Application of Interaction Design Technology in Elderly People's Wearable Health Products

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Abstract. With the development of society, young people's ideas have undergone major changes. In recent years, the number of new born children has gradually decreased compared with previous years. As a result, the proportion of elderly people in the total population has been increasing, making China's population aging. The trend of development has become increasingly severe. The age of population aging has become more and more imminent, the attention of all parties to the health of the elderly has continued to increase. The rapid development of population aging has led to an increase in the number of older people. The number of elderly people with chronic diseases and the number of elderly people with disabilities have increased significantly. The task of nursing care and cooking for the elderly has become increasingly arduous. Exploring how to adopt more effective health management to ensure the health rights of the elderly has become an important research topic in the current health field. With the continuous rapid development of computer, Internet and artificial intelligence technologies, various wearable products are gradually appearing in the market. In today's marketable wearable products, most of the wearable products are designed for the young and rejuvenated main consumers. These wearable devices are too intelligent and technological in design and production. The use of products is relatively complex and there is no major consideration. Differences between older people and young people in cognitive and learning skills make it difficult for older people to use these wearable devices. This article takes old people's health-related wearable equipment as the research object. Under the premise of fully considering the conditions of the elderly, the interactive technology design method is applied to the design of wearable health products.

1. Introduction

In today's society, the problem of aging has become more and more prominent and has aroused widespread concern from all walks of life. With the gradual increase of age, the physiological functions of the elderly are aging and declining year by year. The development of a certain degree of the body will lead to lesions, which will ultimately lead to physical dysfunction. Among the elderly population, older people with multiple diseases are very common and have a serious impact on the quality of life of the elderly. With the rapid increase in the number of elderly people in society, the ranks of older people are growing stronger and the number of empty-nest adults in families is increasing. The situation of these elderly living alone is in constant danger and has developed into a serious social problem. On the one hand, the pension problem brings certain pressure from the economy. What's more serious are the time and cost for the elderly to take care of and care for the elderly. Many young people are burdened with a greater economic pressure to support the elderly. The process is prone to dissatisfaction. At the same time, due to the differences in the way of solving the

problem of supporting the elderly, the elderly and young people are also prone to many conflicts in life. These problems exist on a relatively large scale and are bound to harmonize the entire society.

In today's technology market, the market development prospects of wearable devices for the health of the elderly are generally optimistic, some wearable devices for the health of the elderly are gradually moving toward the market for sales. At present, the wearable device has a relatively small influence on the elderly population in China. The development of wearable products for the elderly in China is still in its infancy and there are many problems. In many designs of wearable products, there is no real consideration. Many wearable products sold on the market rarely focus on elderly people. In the traditional design of related products, they mainly seek to meet the needs of all elderly people and pursue "ageing" and "fool" in the product design process. There is a clear distinction between the design of mainstream products. Research on the design of wearable health products for the elderly based on interactive design technology is of great significance for solving the mismatch between the current wearable devices and the needs of the elderly.

2. Interaction Design Overview

The "interaction" in interaction design is derived from the English "Interaction" and "Interactive", which means that the two involved in the design will interact with each other, and the behavioral results will have mutual influence; it involves the design field between the artificial system and the behavior. Between two or more independent individuals, the information transmission and feedback mechanism are defined. The two or more parties involved can collaborate with each other, eventually achieve a certain task in coordination to achieve the ultimate goal. Interaction design attempts to establish a meaningful relationship between people, objects and their environment. The basic features of interaction design include: two or more participants; participants can communicate and interact with each other through a certain convention. The basic flow of interaction design is shown in Figure 1:
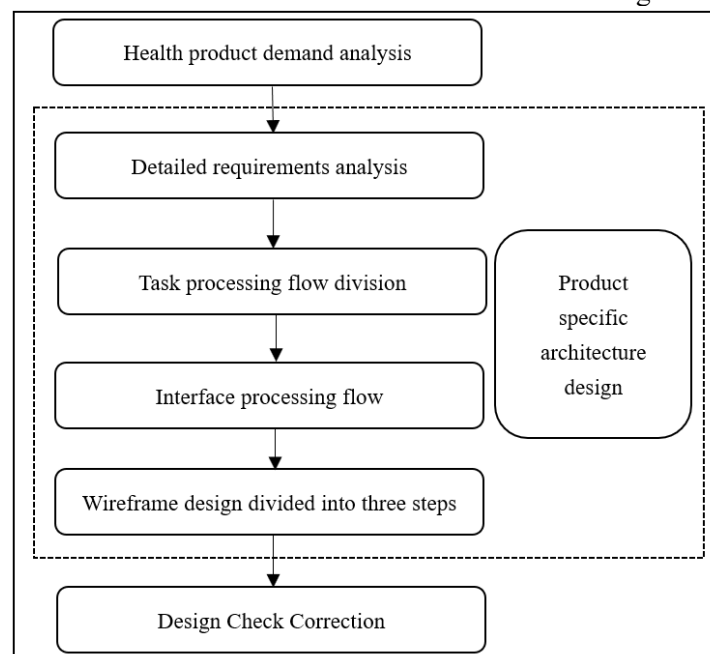

