Application of smart wearable devices in the health management of the elderly

ZHOU Yuguang. International Department, The Affiliated High School of SCNU

Abstract: my country is gradually entering an aging society, and the health of the elderly is related to the development of people’s livelihood. With the development and progress of science and technology, intelligent health monitoring products have been gradually developed to address the health problems of the elderly. This article analyzes the characteristics of the elderly and the types of smart health devices, focusing on the specific design and application of wearable smart devices in the health management of the elderly. Hope to provide help and humanistic care for more elderly people.

Keywords: intelligence; elderly health management; equipment application

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According to the “China Development Report 2020: Development Trends and Policies of China’s Population Aging” released by the China Development Foundation, there are about 180 million Chinese aged 65 and over in 2020, accounting for about 13% of the total population; in 2025 “When the 14th Five-Year Plan is completed, there will be more than 210 million elderly people aged 65 and over, accounting for about 15% of the total population; in 2035 and 2050, China’s elderly people aged 65 and over will reach 310 million and close to it. 380 million, accounting for 22.3% and 27.9% of the total population respectively. If 60 years of age and above are used as the criteria for delimiting the elderly population, the number of elderly population in China will be larger, and there will be close to 500 million elderly people by 2050. The number of elderly people living alone and in empty nests is increasing year by year. The health problems of the elderly have become the focus of social and economic development. It is urgent to develop wearable smart health monitoring products suitable for the elderly.
1. The characteristics of the elderly and the types of smart products suitable for aging

1.1 Features

My country defines the age of the elderly as over 60 years old. Unlike other age groups, the elderly often suffer from more illnesses, decreased physiological functions, skeletal muscle decline, and decreased vision, hearing and memory. The hands and feet are no longer flexible, the reaction will gradually slow down, unable to carry out strenuous activities, and the ability to recognize and accept new things is gradually declining. Older people are more emotionally and psychologically more sensitive than younger people. Decreased cognitive ability will give older people a sense of being disconnected from society and gradually become anxious. Lack of the company of children will also make the elderly feel more helpless and lonely.

1.2 Types of aging smart products

In recent years, intelligent products suitable for aging in my country have sprung up, aiming to provide more convenient lives for the elderly. The most common are hearing aids, smart pill boxes, etc. In addition, many smart home products for monitoring have been launched. Products in this area are mainly aimed at monitoring the health of the elderly. Such as home sphygmomanometers, smart hip belts, and health smart bracelets. The installation of smart cameras in the home can also monitor the situation at home. In the event of an illness or fall, it can promptly report to the police and notify the family members. In order to satisfy the spiritual emptiness of the elderly, a series of spiritual smart home products, such as smart TVs and smart pets, have been launched one after another. The purpose is to comfort the elderly and eliminate their loneliness.

2. Development strategy for aging smart products

2.1 Development trend of aging smart products

The development and development direction of aging products are mainly di-
vided into two aspects, namely intelligent products and emotional products. From small daily necessities to large medical equipment, intelligent products can bring more convenient life to the elderly. Most elderly people will spend most of their time at home. Smart products have gradually begun to occupy the food, clothing, housing and transportation of the elderly. When developing products, in-depth observation and research should be conducted on the mental, physical and behavioral habits of the elderly. Focusing on the research for the elderly’s vision impairment, hearing impairment, mobility impairment, etc., voice recognition and other control technologies are widely used in aging smart products, which are more convenient for the elderly to operate and increase the product humanity. The use of smart products suitable for aging in the home environment is the overall development trend in the future, and the demand for products suitable for aging among the elderly in my country is also increasing. Due to the family planning policy, my country has maintained a family structure of only one child for a long time. The number of empty-nest elderly in the country has soared, and the number of elderly living alone has exceeded 180 million. After retirement, the elderly will have excessive emotional dependence on their children and varying degrees of loneliness. For these empty-nest or solitary elderly groups, the lack of daily emotional communication requires more entertainment, communication and social space, so that the elderly groups can get emotional and spiritual comfort. Major smart product companies have launched AI speakers based on the elderly, such as Xiaodu, Tmall Elf, etc., integrating smart AI, TV, and exploration experiments. It can wake up and command the speakers through voice recognition, and also has Functions such as voice control and small chat interaction. In 2018, the United States developed a companion robot that can communicate and communicate with users emotionally in daily life. In the development process where traditional Chinese family companionship and support functions are gradually fading, intelligent emotional products can greatly alleviate the loneliness of the elderly group and have greater market development potential.

