent elderly care platform. Daily nursing covers basic nursing items such as meal delivery service, housekeeping service, bath help, cleaning help and so on. Health detection refers to the establishment of health files for the elderly, regular physical examination, remote monitoring of blood pressure, heart rate and other physical indicators, and the provision of health management services for the elderly. Health care services include massage, acupuncture, cupping, scraping and other physical therapy and health care, accompanying medical treatment and other walking services, taking medicine reminders and other intimate reminders, providing health lectures and other items. Emotional communication is to provide chat service, life entertainment, consulting service and mental health counseling for the elderly, so as to realize humanistic care. Safety monitoring refers to mastering the action track of the elderly and providing services such as emergency call for help. Therefore, the intelligent elderly care platform can enable the elderly to have a sense of security and support, and live a happy life.

3. Design of intelligent elderly care platform

In order to realize the function of intelligent elderly care platform, this paper designs the framework of the platform. The advanced five layer technical architecture and modular design concept are adopted to ensure high scalability and realize personalized customization requirements and continuous iterative upgrading of functions. The platform includes five modules: Information sharing center, Daily care center, Medical and health center, Humanistic care center and Safety monitoring center. See Figure 1 for details.^[2]

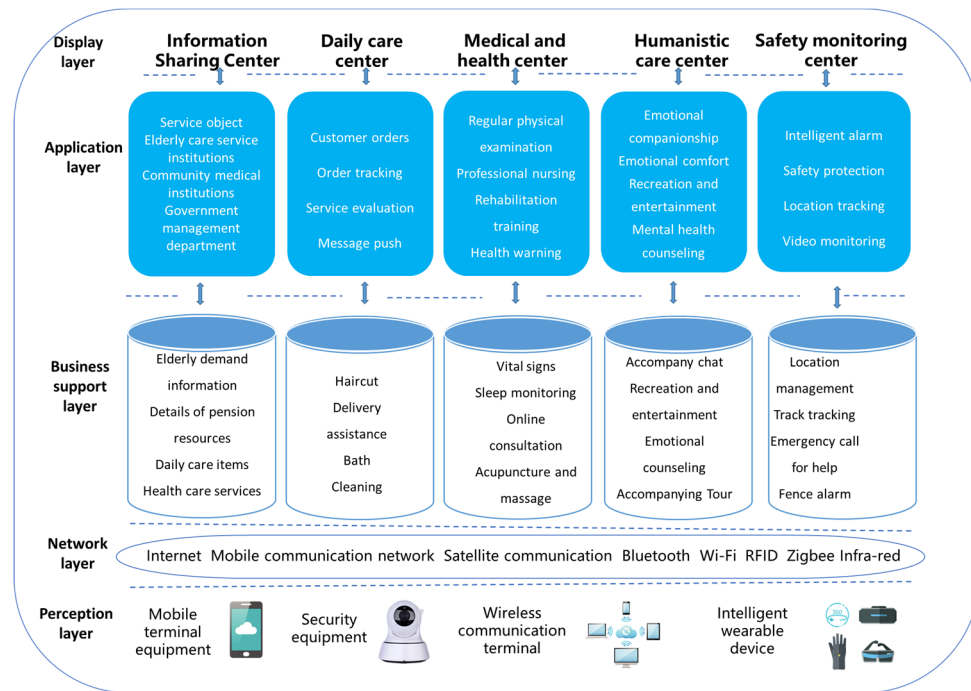


Figure 1 Intelligent elderly care platform

3.1. The Information sharing center

The Information sharing center provides four entrances for elderly people to be served, elderly care service institutions, community medical institutions, and government management departments. The elderly log in to the platform to enter personal information and basic needs. Elderly care service institutions can log in to the platform to input the available elderly care resources and elderly care service projects. Community medical institutions can log in to the platform to input the available physical examination projects, patient care, rehabilitation training, emergency medical assistance and other services. The government management department can obtain management data of the elderly through this platform, providing convenience for efficient elderly care work.^[3]

For this purpose, this platform needs to provide three types of services: web page server, web page client, and mobile application client. The database is used to achieve data storage and access, and includes two parts: a server-side database and a terminal database. The server side adopts MySQL database, which is an open-source database that can be used for free. The number of users processed at the same time is unlimited, and the running speed is fast. It supports multi-threaded operations, ensuring the security requirements of the database. The terminal uses the SQLite database supported by Android itself to store data. The characteristics of SQLite databases are small, fast, simple, secure, stable, reliable, and completely free.

The overall architecture design is based on four levels of architecture: elderly care service institution management, community medical institution management, government

management department management, and client management. Different roles have different usage permissions. The system design completes the functional requirements design of the server and client respectively. There are three types of user login roles on the web server, namely elderly care service institutions, community medical institutions, and government management departments. The specific functional modules include customer information, service project management, service point orders, order management, etc. The client is divided into web terminals and Android Pad terminals, with functions such as inputting personal information, ordering various service projects, and evaluating services. At the same time, it is necessary to consider the quality and attributes of this system, such as reliability, scalability, maintainability, and other factors.

3.2. Daily care center

The Daily care center can meet the needs of users to place orders, track, and evaluate routine care items such as haircuts, meal delivery, meal assistance, bathing, and cleaning.