Figure 1 The basic flow of interaction design

3. Wearable gesture interactive control system design

Muscles that control the movements of the wrists and fingers are mainly concentrated in the forearm. In order to accurately capture the details of the movements of the palms, it is necessary to wear the myoelectric sensors in the forearms; at the same time, the acceleration signals are captured during the execution of the gestures. The forearm position is more suitable. Therefore, we can design a wristband that can be worn with the forearm, can collect the surface muscle signal and acceleration signal

synchronously and then transmit the collected data information to the mobile device through the Bluetooth connection. The structure of the wearable device that captures the gesture signal is shown in Figure 2. The wristband includes a component master control board. The master control board integrates a Bluetooth module, an accelerometer, a battery and a microcontroller, also includes four components. Surface myoelectric sensors. These sensors are fixed by a rubber band into a strip and these sensors are connected by wires to facilitate data transmission and power supply.
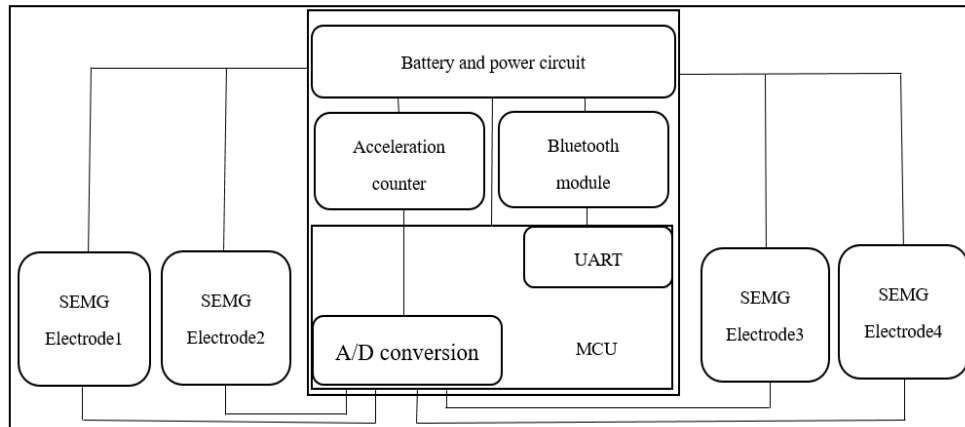

Figure 2 Gesture capture device structure design

The surface electromyography electrode is a dry electrode and the electrode can work after contact with the skin. Each electrode collects the surface EMG signal of one channel, performs 500-fold signal amplification on the original signal. After 20-300 Hz band-pass filtering, the signal connects with the main control board MCU analog-to-digital conversion module, these signal amplification and the band-pass filtered signal are transmitted to the microcontroller module. The accelerometer installed on the main control board belongs to a three-axis accelerometer and can collect accelerations perpendicular to each other in three directions (x, y, z) in space. The collected signal data is output through three channels and uploaded to the accelerometer. SCM processing module. The single-chip computer completes the acquisition of seven-channel signals of 600Hz and 12 bits and performs simple preprocessing on the collected signals, such as power amplification and noise filtering, and these signals are transmitted via Bluetooth.

4. Data platform interaction with elderly health monitoring products

From the perspective of health monitoring, the ability to carry out natural and intuitive human-computer interaction is the basic requirement for the design of health products for the elderly, and the ease of use and humanization of health monitoring products must be reflected in product design. This article combines some of the existing research results, and on this basis, combined with the research results of their own laboratory, to build a wearable interactive platform for the elderly health monitoring needs. The health monitoring and interactive platform is mainly based on the common life scenes of the elderly and designs more daily life scenes. In terms of health monitoring and human-computer interaction, it can provide the elderly with interactive services anytime and anywhere. It is more applicable in nursing homes, living communities and other public places, as well as ordinary private homes. The internal structure design of the elderly health monitoring and interaction platform is shown in Figure 3:
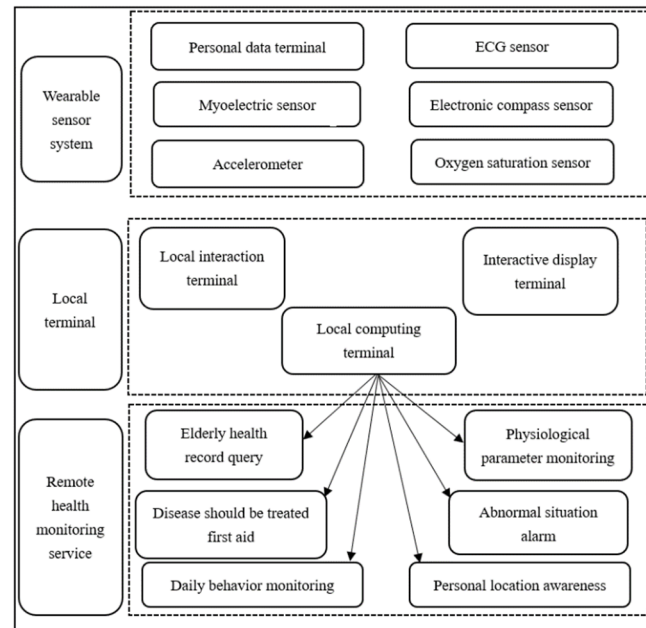
Fig.3 Internal structure design of elderly health monitoring and interaction platform