2.2 Product development that meets basic material needs

At the material level, the product needs to fully integrate the physiological conditions of the elderly, focusing on the inconvenience of movement and the decline in various aspects of reaction ability. In the process of product design, it is necessary
to consider the convenience of functional use and whether it is reasonable. Individual products suitable for aging have obvious labels, and there are differences in treatment for the elderly. As a branch of computer technology, artificial intelligence can not only involve computer technology capabilities, but also philosophy and psychology, but also need to consider the issues of ethics and values. The elderly often feel powerless when they touch and use intelligent products, and have a feeling of being abandoned by the society, which in turn leads to poor product experience. Products suitable for aging should pay more attention to the needs of the elderly to ensure that there is no barrier between the elderly and non-elderly groups, and the products should meet the basic needs of the elderly. Appearance design can also focus on trends and aesthetics, and remove the labels of aging products.

2.3 **Product style that meets spiritual and emotional needs**

The development of products should also pay attention to the spiritual level of the elderly. At the same time, the status symbol and aesthetic needs of the elderly should be considered, and the design should be in-depth thinking from the product’s texture, shape, environmental protection, style, color and other aspects. The design must always adhere to humanistic care, which can emphasize consideration, health, safety, and warmth, and can maintain the personal dignity of the elderly. At present, the elderly crutches, hearing aids, and mobile phones on the domestic market lack a sense of design in their appearance, and are more or less discriminatory. This makes the elderly people who are eliminated and abandoned by the society in the process of using them. Illusion, and then a sense of psychological loss. In the design of products suitable for aging, the appearance can be classic, stable, full, round and textured, so that it can match the identity of the elderly and can show due respect to the elderly and reduce the use of the elderly. Negative emotions caused by differential treatment.

3. **Design methods for aging smart products**

3.1 **Functional customization design method**

When designing aging smart products, we must first consider ergonomics.
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The elderly can enjoy comfortable enjoyment and receive safe services during the use of the product, and have a better sense of experience. The physical weakness of the elderly consumer groups is different. Smart products should be designed with targeted functional modules according to the different health conditions of different elderly people, and the use mode should be switched according to different factors in each part. When various technical conditions are stable and mature, customized products can also be used to meet the consumer demand of the elderly market.

3.2 Emotional experiential design method

In the design process of intelligent products suitable for aging, the research and analysis of the emotional needs of the elderly should be deepened, and products and services that can relieve the difficulties of life and loneliness can be provided for the elderly based on humanistic care. The design elements of the product should express the status of the elderly, their hobbies, and their aesthetic values. Product design should be more humane, understandable and provide services at any time, so as to meet the specific needs of the elderly consumer groups. Increase the interaction between products and elderly consumer groups, so that elderly consumer groups have a more satisfying emotional experience. The elderly must fully enjoy the convenience of intelligent life in order to be more actively integrated into the developing society, increase communication and exchanges with the outside world, and enhance the satisfaction and happiness of the elderly life.

4. Research on wearable products for elderly health monitoring

4.1 The meaning of wearable smart devices

People are aging. As the age continues to increase, various functions of the human body are gradually deteriorating. Some chronic diseases have been latent for a long time, such as nervous system problems. The most common nervous system problem in the elderly is brain atrophy. Brain atrophy will cause recognition, decreased cognitive ability, decreased autonomic nerve excitability, slow adjustments, and slow reflexes. The memory decline of the elderly can also cause a de-
cline in learning ability. Another example is the problem of the sports system. Declining physical fitness is the most obvious sign of increasing age. Different degrees of osteoporosis increase the incidence of fractures. In addition, the circulatory system of the elderly also has problems that cannot be ignored. The cardiovascular and cerebrovascular functions gradually decline due to aging, such as coronary heart disease, high blood pressure, and cardiovascular sclerosis. In response to the above problems, wearable smart health monitoring devices came into being, using simple and accurate instrument software to monitor the problems of the elderly in real time, and analyze various physical skills to form a database. From the physiological characteristics of the elderly, it can be concluded that the visual sense of the elderly is gradually reduced due to the influence of the nervous system, and the reduction of cochlear hair cells will also cause hearing loss. In this case, wearable smart health monitoring equipment can avoid These two problems allow the elderly to use it smoothly. Wearable smart health monitoring equipment can be designed with an interactive system, which can be used conveniently without too much learning of new technologies and operations, and it can be more suitable for the elderly to use the design by adding situational awareness.

