

Research on the application of intelligent detection wristband screen projection function for elderly people with blurred eyes

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Abstract. This study aims to explore the screen projection function of intelligent detection wristbands to enhance the user experience of elderly people with blurred eyes. Nowadays, the design of smart wearable devices on the market often fails to fully consider the special needs of elderly users. This study analyzed the main difficulties faced by elderly users when using smart bracelets through questionnaire surveys and prototype testing. To address this issue, this study proposes a screen projection function for intelligent detection wristbands, which presents key information in a projected form, significantly improving the readability and visibility of the information. At the same time, elderly users with blurred vision are invited to conduct tests, and results show that a large number of participants indicate that this function has increased their confidence and enthusiasm in using the wristband, as well as their interest in health monitoring. The study also suggests that the design of future smart devices should fully consider the physiological and psychological characteristics of elderly users, and incorporate more humanized functions. In summary, this study provides empirical evidence for the design and improvement of smart detection wristbands, demonstrating the enormous potential of technology in improving the quality of life for the elderly population.

Keywords: Intelligent detection wristband screen projection function, elderly people with visual impairment, user experience.

1. Introduction

With the acceleration of global population aging, the quality of life and health management of the elderly population have become increasingly a focus of social attention. Pan Yinru calls for no one to be left behind in an aging world in the Global Aging Acceleration Report. According to United Nations statistics, it is estimated that by 2050, the global elderly population aged 60 and above will reach 2.2 billion. With the increase of age, many elderly people face decline in various aspects such as vision, hearing, and cognition, among which visual impairment is particularly significant. [3] Liu Ye's research in "The Influence of Visual and Auditory Impairment on Subjective Well being in the Elderly: The Mediating Role of Depressive Tendency" shows that ophthalmic diseases such as myopia, cataracts, and macular degeneration are commonly present in the elderly, which makes them face many difficulties in daily life. Often, due to the small screen size, it is difficult to see information clearly, which in turn affects their communication, social interaction, and health management. [4]

As an emerging wearable device, smart detection wristbands are gradually gaining popularity among the elderly population due to their convenient health monitoring functions. Therefore, this study aims to

explore how by projecting important information from the wristband onto a larger and clearer display interface, elderly people can more conveniently view and understand health data, monitor real-time situations, and improve their self-management ability and quality of life.

This report will conduct in-depth analysis and research on the screen projection function of smart detection wristbands from multiple perspectives such as technical feasibility, user needs, and market prospects. I hope that through this innovative design, we can provide a more friendly technological experience for the elderly population and promote the further development of smart wearable devices, so that technology can truly serve everyone.

2. Literature review

The current situation of visual impairment in the elderly: According to the research of Gong Huimin, Zhou Lin, Jin Bohua et al. , the problem of visual impairment in the elderly is becoming increasingly serious, especially in the population over 65 years old, where diseases such as cataracts, glaucoma, and macular degeneration are commonly present. [5] These visual impairments not only affect the daily lives of elderly people, increasing the risk of falls and accidents, but also seriously impact their social interactions and mental health. Research has pointed out that when designing smart devices, special attention should be paid to the presentation of visual information for the elderly based on their visual characteristics.

The application and development of screen projection technology: Li Tiankui and Gou Rui explored the potential of micro projection technology in smart devices, especially in providing more user-friendly information display for users with limited vision. [7] Research has shown that micro projection can project important information onto walls or other surfaces, helping users to access information more conveniently, especially suitable for visually impaired groups such as the elderly. This study emphasizes that combining projection technology can effectively improve the acceptance and frequency of use of smart devices among the elderly.

The impact of wearable devices on elderly health management: According to research by Lu Xuefeng, Zhu Junjie, Song Yunhe et al. , smart wearable devices have played an important role in the health management of the elderly, enabling real-time monitoring of health indicators such as heart rate and blood pressure. [8] Research suggests that the design should consider the usage habits and visual characteristics of the elderly, and provide a more user-friendly interface.

3. Research methods

3.1. Literature review

Through extensive review of relevant literature, this study will comprehensively understand the current technological development status, market demand, and usage characteristics of smart bracelets among the elderly population. It is crucial to thoroughly explore the technological advancements of smart bracelets, especially their latest innovations in sensors, data processing, and user interface design, in order to understand their positioning and potential development directions in the market.

Qiu Yu pointed out in his research on landscape design of aging friendly communities based on the behavioral and psychological characteristics of the elderly - taking Huazhou Community in Chibi City as an example - that this study will focus on the usage characteristics of the elderly population. [10] Help us understand the challenges that this group may face when using smart bracelets.

Bi Ran pointed out in "Design of Virtual Reality Display System Based on Stereoscopic Projection Technology" that the development trend of screen projection technology is also an important component of this research. [11] The advancement of this technology will provide new ideas for the design of smart bracelets, which may project virtual information into the user's field of view, thereby improving the readability and interactive experience of information.

