

Design of Smart Home Pension System Based on Wearable Computing Technology

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Abstract. With the continuous development and application of the Internet of Things technology, wearable computing technology has gradually penetrated into all walks of life, providing new solutions for smart and convenient work and life. Under the reality of aging phenomenon, we use wearable computing technology to connect with the human body seamlessly to obtain real-time data for the elderly, and then provide "4 + 1" smart home retirement services through data integration and analysis on the cloud platform. This article mainly puts forward the development status of wearable computing technology, analyzes the design requirements of intelligent old-age pension system, and realizes the design of the overall structure of smart home pension system. It also puts forward the design of the four main functional modules of health management, disease prevention and control, safety precaution, and intelligent accompanying, and an auxiliary functional module to provide a one-stop care service for the elderly in life and provide a new idea for the development of the intelligent endowment industry in the future.

Introduction

According to the statistics published in the Report on the Development Trends and Investment Strategies of China's Old-Age Industry for 2017-2022, in 2016, the population of the country's population aged 60 and over was 229 million, accounting for 16.6% of the total population. It is estimated that by 2020, The elderly population reached 248 million, and the aging level reached 17.17%. By 2025, the population over 60 years old will reach 300 million, and China may become a super-age country[1]. In this grim situation of social aging, how to realize the wisdom of the elderly to provide one-stop living, health, safety, escort and auxiliary services for the elderly is a subject worth in-depth study, aiming to improve the well-being and quality of life of the elderly, and to effectively serve the society[2]. Driven by the new application of the Internet of Things, the old-age service industry caused by the elderly has huge market potential. It can not only bring rich economic benefits, but also help solve many people's livelihood problems[3].

Wearable computing technology is a new technology for non-intrusive monitoring of human state with the functions of signal detection and processing, signal feature extraction and data transmission[4]. Through wearable computing technology, sensors of various sensory physiology and environmental indicators can be integrated into items such as clothing, shoes and hats to achieve seamless connection with the human body and achieve the application requirements for real-time data collection[5]. In 2014, as the first year of development of wearable devices, it provided a huge opportunity for the rapid development of wearable technology. After the introduction of recent years, various wearable devices for health, sports, and medical treatment have also emerged one after another, providing a certain amount of technical reference for the design and research of smart home pension systems.

Analysis on the Need Design of Smart Home Pension System

Due to the particularity of their own physical condition, the elderly population has certain

limitations on their ability to take care of themselves, their ability to act, their physical functions, and their mental state[6]. Especially with the increase of age, the memory and attention of the elderly are obviously declining, and the various functions of the body are declining. As a result, some self-care disorders appear in life, which affects the quality of life of the elderly[7]. In view of the special needs of the elderly, wearable technology is applied to the lives of the elderly, and health management, safety prevention, intelligent escort and other support services are provided for the elderly. Therefore, Smart home pension system need to meet the following major design requirements:

Design Principle Based on Reflection of Humanistic Care. The basic solution to the health management needs of the elderly, to meet the daily health data collection, management, upload, integration, analysis and early warning functions. It also provides users with functions such as safety prevention, life accompaniment, and entertainment assistance, reflecting the humanistic care for the elderly, solving the various necessities of the lives of the elderly, and improving the quality of life of the elderly in their later years.

Design Principle with Life Safety Protection as the Core. Older users are vulnerable to life-threatening emergencies due to age or chronic diseases. In the design of the smart home pension system, special attention should be paid to the life safety of the elderly, so that long-term prevention, regular health analysis, real-time monitoring, timely alarm assistance and other functions should be taken to protect the personal safety of the elderly.

Principle of Use based on Simplicity and Ease of Use. As a special user group, the body functions of the elderly have been reduced. For the design of various hardware products for smart pension systems, attention should be paid to the ease of operation and convenience[10]. Do your best to simplify the complicated operation process and form a one-key type, large-screen functional operation interface to facilitate the actual operating needs of elderly users.

Taking Privacy Safety Protection as a Higher-order Application Principle. In the process of data processing in the smart home pension system, the privacy data security of each user should be protected from many technical aspects. We will prevent information leaks from causing additional problems and injuries to users and provide a safe, reliable and stable environment for elderly people to live in.

Architecture Design of Smart Home Pension System

Wearable computing plays a leading role as the core application technology in the smart home pension system. According to the functional analysis and design of wearable products, the platform for smart home pension system is divided into "4 +1" functional modules. Specifically refers to health management, disease prevention, safety prevention, intelligent escort these four main functional modules and an auxiliary functional module. The four main functional modules provide daily life, safety and health services for the elderly, and an auxiliary functional module provides entertainment, leisure, social and other services to meet all functional design needs of the smart home pension system and achieve one-stop old-age care services for the elderly. The main frame design is shown in Fig. 1 .

