Design and implementation of pension management system based on Internet of things technology

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Abstract. The old-age management system based on the Internet of things has integrated the health management information resources of the residents, allowing residents to enjoy medical monitoring services and intelligent health services at anytime and anywhere, and provide unified standardized, specialized and affectionate health inspection, analysis and assessment for the residents of the community. In this paper, the feasibility analysis of system construction is carried out, the system requirements are analyzed from the aspects of system feasibility, business function and business process, and the overall design of the system function is carried out. Finally, the effect of the system is expounded.

1. Introduction

In recent years, the Chinese government put forward the "construction planning Internet plus" information, the use of mobile Internet, cloud computing, big data, networking and other information technology, make the Internet and traditional industries depth of integration, enhance the level of information technology in various industries, so as to promote the innovation and development of China's economy and society [1]. At present the medical field put forward the "Internet plus health" concept, the government leading internet medical, make full use of modern information network technology, focus on promoting the construction of hospital electronic medical record information system based, and gradually establish among hospitals and hospital and relevant departments, unified and efficient interconnection and information sharing area. The medical cooperative service model can effectively promote the integration of information resources in hospitals, promote information sharing and process optimization, and ultimately improve the quality and efficiency of medical and health services, facilitate the medical treatment and reduce the cost of medical treatment [2].

With the aging of population, the "pension industry" has become a hot word in society. By the end of 2017, there were 241 million elderly people aged 60 and over in China, accounting for 17.3% of the total population. At present, the main ways of providing for the aged are home care (96%), institutional endowment (3%), and community endowment (1%) [3]. In the period of "13th Five-Year", the pension industry in China will face new opportunities and challenges. After the implementation of the two child policy, it is still necessary to strengthen the construction of the old-age security and service system, and the prospect of the pension industry is broad. China's pension industry chain is longer, and the upper and lower reaches are obvious. The pension industry should focus on [4], such as health care, medical care, housekeeping services, entertainment and leisure, daily consumption and information platform.
Therefore, how to do a good job of health care for the elderly can better reflect the public health service of public health services, improve the quality and efficiency of medical services, to ensure the basic medical and health services for the elderly and improve the quality of life of the elderly are of great meaning [5].

As an important part of the community intelligence health public service platform, the old-age management system studied in this paper is designed to provide convenient health monitoring services for patients with slow disease and suitable population. Through the form of health huts or portable household electronic monitors, the collection of human body data related to common diseases is realized in the form of Internet of things. Collecting and monitoring (such as blood pressure, blood sugar, ECG and heart rate), and calling the interface service of the intelligent health public service platform, combining the related monitoring data with the health files, so that the residents can inquire their health data at anytime and anywhere, so as to achieve the goal of health self-management. At the same time, through the integration of the intelligent health public service platform, the detected data can be provided to third party services to provide safe and high-quality health services for the residents.

2. System demand analysis

2.1. System feasibility analysis

The old-age management system, as the data collection, monitoring and management platform for the core human characteristics of the elderly, needs to make full use of advanced mature technology and substantial funds to provide support for the development of the system. In technology, the spring lightweight framework platform and Java programming language are used to realize modular and integrated development. Data call and resource sharing are realized through Webservice. Hibernate supports database persistent access and supports users to access system by B/S mode. In terms of economy, as a sub project of the public service platform for intelligent health, the system can make use of the existing hardware and software infrastructure, and the government has sufficient financial budget and support as a guarantee. The system construction system has a large target user group, which can cover the various social communities in the City, and play an important role in the health of the elderly people in the community. To the prevention and timely diagnosis, the health index of the elderly in the community can be improved, and the government can save a large amount of financial expenditure on medical reimbursement, and the economic return is objective. In terms of social feasibility, the elderly, medical staff and government agencies of the community can quickly search for the chronic disease monitoring data of all the contracted residents. The residents can enter their own health monitoring data by hand, and have a clear understanding and prejudgement on the body state through the trend map. Health rehabilitation and treatment provide data early warning. The function of community residents' pension management system is relatively simple, easy to operate, easy to start, and can provide real and healthy help for the residents of the community. Therefore, the construction of the system is highly feasible.

2.2. Analysis of system business process

The business process of community residents' pension management system includes the core function stages of the pension management system, which are divided into the signing authorization, the browsing of the home page, the monitoring of medical equipment, the manual entry and the inquiry. The user has unified the identity authentication through the community public health platform and signed the agreement signed after the successful landing system. After signing the contract, access to the home page of the system can support monitoring and querying of core health indicators such as ECG, blood pressure, blood oxygen and blood sugar. Monitoring the body by medical equipment, and receiving relevant indicators to judge whether to exceed the early warning value, and to alert the relevant situation, and to store the data to the monitoring file database through the interface service provided by the platform, and the monitoring of the monitoring instrument by manual recording. Manual entry, early warning and recognition of various data, and then stored in the database; users can make fuzzy and
accurate query through the system, form a trend map through a period of time, to carry out the health trend analysis.

2.3. Analysis of system business function

The core business functions of the pension management system include service application, service revocation, authority management, setting wizard, various indicators monitoring, data query, trend map analysis and system management.

(1) Service application: users apply for the system, and the user will sign an agreement with the system operator or management authority to authorize the user to use the system.

(2) Function rights management: users independently open and close the various functional modules in the system.

(3) Service revocation: the signed user has applied for the revocation of the use system authority, and the user's system use rights are cancelled after the user has signed the revocation protocol with the system operator or the management organization.

(4) Platform user login: calling the public login service of the platform.