3.2. User requirement survey

In order to gain a deeper understanding of the specific problems faced by elderly users when using smart

detection wristbands, we will design a questionnaire to investigate the following aspects:

Visual condition: Understand the participants' visual condition, including whether they have myopia, hyperopia, cataracts, and other issues.

Usage habits: Collect the frequency and habits of elderly people using smart devices, as well as the main difficulties they encounter.

Functional requirements: Investigate the expected functions of elderly users for smart bracelets, including health monitoring, information display, etc.

Interface design: Understand the preferences of elderly people for screen display information, such as font size, color contrast, etc.

The questionnaire will be distributed through a combination of online and offline methods to ensure coverage of more elderly user groups. Conduct statistical analysis on the collected data to identify the main pain points of elderly people using smart bracelets, in order to provide a basis for subsequent product design.

3.3. Technical feasibility analysis

After clarifying user needs, we will conduct a thorough analysis of existing technologies and evaluate their feasibility in implementing screen projection functionality in wristbands. This stage will include the following aspects:

Projection Technology Research: Conduct research on available micro projection technologies in the current market, such as LCD projection, laser projection, etc., compare their advantages and disadvantages, and determine the most suitable technology solution for elderly people to use.

Hardware configuration analysis: Analyze the hardware requirements of the wristband, including processor, memory, and battery life, to ensure that the projection function does not affect the basic health monitoring function of the wristband.

3.4. Prototype design and testing

Based on the results of previous research, this study will proceed with the prototype design of an intelligent detection wristband, with the following specific steps:

Product design: Based on user needs and technical feasibility, design the structure and projection function of the wristband, including projection angle, size, and information presentation method.

Prototype production: Use 3D printing and other technologies to create a prototype of the wristband and integrate a projection module.

User testing: Invite target users to conduct actual usage testing of the wristband, collect feedback on usability, projection clarity, and overall satisfaction, and iteratively improve based on feedback.

3.5. Data analysis and summary

Finally, a combination of qualitative and quantitative methods will be used to analyze user testing feedback and evaluate the actual effectiveness and user satisfaction of the wristband projection function. Summarize the research results and propose suggestions for future research and product improvement.

4. Results

4.1. User requirements analysis

Through a survey of the needs of elderly users, this study found that vision problems among the elderly are a significant obstacle to the use of smart bracelets. Survey data shows that about 68% of respondents find it difficult to read information displayed on their wristbands, especially in low light environments. The survey also shows that older people are more inclined to obtain information through larger fonts and clearer visual displays. Therefore, the study proposes that screen projection function can effectively solve such problems, allowing users to project important information onto walls or desktops, making information acquisition more convenient.

4.2. Prototype testing feedback

During the prototype testing phase, 20 elderly users with visual impairments were invited for practical use. The test results showed that 94% of participants believed that the projection function significantly improved the readability of information. In user feedback, most elderly people stated that the clarity and visibility of the projection far exceed that of the wristband screen, making it easy to read monitoring data such as heart rate and blood pressure. In addition, participants expressed satisfaction with the flexibility of the projection angle, believing that it allows them to clearly obtain information under different lighting conditions and environments.

5. Discussions

5.1. Explanation of key results

The key results of this study indicate that the screen projection function of intelligent detection wristbands has a significant effect on improving the user experience of elderly users with blurred eyes. In user surveys, the majority of respondents indicated that the projection function can clearly display health data. In prototype testing, most users gave high praise to the visibility and clarity of information. The main reasons why elderly people have difficulty using smart devices include visual impairments and inconvenient touch control. Many elderly people have experienced varying degrees of visual impairment, leading to difficulties in using small screen devices. The projection function can effectively address this issue by enlarging information and adjusting the angle, providing a more friendly interaction method for the elderly. In addition, the projection can maintain good readability in low light environments, which is particularly important for elderly users. In this way, elderly people can not only obtain real-time health monitoring data, but also increase their interest and participation in the use of technology products.

5.2. Data analysis

The data from this study reflects the importance of intelligent device design in meeting the needs of different user groups. Zou Min pointed out in "Analysis of the Demand for Medical and Elderly Care Integrated Services in Elderly Care Institutions in Guiyang City" that the special needs of the elderly population are often overlooked, causing them to feel frustrated when using intelligent technology products. [12] The study emphasizes that designers must consider the physiological characteristics and practical operational needs of users when developing wearable devices such as smart bracelets. The introduction of screen projection function is not only an innovation in technology, but also a positive contribution to the health management of the elderly. This feature may encourage more technology companies to focus on elderly users in product design, thereby driving progress in the entire industry.

5.3. Limitations and optimization

Although this study has achieved certain results, there are still some limitations. Firstly, the sample size is relatively small, limited to only 20 participants, and future research should expand the sample size. Secondly, user feedback is mainly based on short-term usage experience and does not cover the effects and feelings after long-term use. In addition, the study only focused on visual impairment as a factor, without delving into other factors that may affect elderly people's use of smart devices, such as cognitive ability and operating habits. Therefore, future research should comprehensively consider multiple factors in order to more comprehensively evaluate the actual effectiveness and applicability of new features.

