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Research on the Design of New Media Products for Barrier-Free Life of Visually Impaired People: Taking the App "Touchpoint Life" as an Example

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Abstract: This paper focuses on the "Touchpoint Life" app designed specifically for the visually impaired. The study deeply analyzes its functional settings for different visual impairment conditions and its diverse applications of AI technology. By sorting out the life difficulties faced by the visually impaired and the limitations of existing assistive tools, the unique value and innovation of the "Touchpoint Life" app are highlighted. The aim is to provide solid theoretical and practical references for improving the quality of life of the visually impaired and promoting the development of related fields.

Keywords: Visually impaired people; Assistive app; Touchpoint Life; Personalized functions; AI applications; Life convenience

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1. Introduction

In today's digital society, blind individuals face significant challenges using smart devices, limiting their independence and opportunities [1]. "Touchpoint Life" leverages AI to provide personalized and accessible assistance, aiming to bridge the digital divide and enhance the quality of life for the visually impaired [2].

2. The current situation and needs of visually impaired individuals

2.1. Current situation

2.1.1. Travel difficulties

Visually impaired individuals face many challenges when traveling, including cluttered blind paths and insufficient guide dogs. Public acceptance of guide dogs is low, and the rights of visually impaired individuals to bring guide dogs are often not respected [3]. These issues highlight society's neglect of their needs [4].

2.1.2. Information access barriers

Visually impaired individuals use mobile phones by placing the speaker near their ears, listening to audio cues, and using finger gestures to navigate. Single clicks select and read information, while double clicks activate functions. They often require about three times more clicks than sighted users for the same tasks.

2.1.3. Social limitations

In traditional and virtual social settings, blind individuals face barriers in understanding emotions and intentions due to the lack of visual cues. Mainstream social platforms are unfriendly to the blind, as their design relies heavily on visual elements, making basic operations like sending messages or adding friends extremely difficult.

2.2. Thinking based on the current situation and user needs

2.2.1. Functional requirements

Blind individuals have diverse software needs for daily life, including navigation with real-time traffic and obstacle detection, text recognition for information acquisition, and voice-interactive shopping for self-care.

2.2.2. Demand for ease of operation

Since blind people have limited vision, software design should focus on simplicity and clear voice guidance, supporting touch and voice interactions to reduce steps and ensure ease of use [5].

2.2.3. Personalization needs

Blind individuals have varying personalization needs due to differences in residual vision, habits, and scenarios. Those with weak vision need adjustable font sizes and contrast, while fully blind users focus on voice interaction. Operation preferences include gestures, shortcut keys, or voice commands [6]. Office users seek integration with productivity tools, while students need learning support. Customizable modules address these diverse needs.

3. Interface design and multi-dimensional innovation of “Touchpoint Life”

3.1. Interface design

For visually impaired individuals, a friendly and user-friendly interface design is crucial for their smooth use of the app. The “Touchpoint Life” app focuses on the following key elements in its interface design:

3.1.1. Simplicity, usability, and consistency

When visually impaired individuals use the app, they find it difficult to process complex visual information as easily as those with normal vision. The interface elements of the “Touchpoint Life” app have been carefully simplified, removing redundant decorative elements and complex visual effects. The design follows the principle of being easy to understand and operate, aiming to closely match the cognitive habits and operational capabilities of visually impaired individuals [7]. This reduces their learning costs and, to facilitate the memory and use by visually impaired users, the app should maintain a high degree of consistency in its application design style and operational logic.

3.1.2. High color contrast

Color contrast is crucial for visually impaired individuals to clearly distinguish interface content. The app deliberately uses high contrast color combinations to enhance visibility. During the color selection process,

strict color accessibility tests were conducted to ensure that even users with weaker vision can easily distinguish different interface elements.

3.1.3. Adding accessible labels

At the source code level of the app, adding detailed text descriptions for icons and images is a key step to ensure that visually impaired individuals can fully obtain interface information.

3.2. Design innovation

3.2.1. Integrating multimodal interaction

Breaking away from the traditional single interaction mode of apps, the "Touchpoint Life" app innovatively integrates multiple sensory input and output methods such as voice, touch, and hearing, creating a new interactive experience for visually impaired users.

3.2.2 Functionally targeted customized services

Fully recognizing the individual differences among visually impaired individuals, different modes are set based on visual residual degree, preferred functions, and living habits.

3.2.3 AI-driven community ecological function model

By leveraging AI technology, the app conducts in-depth analysis of multi-dimensional data such as user usage habits, operation behavior trajectories, and function usage frequencies [8]. It can intelligently understand users' preferences and needs, and precisely recommend relevant functions and services, establishing an AI-driven community ecological function model to build an exclusive social space for visually impaired individuals, encouraging mutual assistance and friendly communication among users, and forming a positive social cycle.

3.2.4. API and ecosystem construction

With a focus on long-term development and building a comprehensive service ecosystem for visually impaired individuals, the "Touchpoint Life" app actively seeks commercial cooperation and opens API interfaces. Through cooperation with various related service providers, hardware manufacturers, etc., it integrates multiple resources and extends the app's functions and services to broader fields, achieving multi-domain interconnection.