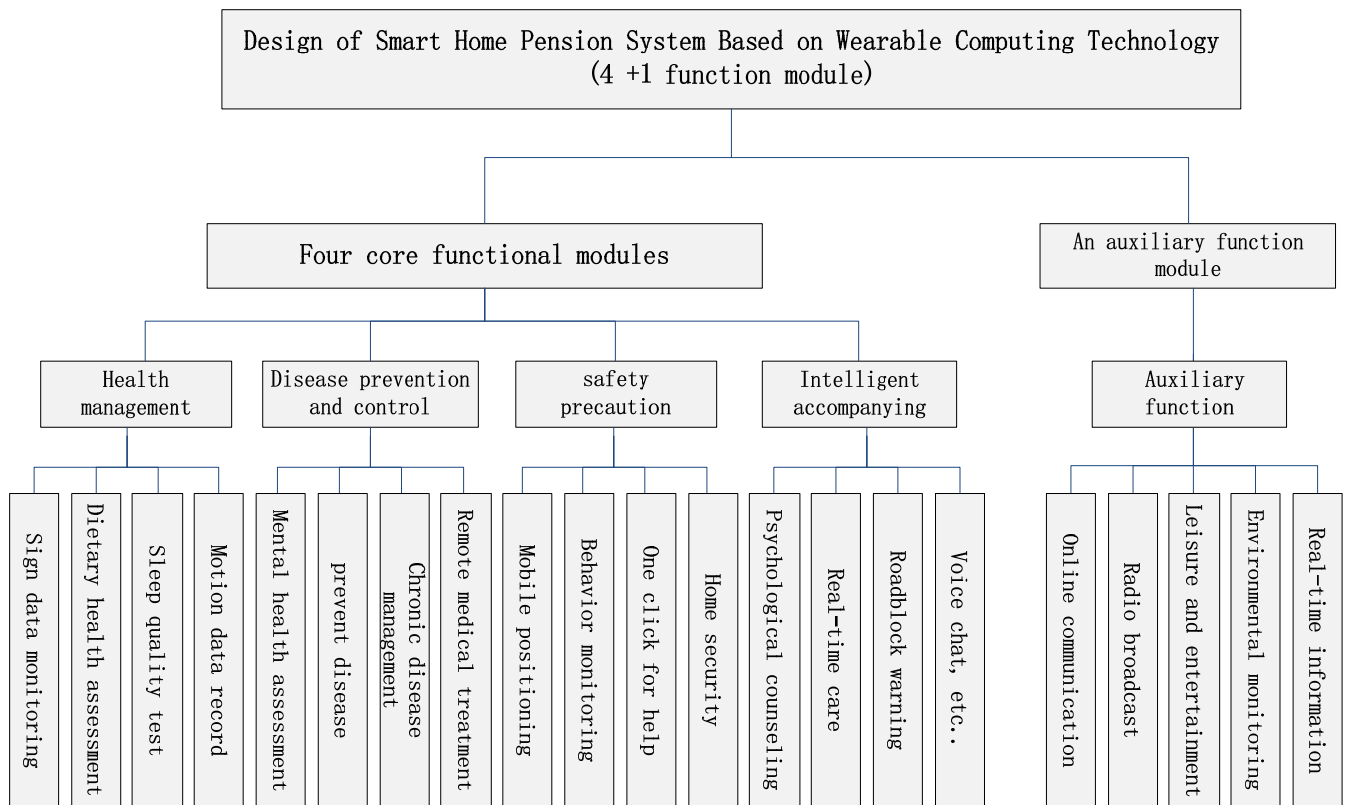


Figure 1. Architecture Design of Smart Home Pension System.

Design of Functional Module of Smart Home Pension System

According to the architectural design of the smart home pension system, the entire system is divided into "4 +1" function modules. The specific design is as follows:

Health Management. In the health management function module, there are main functions such as physical sign data monitoring, diet health assessment, sleep quality test, and motion data recording. These basic health data are collected and stored by wearable devices and uploaded to the smart pension cloud service platform to form individual users health data files for reference by the families of the elderly. It is submitted to the community and medical institutions as the source and basis of general diagnosis and treatment data .

Disease Prevention and Control. In the disease prevention and control function module, it mainly provides services such as mental health assessment, disease prevention, chronic disease management, and remote medical treatment. All data acquisition is done by various sensors integrated by wearable devices and is responsible for the regular uploading of data. On the home pension service platform, it is necessary to increase the accuracy of big data analysis and processing functions according to the demand, to achieve regular physical analysis and evaluation of the elderly users, and to form a new mode of prevention.

Safety Precaution. In the safety precaution function module, mainly meets the safety needs of the elderly. In the functional design of wearable devices, security services based on mobile positioning, behavior monitoring, one-click help, home security and so on are realized. With the increase of age, the elderly at home are prone to physical phenomena such as memory loss, weak vision, and inconvenient hands and feet. Therefore, in terms of safety and protection, special attention needs to be paid to give the elderly a safe living environment.

Intelligent Accompanying. In the intelligent accompanying module, it mainly aims to solve the actual needs of the elderly in their later years of life, and provides humanistic care services such as psychological counseling, real-time care, roadblock warning, voice escort chat, video calls, and reminder of events. In the concrete realization, can use the wearable equipment to carry on the

property, provides the old person emotionally psychosomatic intelligence escort, also can reduce the old person unexpected circumstance to some extent, saves the endowment cost.

Auxiliary Function. In the design of the auxiliary function module, it is mainly the integration of social entertainment and life support functions. Including online social networking, radio broadcasting, leisure and entertainment, environmental monitoring, life information and other services, to provide elderly people with an assisted entertainment experience for retirement, more enriched pension life, reduce loneliness, and experience the fun of leisure life.

Conclusion

Aiming at the special needs of the elderly, this paper designs a smart home pension system based on wearable computing technology, which mainly provides health management, disease prevention and control, safety prevention, intelligent escort and auxiliary function services, and is dedicated to solving the livelihood problems of social home pension. In the technology realization of wearable equipment, the corresponding design requirements are put forward to provide reference for the product design of wearable equipment in the intelligent retirement system.

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