For this purpose, this platform has designed an automatic data collection system. Automatic data collection refers to the use of computer programs to automatically capture and extract specific information from a designated website or database, and convert it into structured data and store it in the database. Compared to traditional manual collection methods, automatic data collection has advantages such as high efficiency, high accuracy, good scalability, and low cost. By implementing automated collection through programs, efficiency can be greatly improved, errors caused by human factors can be avoided, and the accuracy of data can be guaranteed. New columns can be added as needed for collection at any time. Compared to manual collection methods, the cost of automatic data collection is lower. Implementing automatic data collection requires some technical means, including crawler technology, API interfaces, data grabbing tools, etc. Among them, crawler technology is the most commonly used method, which involves writing programs to simulate human behavior, automatically accessing websites or databases, and capturing the necessary information.^[4]

3.3. Medical and health center

The Medical and health center establishes health records for each elderly person and provides regular physical examinations. Provide care, rehabilitation training, and other services for elderly people with a past medical history. For this purpose, the platform is equipped with intelligent sensing devices to achieve real-time monitoring. As an IoT terminal device, intelligent wearable devices can monitor basic signs such as blood pressure, heart rate, and blood sugar in real time, achieve abnormal physical condition warnings, and promptly remind patients to seek medical attention. When there are abnormal health conditions in the elderly, the platform will issue warnings to their families and alert the elderly care institution system, as well as promptly check and treat any possible illnesses that may occur in the elderly.

Intelligent wearable devices can be divided into hand wearing (smart watch, smart bracelet, etc.), ear wearing (smart glasses, smart headphones, etc.), wearing (smart clothing), foot wearing (smart shoes), etc.

This platform develops intelligent wearable devices such as smartwatches or bracelets, tracks users' daily activities, sleep status, and movement trajectory, develops medical portable devices such as medical vests and belts, provides detection and processing of medical signs

such as blood pressure and heart rate, synchronizes data with Android intelligent terminal devices and cloud platforms, helps the elderly and children understand and improve their health status, achieves real-time positioning and reporting, movement trajectory tracking SOS emergency call, electronic fence alarm, fall alarm, real-time heart rate monitoring, etc.

A smart watch or bracelet can use photoelectric sensors to collect wrist pulse waveforms and obtain data such as heart rate, blood pressure, blood oxygen, and blood sugar. Utilize acceleration sensors to collect body turnover and movement, obtain shallow and deep sleep time, and obtain sleep quality. Utilize built-in GPS or Beidou positioning module to receive satellite signals, obtain location information, and constantly track movement trajectory. If it exceeds the electronic fence, an alarm will be given immediately to prevent elderly people with cognitive impairment from getting lost or lost. When the elderly experience emergencies such as palpitations and difficulty breathing, they can press the SOS button to call for emergency help, and immediately upload the call signal to the medical institution for timely rescue.^[5]

Medical portable devices such as medical vests and belts provide specialized solutions for the detection and processing of medical signs. If a full body physical examination is conducted once a day for the patient, any abnormalities should be reported in a timely manner. Long term monitoring of patients with chronic diseases such as cardiovascular and cerebrovascular diseases or heart disease, collecting data and storing it in the cloud. Through big data analysis, timely warnings and treatment plans can be given to patients, and medication and treatment plans can also be monitored and tracked.^[6]

3.4. Humanistic care center

The Humanity care center provides services such as chatting, entertainment, counseling, and mental health counseling for elderly people with loneliness. It can help them alleviate their feelings of loneliness, achieve happiness in their old age, make up for the shortage of busy children who cannot accompany the elderly at all times, and improve the happiness index of the elderly. For this purpose, this platform can achieve chatting function through chat robots. Chat robots are programs used to simulate human conversations or chats, with the main function of chatting with people. In addition, these robots can even respond to different words based on people's emotions. Chat robots can also serve as little secretaries, such as time reminders, alarm clock settings, and so on.^{[7][8]}

3.5. Security monitoring center

Home safety is particularly important for elderly individuals who are elderly, live alone in empty nests, semi disabled, and have cognitive impairments. In order to solve the problem of unmanned supervision and care, reduce the pressure of care, and more effectively achieve day and night care, this platform has designed early warning for safety protection issues such as smoke, gas leakage, water leakage, door and window opening and closing, and timely warning when leaving home. Choose to install IoT sensing devices such as intelligent gateways, rope pagers, emergency buttons, door magnets, infrared detectors, water immersion detectors, fall alarms, etc. in the residence, and use wireless communication intelligent terminals such as RFID and Zigbee to track the movement trajectory of the elderly, predict their body falls, provide emergency calls for help, and achieve safety for the elderly.^[9]

4. Implementation of intelligent elderly care platform

Intelligent products are emerging one after another, but most of them have problems with complex operations, unclear vision, and difficulty remembering for the elderly. Therefore, when developing intelligent elderly care platform application terminals, it is necessary to consider the special needs of the elderly. When designing user interfaces, emphasis should be placed on factors such as color, font, comfort, and visualization. The overall style should adopt calm colors, with a soft background, easy to recognize fonts, larger font sizes, and visual elements such as graphics and images presenting information. The interaction design fully considers the elderly's ability to accept intelligent terminals, and tries to be simple and easy to understand, with fewer structural levels, simplified processes, and recording user habits. This system is based on Android for the development of intelligent terminals. The source code of the Android system is open and free, and the security mechanism is relatively complete.^[10]

5. Summary

The intelligent elderly care platform comprehensively utilizes technologies such as intelligent perception, wireless communication, big data, artificial intelligence, etc., achieving functions such as information sharing, daily care, medical health, humanistic care, and safety monitoring, which helps to achieve a sense of security for the elderly, a sense of support for the elderly, a sense of happiness for the elderly, and a sense of security for the elderly.

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