From the perspective of internal structure, the components in the platform include: local terminal and remote health services, wearable sensing systems, which correspond to the middle tier, management layer and device layer, respectively. The wearable sensing system includes a gesture capture device worn on the forearm, a personal data terminal that can be worn on the waist and sensors that can be worn throughout the body. These sensors mainly include an acceleration sensor. EMG sensors, electronic compass sensors, blood oxygen saturation sensors and ECG sensors, etc. In this section, the personal data terminal is responsible for collecting relevant data from various sensors and then sending these data after being packed; the local terminal includes the local Computation terminal and local interaction terminal two parts. The gesture capture device data sent from the device is received by the local interactive terminal, decodes the received data, interprets the gesture command and executes the execution operation in accordance with the command; the data sent by the personal data terminal is calculated locally; The terminal is responsible for receiving, analyzing the data, monitoring the indicators of the corresponding health parameter data, providing health monitoring service work, uploading the processing results to the remote health care service center server for monitoring abnormalities and management network.

In the interactive design and deployment of health products, it is necessary to arrange various periods in appropriate positions so as to complete accurate collection of motion data information on specific parts of the body. The various sensors and the positions they need to place are shown in Table 1. It is necessary to wear the gait information to detect the leg and obtain the gait data information, the reason is that electromyographic electrode sensor needs to be placed in the muscle position related to the movement; to obtain the gesture movement information, it is necessary to wear the forearm; The collection of ECG signal changes uses the right leg to drive the double guide, which needs to be placed on the right leg and both hands. In order to monitor the heading of the elderly, an electronic compass is used to obtain the direction-related signals. Therefore, it needs to be worn on the chest. In the interactive design of this health monitoring product, an acceleration counter is used to capture the posture of the body. At this time, it is necessary to ensure that the body and the acceleration counter have the same posture, the acceleration sensor also needs to be worn in front of the chest; the pulse oximeter can be made independent the accessories, worn on the fingertips or on wrists, can also be embedded in personal data terminals; in order to have a clear grasp of the body fat content of the elderly, the measurement of such data needs to stand on the body and hold the hands horizontally.

Completed in a gesture that does not require real-time monitoring in daily life, therefore, in this article Total health care interaction platform, the index only as a detection parameter for routine health care. In order to complete the monitoring of the daily health of the elderly, in the design of wearable health monitoring products, more sensors are deployed and good communication signals are needed to provide protection for the transmission of data information.

Table 1 How to wear each sensor and its features

sensor type	Measurement or wear position	Features
Electronic compass	Chest	Measuring the direction of advancement as a basis for the pedestrian's dead reckoning
GPS	Waist (personal data terminal)	Positioning, training and correcting gait dead reckoning
Magnetic resistance	Waist	Correction of pedestrians' dead reckoning
Skin resistance water chalk	Any part	Measuring local skin moisture content
Skin resistance body fat meter	Hands with thumb and index finger	Measuring body fat content
Pulse oximeter	Fingertips or other parts	Measure heart rate and oxygen saturation
ECG electrode	Hands, arms and right legs	Right leg driven ECG detection
Accelerometer	forearm	Capture arm movements for gesture recognition
	Chest and thigh	Get spatial postures of the body and thighs to calculate body posture and perform fall monitoring
Electromyography electrode	thigh	Capture muscle movements and identify movement patterns
	forearm	Capture small movements of wrists and fingers for gesture recognition

5. Conclusion

This article discusses the design methods for wearable health products, applies the interaction design techniques and method concepts. These design techniques adhere to the user-centered basic idea and design the health monitoring products centered on the actual situation of the elderly population. When segmenting elderly users, in addition to maintaining a focus on older people in traditional concepts, it is also necessary to strengthen the attention of those senior citizens who are in the early stage of the old age, the physiological changes and psychology they are currently experiencing. Adjustments stay focused. In the product design, we must adhere to the design process centering on the analysis results of the elderly, adopt reasonable methods to investigate the needs of the elderly, use a combination of realistic questionnaires and networks and integrate household interviews with observations. Based on the study of geriatric psychology and cognitive psychology, we analyzed the attention and memory of the elderly, the decline of visual acuity and the slow physical cognition of learning rhythms. Combining the theory of senior psychology and the hierarchy of needs, this design method analyzes the psychological needs of the elderly, including health and safety needs, emotional and belonging needs, respect and self-fulfillment needs. From the three levels of perception, emotional and social

levels and design suitable for the elderly the use of wearable health products to better serve the elderly population.

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