4.2 Demand for wearable smart devices

With the advancement of science and technology, people’s living standards continue to improve, daily life is gradually becoming intelligent, and the application range of technology products is wide. The design of wearable intelligent health monitoring equipment is gradually becoming intelligent. According to the physical condition of the elderly, the The physiological functions of the body are monitored. The elderly’s understanding and acceptance of modern informatization are not as accurate and rapid as the young, and they cannot fully grasp the relevant data processing. Therefore, in the design of wearable smart health monitoring equipment, it is necessary to consider whether the elderly can use it smoothly, continuously optimize the equipment according to the specific needs of the elderly, and adopt visual and interactive designs to make up for the problem that the elderly cannot use mobile devices smoothly. The use of apps such as health monitoring can also monitor the physical fitness data of the elderly, and the elderly can more intuitively grasp their own health conditions based on the actual data.
5. Design and application of wearable smart devices for elderly health monitoring

Wearable smart health monitoring equipment can be used as smart medical auxiliary equipment. The configuration includes smart bracelets, servers, personal terminals, smart medicine boxes and doctor terminals. The smart bracelet can be applied to real-time monitoring of blood pressure and other related data of the elderly. The data is sent from the bracelet to the personal terminal and the doctor’s terminal. When the medication time is up, the personal terminal will issue relevant instructions and then send it to the bracelet to remind the elderly to take the medication. When the bracelet detects that the blood pressure and other data of the elderly reach the high-risk area, it will enter an emergency state, use vibration or flashing to remind the elderly to pay attention to their physical conditions, and send relevant data to the doctor’s terminal to remind the doctor to perform a physical examination on the terminal. Take corresponding measures according to the specific situation.

The function of the server is to collect the physical data of the elderly, perform statistics, calculation and analysis on the data, and send the analysis results to the personal terminal and the doctor terminal through the smart bracelet. Through real-time analysis and comparison of the change trend of body data and recent data, it is recorded in the personal database of the elderly, and can be called up and viewed at any time through personal terminals and doctor terminals. The doctor’s terminal can be bound to one or more personal terminals to form a doctor-patient relationship. The doctor can check the physical data of the elderly at any time, compare it with recent data, and adjust the medication or set instructions according to the actual situation. The corresponding file can be formed and sent to the personal terminal. After the personal terminal is bound with the doctor terminal, the elderly can view the corresponding data of the body at any time, or observe the recent changes in the body data, so as to have a detailed understanding of their body. The medication-related files set by the doctor can also be found in the medication management interface, but they can only be viewed and cannot be modified. The medication time is reminded by the smart bracelet, and the patient can download the
medication file to the smart medicine box, and check the medicine box. Make settings. The inside of the smart medicine box can be divided into multiple grids. Medicines can be stored in compartments. The labels and reminders of the medicines can be individually set. Regular reminders are given according to the amount and time in the medicine file, and the medicine is played according to the content of the file. Related precautions.

The smart bracelet can include data monitoring, attack mode, and vibration reminders. Functions such as Bluetooth connection, voice reminder and file download can be set in the smart medicine box. The server, personal terminal, and doctor’s terminal perform overall control, including statistical data, setting files, adjusting bracelets, and dispensing medicine boxes. The smart bracelet can be connected to personal terminals and doctor terminals via Bluetooth, and exchange and transmit data. The smart bracelet adopts two technologies, ECG and PPG, to collect ECG signals and light volume pulse wave signals, and use median filtering algorithm to eliminate high-frequency interference after separating the synchronized signals, and eliminate signals caused by human body jitter and breathing Baseline drift, after extracting the signal, it is accurately transmitted to the personal terminal and the doctor terminal.

Concluding remarks: The elderly belong to a special group, and through the continuous improvement and optimization of intelligent health monitoring equipment to meet the needs of the elderly for health monitoring. The use of interactive design method can improve the adaptability of the elderly to the operation interface, reduce the difficulty of users, streamline the operation process, reduce the cognitive burden of the elderly, and improve the satisfaction of the elderly. In summary, wearable smart health monitoring devices can not only target the elderly but also some patients who need to be monitored. In the face of the continuous development of society, smart devices are facing more challenges and cannot monitor the health of the elderly. Relying only on smart products, we must also establish a more complete medical monitoring system, so that more people of the elderly can receive the care of the society and family. This is the goal we must strive for for a long time.
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References