4. Function settings and targeted features of Touchpoint Life

4.1. Login settings

In the process of meeting the needs of visually impaired people, login, as the initial step of using the app, is of no doubt of great importance. Therefore, the developers provide two different login methods: voice login and manual login. The developers fully consider the operational capabilities and usage preferences of different visually impaired groups.

4.2. Communication and call function

In the communication and call function, the Touchpoint Life app supports both voice input and text input. For those completely blind people, voice input is more convenient. For visually impaired people with some vision, text input can also be operated [9]. This increases the flexibility of the function and takes into account the usage habits and scene requirements of different users.

4.3. Voice social function

Traditional social platforms have limited friendliness towards visually impaired people. Based on the special needs of visually impaired people in social aspects and the relatively limited social scope, the "Touchpoint Life" app innovatively creates an exclusive social circle for visually impaired people. Users can freely share their lives through voice or text. For the content published by users, dual expression modes of voice and text are set.

4.4. Community function for daily life

The community function of Touchpoint Life aims to build an online communication platform for visually impaired people for information sharing and mutual assistance. Relying on voice interaction technology, it facilitates various aspects of users' daily lives, forming a closely connected and positive community atmosphere, and effectively improving the overall quality of life.

4.5. Map navigation function

Considering the different visual conditions of visually impaired people, we have designed three types of maps: Map 1, Map 2, and Map 3, to provide highly targeted services (**Figures 1**, **2**, and **3**) [9].

Map 1 is mainly for fully blind and visually impaired people. These users have completely lost their visual perception ability. In Map 1 mode, the app uses advanced voice recognition and intelligent route planning technology. Users only need to hold the device and say the destination, and the system can quickly recognize it, and comprehensively consider factors such as distance, obstacle distribution, etc., to plan the optimal route, and provide real-time information on distance, obstacles ahead, traffic light status, and various emergencies, providing users with comprehensive voice guidance.

Figure 1. Concise navigation effect

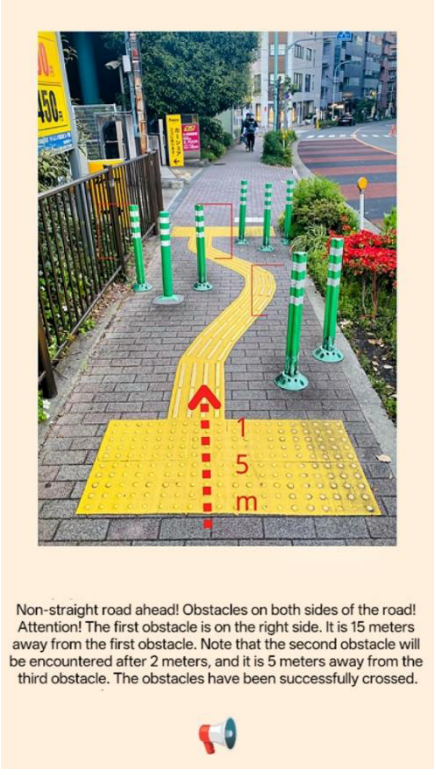

Figure 2. Precise navigation effect

Figure 3. Bouncing map effect

Map 2 is designed for people with poor visual acuity or other low visual clarity issues. By using high-contrast color combinations and enlarged icons, it effectively enhances the readability of the map information. At the same time, the interface of the map is optimized and streamlined, filtering out unnecessary and irrelevant information, while retaining the core routes and key landmarks. This enables users to view and understand the map content more attentively and conveniently, thus facilitating the completion of navigation.

Map 3 is mainly designed for people with color blindness or other visual impairments who have some degree of visual ability. In this mode, the app adopts a unique pulsating icon design. These icons have distinct dynamic features and can stand out in the map interface, facilitating users to quickly and accurately identify and locate the target position. This effectively compensates for the visual recognition deficiencies of these users and helps them efficiently utilize the map functions.

4.6. Camera and album functions

The camera function has a special purpose for visually impaired individuals. Besides the traditional function of taking photos and framing scenes, it can also capture specific scenes or objects through voice commands. For those with poor vision or color blindness, the camera in the app can be used to record daily life. For users with more severe vision problems, it also has its specific functions, such as in situations requiring identity verification, users can take photos through voice commands to capture ID cards. The album function can manage photos through voice descriptions, making it convenient for visually impaired people to record important moments in their lives.

5. Conclusion

The "Touchpoint Life" app, with its targeted function settings for various visually impaired individuals, holds significant importance in improving the lives of visually impaired people. It not only resolves numerous issues faced by visually impaired individuals when using smartphones, but also provides strong assistance for them to integrate into social life [10].

With the continuous development of technology, it is hoped that similar assistive applications can receive more promotion and improvement, further enhancing the quality of life for visually impaired people and promoting "the goodness of technology."

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The authors declare no conflict of interest.

Author contributions

Dan Ni: provided guidance and support for the design of the project and the writing of the article.
Jiayi Shu: completed the design of the project and the writing of the article.

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