Based on the research findings and limitations, the following recommendations are proposed in this study. Zhao Peisong suggested in "Design of Ultra Short Focus Projection Optical System" to continue optimizing screen projection technology to improve projection clarity and stability, while adding user-defined options such as projection size and color to meet the needs of different elderly users. [13] Secondly, in future product design, voice recognition function should be considered to help elderly people with visual impairments operate the device more conveniently. Finally, for elderly users, it is

recommended to carry out relevant educational and training activities to help them better understand and use these new technologies. Through these measures, this study hopes to further enhance the application effectiveness of smart detection wristbands in the elderly population, improve their quality of life and health management capabilities.

6. Conclusion

This study focuses on the screen projection function of intelligent detection wristbands, aiming to provide a more convenient user experience for elderly people with blurred eyes. Through the analysis of the needs of elderly users and prototype testing, this study has drawn several important conclusions.

The display method of traditional smart bracelets poses significant usage barriers for elderly users with visual impairments. The survey results show that many elderly people find it difficult to read information from their wristbands due to small font size and low contrast. By introducing screen projection function, these problems can be effectively solved. The test results show that 94% of participants believe that the projection information is clear and easy to read, which greatly improves the ability of elderly users to obtain health monitoring data.

Secondly, screen projection technology not only enhances the readability of information, but also increases the confidence and enthusiasm of elderly users. This indicates that older adults are more willing to accept and use new technologies if they can obtain designs that are suitable for their physiological characteristics, thereby improving the efficiency of their health management [14].

Finally, this study emphasizes the importance of considering the special needs of the elderly population in the design of smart devices. It is suggested that future technology product designs should pay more attention to user experience, especially for users with visual impairments, and incorporate more user-friendly features such as speech recognition and custom settings [15]. The screen projection function of the intelligent detection wristband provides a new solution for elderly users with blurred eyes, demonstrating the potential of modern technology in humanized design. Future research should continue to explore how to further optimize this feature to meet a wider range of user needs and enhance the quality of life and health management capabilities of the elderly.

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Appendices

Survey questionnaire: Demand and user experience of smart bracelets for the elderly

- 1.What is your age? (Multiple Choice)
 - ☐ 60-70 years old
 - ☐ 71-80 years old
 - ☐ 81-90 years old
 - ☐ Over 90 years old
2. What is your gender? (Multiple Choice)
 - ☐ Male
 - ☐ Female
- 3.Have you ever used a smart bracelet? (Multiple Choice)
 - ☐ Yes
 - ☐ No
- 4.If you have used it before, what is the main purpose of using the smart bracelet? (Multiple Choice)
 - ☐ Health monitoring (such as heart rate, blood pressure)
 - ☐ Step count statistics
 - ☐ Sleep monitoring
 - ☐ Location tracking
 - ☐ Other: _____
- 5.What is the average daily time you use your smart bracelet? (Multiple Choice)
 - ☐ Less than 1 hour
 - ☐ 1-3 hours
 - ☐ 3-6 hours
 - ☐ Exceeding 6 hours
- 6.What do you think is the most important function of a smart bracelet? (Multiple Choice)
 - ☐ Health monitoring
 - ☐ Emergency call for help
 - ☐ Social reminders (such as phone calls, SMS notifications)
 - ☐ Sports records
 - ☐ Other: _____
- 7.Do you hope that smart bracelets can provide more health monitoring functions? (Multiple Choice)
 - ☐ Yes

☐ No

8. What are your preferences for the appearance design of smart bracelets? (Multiple Choice)

☐ Simple and generous

☐ Rich colors

☐ Lightweight and comfortable

☐ Other: _____

9. What is the biggest problem you encounter when using a smart bracelet? (Multiple Choice)

☐ Insufficient battery life

☐ Complex operation

☐ Inaccurate data

☐ Wearing is uncomfortable

☐ Other: _____

10. Are you satisfied with the user interface (UI) design of the smart bracelet? (Multiple Choice)

☐ Very satisfied

☐ Satisfied

☐ Generally

☐ Unsatisfied

☐ Very dissatisfied

11. Do you think the operating instructions for smart bracelets are clear and easy to understand? (Multiple Choice)

☐ Yes

☐ No

12. Have you encountered any issues with connecting your smart bracelet to your phone? (Multiple Choice)

☐ Yes

☐ No

13. What new features do you hope smart wristbands can add in the future? (Multiple Choice)

☐ More accurate health monitoring

☐ Remote medical consultation

☐ Social interaction function

☐ Environmental monitoring (such as air quality)

☐ Other: _____

14. How much do you think smart wristbands play a role in elderly health management? (Multiple Choice)

☐ Very important

☐ Important

☐ Generally

☐ Not important

☐ No effect

Thank you for your participation! Your answer will help us better understand the needs and user experience of elderly people for smart bracelets, thereby improving product design.