A design of new type of intelligent home care system for the elderly

Ru Zhang

College of Mechanical and Electronic Engineering, Jingdezhen Ceramic Institute, Jingdezhen Jiangxi 333000, China

wowei2004@sohu.com

Abstract

We propose the design of a new type of intelligent home care system based on social service forces, community, family, and the wisdom of the four. Its core, on the one hand, is the old people's home and center as a unit, with modern communication means and modern Internet technology, to the elderly health and safety monitoring, remote monitoring and detection means, the key point is the physiological electrical signal acquisition and security information remote transmission, on the other hand, the use of modern mobile portable equipment (mobile phones or positioning equipment), so that the elderly needs a lot of release and rapid response. The remote monitoring technology includes computer technology, Internet technology, communication technology, multimedia technology and medical technology. It involves a wide range of technology, and is a frontier science.

Keywords

App, Home care,Pcweb.

1. Introduction

With the increasing of the aging population, the function of the aged is weakening, and the demand of the aged care service is increasing. Home care for living at home in the elderly and specialization of social service, to meet the diversified demand for pension services, both to ensure the old-age care and in conformity with the wishes of the elderly, is a feasible way of pension.

From the perspective of international popular support, according to the survey data show (see Table 1), home care as the current international social service delivery methods and social work, an important direction of development, has been widely used and important development.

Table 1. Data comparison of national pension

country	United Kingdom	United States of America	Sweden	Japen	Singapore	Thailand
Home care	95%	96.3%	96.2%	98.6%	94%	72.2%
Institutional pension	4.6%	3.7%	4.8%	1.2%	3.9%	20.1%

However, in the above mode of operation to bring home care for a lot of people happy and comfortable at the same time, it is also faced with the huge development of old people information network seriously backward and social digital process, the great news is due to recent years, the rapid development of large data technology, smart devices, rapid use of new technology to meet the new home care, to meet different needs, better service local elderly population will be more, better implementation and implementation. We know that home care is not a concept of physical space, in which the wisdom of pension mode, we pay attention to the platform to join the intelligent human care, emotional exchange, so that the system has a real time with physical and mental pension and pension environment.

2. Knowledge base of project support

2.1 Starting with the design of the system

In this paper, the health information signal of the old man's health information is acquired by the acquisition circuit and the signal is converted into digital signal and digital filter. Finally, the data is transmitted to the upper computer by serial port.

The process is described in detail below.

(1) communication protocol

We communicate with the center of the communication protocol standards, this communication standard makes the blood pressure health information collection equipment and system center connect successfully, and drive the right to install, then the system center will take it as a virtual port through the Wi-Fi/3G communication. Data flow control of communication protocols is shown in figure. When the center sends a request to the data packet, the communication is started, and a confirmation packet is sent to the host computer. The data collection has been transmitted to the system. We will see the flow in Fig1.

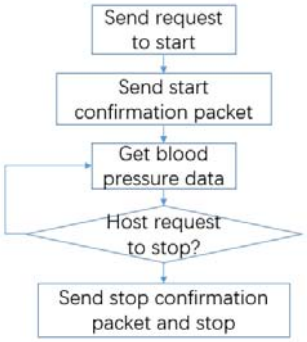

Fig1. The Sending data flow

The data packets are transmitted between the acquisition software and the system center, and each data packet includes four parts: data packet type, operation code, data length and data. Opcode Command accounts for a byte, which is used to indicate the current operation in what mode, including the beginning of the heart rate calculation, the suspension of heart rate calculation, the completion of the calculation of blood pressure, blood pressure calculation error, detection of blood pressure, blood pressure testing, blood pressure test and blood pressure data ready for eight models, which is shown in figure2.

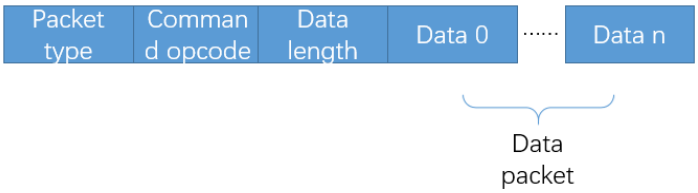

Fig2. The format of data flow

Table2. Available data for the health of the elderly

Function one	Function two	Function three	Function four
With visual intercom, unlock, alarm call, security alarm, care, intelligent control and other functions Home Furnishing;	Can quickly call the children's mobile phone, enjoy and children communicate with the good time;	Provide a setting sun red life communication platform, the elderly can share their own life to app	pulse, blood pressure, blood oxygen, blood glucose, lung function, body weight, temperature, electrocardiogram

(2) Health data function

2.2 Filtering algorithm for related health data

The noise of the health signal mainly comes from the noise of the source, the EMG, the electrode and the skin friction. After the hardware filter, the ECG signal is still noisy, so it is important to analyze the ECG signal.