(5) User authentication: check whether the user is legitimate user and verify the user's permission to use the system.

(6) Exemption reminder: remind users of the system's exemption information.

(7) Setup wizard: guide users to personalized settings in the way of guide guidance, set the system use parameters through personalized wizard, and make users more convenient to use the system.

(8) Home page display: users enter the main page after the system to provide users with links to various functional points.

(9) Blood pressure monitoring: monitoring the blood pressure of the user through the external blood pressure measuring device, and preserving the measurement results to the archives.

(10) Blood glucose monitoring: monitoring the blood glucose level of users by external glucose monitoring equipment, and preserving the results of the measurement to the archives.

(11) Blood oxygen monitoring: monitoring the blood oxygen saturation of the users through the external blood oxygen measuring equipment, and preserving the results of the measurement to the archives.

(12) ECG monitoring: monitoring the ECG of the user through external ECG measurement equipment, and preserving the measurement results to the archives.

(13) Query: users can query the required data through different query conditions.

(14) Trend map: it can be converted into graphics according to the user's measurement results, so as to provide users with clear, intuitive health conditions and development trends.

(15) System management: providing system administrators with relevant system parameters and configuration, such as maintenance of protocol contents, default wizard parameters of users, etc.

(16) Community doctor inquiries: it is convenient for community doctors to inquire the health data records of the health management of their own jurisdiction, and to send intervention information to those who have exceeded the health warning.

2.4. User role analysis

The pension management system mainly provides four types of chronic disease health surveillance for community residents, especially the elderly. The main users of this system are as follows:

(1) Ordinary residents: Patients with chronic diseases, such as diabetes, hypertension, coronary heart disease and so on, especially elderly people.

(2) System administrator: manage the system users and permissions to ensure the normal operation of the system.

(3) Government management agencies: through the statistical analysis of the health services data of ordinary residents, provide relevant performance management.

(4) Operators: through the analysis and excavation of health records, we can provide residents with more convenient value-added services.
3. System functional structure design

The structure diagram of the system module uses a top-down structured design method. The developer can clearly recognize the relationship between the system levels and functions, and the data call and sharing system can be carried out among the various functions. The main functions of the community residents' pension management system include service management, user login, user's home page, blood pressure monitoring, blood glucose monitoring, blood oxygen monitoring, ECG monitoring, data inquiry, equipment management and system management. The overall functional structure of the pension management system is shown in Figure 1.

![Community residents pension management system functional structure diagram](image)

**FIG 1.** Overall functional structure of the system

4. System core function realization

(1) Home page display

This function is the most used page of the user. The first page of the system is this page. The main information contains the user information, monitoring items, query items, trend map, and setting the wizard entrance. The user authentication function is invoked to verify the user information. If the user just enters the system, he calls the reminders to remind users. Load user access information, get the type of device that users can use, and control the permissions. No permission function is not allowed. According to the monitoring items set by users, the specific monitoring items and links are displayed to display specific query items and links. According to the parameters of user set trend map, the related graphics and links are displayed. The data of the generated graphics can read the results of monitoring and collection according to the periodic parameters set by the user, and the link will turn to the corresponding query item. The layout of the home page is displayed according to user layout layout. According to user style settings, display the style of the home page.

(2) Setting up a wizard

The function user is the user, the guide user is mainly set up in the way of the wizard, and the user's favorite layout style is arranged by personalizing the related parameters of the system. The setup wizard is divided into 4 categories: monitoring item selection, early warning setting, trend chart setting, and home page style.

(3) Data acquisition

1) Manual input: the user of this function is an ordinary user. This function provides the user with manual input method to input the measured blood pressure value and save it.

2) Online collection: users of this function are ordinary users. Users use external blood pressure measurement equipment to measure blood pressure and display and preserve the results collected. The system automatically prompts the user when the result of collection exceeds the pre-warning value set by the user. This function is divided into three functional points: receiving results, displaying results, confirming preservation. The receiving result is mainly used for the measurement result of the receiving equipment.

(4) Data query

As the core function of data query, blood pressure query function mainly provides historical data for monitoring blood pressure, and can query the satisfied data according to the user's query conditions. It
can also maintain the result of query and turn it into a trend map. The list of results obtained can be printed and exported. The condition for the user to enter the query of blood pressure data. Export result list data is Excel file or trend chart is PDF file.

(5) Equipment management

The device management function is used to test the connection with external medical devices. The system provides connection navigation for 4 different devices. When users click on one of the devices, they will dynamically switch the device page.

5. Summary

By strengthening community residents' personal health care behavior and quality supervision, the study of community pension management system establishes a systematic and normalized community resident medical behavior supervision mechanism to improve the scientific, fine and professional leveling of community residents' medical behavior management, and strengthen the health administrative department to the ordinary residence. The whole process of medical behavior, dynamic supervision and early warning decision-making ability. Community residents can monitor their own health indicators such as blood oxygen, blood pressure, blood sugar and electrocardiogram through health monitoring instruments in the community, timely reflect the health status, and provide data support for the health status of the residents by monitoring the health indicators for a period of time, and at the same time, the system is convenient for patients to get medical treatment and through public clothes. The platform realizes the sharing of health data, saves time to check the hospital repeatedly, improves the efficiency of medical treatment, and improves the medical experience. In this paper, the community residents' pension management system has established and perfected the integrated integrated hospital information system with the core of the electronic medical records of community residents monitoring and monitoring in the pilot communities, and initially realized the mutual connection and information sharing between the information systems of each hospital and the residents' individual community residents. Vertical and longitudinal data integration, collaborative services and medical behavior supervision.

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