Digital filter can be divided into infinite impulse response (digital filter and finite impulse response (digital filter. Digital filter can not only ensure the amplitude of the characteristics to meet the requirements, but also to maintain a strict linear characteristic.

Assuming that the transmission function of the digital filter is as follows:

$$H(e^{jw}) = \left|H(e^{jw})\right| e^{j\varphi(w)} \tag{1}$$

The design parameters of the Fir band pass filter are W_P, W_S, and W_P with the frequency of the pass band, and the W_S is the stop band stop frequency, so we can design the following formula to calculate them.

$$\alpha_p = 20 \lg \frac{H(e^{j0})}{H(e^{jw_p})} = -20 \lg \left|H(e^{jw_p})\right| dB \tag{2}$$

$$\alpha_s = 20 \lg \frac{H(e^{j0})}{H(e^{jw_s})} = -20 \lg \left|H(e^{jw_s})\right| dB \tag{3}$$

3. The Actual engineering test system

3.1 Functional design program of the pension system

After wave detection, the ECG signal can be obtained by simple calculation, and stored in a buffer for the HRV time domain analysis and frequency domain analysis. The time domain analysis of HRV can be divided into 10 minutes' time domain analysis and 24 hours' time domain analysis. This research is mainly aimed at the short range of 10 minutes. Next to the NN50 implementation of a simple introduction.

Ten minutes of the NN interval has been stored in a tenMinuteNNBuf ArrayList, and will and its adjacent NN interval after subtracting, every 100ms plus one, and poor storage down, finally obtains its value of NN50 in simple core program is as follows:

```
For (int m=1;m<tenMinuteNNBuf.size();m++)
{
      tp=tenMinuteNNBuf.get(m)-
fiveMinuteNNBuf.get(m-1);
      tenminutednn.add(tp);
    if(tp>100)
    {NN50++;}
 }
```

Fig3. The partial program

3.2 Test data for the pension system

After the analysis of the above algorithm, we designed pcweb terminal can receive the data sent.

(1) Client sending:

[The hexadecimal content of data frame] [55 AA 01 84 00 00 00 00 44 00 0B 2D 31 30 33 31 30 33 30 31 30 30 31 30 30 30 31 39 33 78 00 00 00 00 00 00 31 00 00 00 00 00 00 00 0E 00 00 00 0A 08 0B 0C 12 21 1B 00 24 00 00 00 00 00 00 00 00 00 3A 00]

[Frame header parsing] [VER=1] [ID=0x84] [LEN=68byte] [H_CHK=0x0B] [D_CHK=0x2D]

[Frame data parsing] [Type: body temperature data] [UID=10310301001000193x] [DID=1]

[SYNC=0x0000000E][TIME=2058/11/12 18:33:27][TEMP=36.0℃]

Service parameters receiving confirmation:

[the hexadecimal content of data frame] [55 AA 00 81 00 00 00 00 10 00 7E F2 0E 00 00 00]

[Frame header parsing][VER=1][ID=0x81][LEN=16][H_CHK=0x7E][D_CHK=0xF2]

[Frame data parsing] [Type: Physiological parameters receiving confirmation][SYNC=0x0000000E]

4. Conclusion

In this paper, we can see that we can effectively improve the service quality and promote the industrialization of community service through the development of a new type of distributed system. After the establishment of the service platform, as long as through a variety of network terminals, click on the required service content, the request is sent to the center of the system, the deployment of the city center deployment services, as long as the user to sit in the home, you can enjoy a one-stop Butler service. So that the maximum level of home care for the elderly to protect the needs of service and security.。

In the project to carry out a number of projects in china, a number of pension community survey, we also found a lot of problems.

(1) due to the low return of pension, the pension project has not introduced the latest scientific research of digital intelligent results;

(2) the old consumer group is not clear, how to use the network technology to guide;

(3) as the first demand for home care home health needs, how to use smart devices, and to make it feasible to popularize;

(4) intelligent home care is a large social project, and its system derived from the various subsystems to further fill the gaps.

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