Research on User Experience Elements and Design Strategies for Smart Home Products Based on the Concept of Healthy Living

Yueyang Zhao

School of Art and Design, Changzhou Institute of Technology, Changzhou, China

Abstract: With the growing emphasis on healthy living, smart home products have emerged as a crucial medium for promoting a healthy lifestyle. As a result, the focus on user experience design for these products has become increasingly important. This study aims to explore the core elements of user experience for smart home products, framed within the context of healthy living, across four key dimensions: functionality, emotion, interaction, and safety. Through an analysis of practical case studies, the research provides valuable theoretical insights for the design of smart home products, offering targeted design strategies that aim to enhance users' pursuit of a healthy, comfortable, and intelligent lifestyle.

Keywords: Healthy Living Concept; Smart Home Products; User Experience Elements; Design Strategies

1. Introduction

In today's rapidly advancing technological age, people's expectations for a higher quality of life continue to grow, with the concept of healthy living increasingly becoming a societal norm. Smart home products, which facilitate the interconnectivity of household devices, offer users a smarter and more convenient living environment, playing a crucial role in fostering a healthy lifestyle. However, many smart home products on the market still face significant challenges in user experience, such as overly complex functionalities, lack of intuitive interaction, and an inability to meet personalized health needs. As a result, there are considerable shortcomings in the current offerings. To create truly intelligent home products, it is vital to conduct an in-depth study of the user experience elements within the framework of healthy living and develop effective design strategies to address these issues.

2. User Experience Elements of Smart Home Products under the Concept of Healthy Living

2.1 Functional Experience Elements
2.1.1 Health Monitoring and Management Functions
Smart home products should possess precise health monitoring capabilities, such as smart bracelets, blood pressure monitors, and body fat scales, which can track users' physiological indicators in real time, including heart rate, blood pressure, blood glucose, sleep quality, and physical activity data. These devices should provide personalized health recommendations and interventions based on data analysis. For instance, the Xiaomi Mi Band series monitors users' sleep patterns in real time, analyzes sleep quality, and offers advice to improve sleep, helping users develop healthy sleep habits[1]. Furthermore, the smart home system should integrate various health data to create a user health profile. This not only offers valuable insights for healthcare professionals but also allows users to monitor and manage their health status at any time.
2.1.2 Environmental Adjustment Functions
One of the key functions of smart home products is to create a healthy and comfortable indoor environment. Based on environmental parameters such as temperature, humidity, and air quality, products like smart air conditioners, intelligent ventilation systems, and smart humidifiers can automatically adjust their operation to maintain a healthy and comfortable indoor setting. For example, Honeywell's smart ventilation system detects poor air quality and draws in fresh outdoor air while expelling indoor pollutants, effectively improving indoor air quality. Additionally, smart lighting systems should be capable of creating comfortable lighting environments, protecting users' eyesight, and promoting physical and mental well-being. These systems can adjust the brightness and color

temperature of lighting according to different scenarios and user preferences[2]. For example, activating a "Home Mode" with a single command could trigger multiple devices to work in harmony—lighting automatically turns on, the air conditioning adjusts to a comfortable temperature, and the curtains gently open—providing users with a seamless, efficient, and convenient living experience with minimal effort.

2.2 Emotional Experience Elements

In today's fast-paced world, individuals often seek emotional connection and reassurance. Smart home products, designed with emotional intelligence, can cater to these needs by providing emotional support and fostering a sense of care. For example, some smart elderly care devices function like a family member, offering companionship, medication reminders, and health monitoring, thereby providing emotional comfort to elderly users[3]. Additionally, smart home systems can interact with users and adjust to their emotional states. When users are feeling tired, the system might play calming music or suggest a light-hearted movie to improve their mood. In times of emotional low, these devices can offer a sense of warmth and reassurance, helping users feel supported and emotionally fulfilled, thus enhancing their overall well-being.

2.3 Interaction Experience Elements

2.3.1 Natural Interaction Methods

Traditional smart home devices typically rely on complex controls and inefficient mobile apps, resulting in a less-than-optimal user experience. However, with advancements in technology, natural interaction methods have increasingly become a trend in the design of smart home products. These methods, which align with human instinctive behaviors—such as voice commands, gesture control, and facial recognition—offer users a more intuitive and seamless experience. For instance, Amazon's Echo smart speaker allows users to control music, check the weather, or set alarms simply by speaking, eliminating the need for manual operation. Furthermore, some smart home systems now support gesture-based controls, enabling users to manage lights, curtains, and other devices with simple hand movements, making the interaction both more convenient

and enjoyable.

2.3.2 Multi-Device Collaborative Interaction

A smart home system typically consists of various interconnected devices, and an essential factor in enhancing the user experience is the seamless collaboration between these devices. With the use of Internet of Things (IoT) technology, different devices can communicate and synchronize with each other, providing a more cohesive and fluid interaction[4]. For example, a smart home system might automatically adjust the room temperature, play energetic music, and sync fitness data from a smartwatch to a smart health device. Meanwhile, the smart lighting system could activate, and the smart speaker could play a welcoming message when the user unlocks the door with a smart lock, creating a warm and inviting atmosphere. This seamless interaction between multiple devices not only boosts user satisfaction but also reinforces the overall intelligence and cohesiveness of the smart home system.

2.4 Safety Experience Elements

Smart home products collect a wide range of personal data from users, such as health information, home addresses, and daily routines. Consequently, data security and privacy protection are of paramount importance[5]. To ensure the safety of user data during both transmission and storage, product designs must incorporate advanced encryption technologies that prevent data leakage, tampering, or misuse. The safety and reliability of smart home devices are directly linked to the protection of users' lives and property. Therefore, during the design and manufacturing process, these products must meet rigorous safety standards and regulations. For example, smart locks should be equipped with features such as anti-tamper alarms, password error locks, and emergency unlocking capabilities, while offering multiple layers of security to prevent unauthorized access[6]. Additionally, smart appliances must include essential safety functions, such as overheating protection, leakage protection, and overload protection, to prevent potential accidents caused by device malfunctions. Moreover, companies must establish a comprehensive and responsive after-sales service system to swiftly address any issues users encounter, ensuring the continued safety,

reliability, and proper functioning of the product throughout its lifecycle.

3. Strategies for Smart Home Product Design Based on User Experience Elements

3.1 User-Centered Design Philosophy

The foundation of smart home product design must always be centered around the user. It is essential to deeply understand the user's needs, expectations, behaviors, and psychological traits throughout the design process. By continuously adhering to a user-centered design approach, designers can ensure that every aspect of the product reflects the user's requirements[7]. Collecting user opinions and feedback through research, user testing, and surveys should be integrated at each stage of product development. For instance, during the functional design phase, identifying core and auxiliary features based on users' health needs and life pain points is critical. In the interaction design phase, selecting appropriate interaction modes and interface designs, based on users' habits and cognitive levels, will enhance the product's ease of use and overall user experience. Ultimately, a product that genuinely meets the user's needs is the one that earns their approval and affection[8].

3.2 Function Integration and Simplified Design

Addressing the complexity and cumbersome operation often found in current smart home products, this design strategy advocates for integrating and simplifying functions. By consolidating related features, reducing the number of functional modules, and minimizing steps required for operation, the product becomes more user-friendly and convenient. For example, integrating multiple health monitoring features into a single smart device allows users to obtain various health metrics with a single measurement. Additionally, consolidating control functions for smart appliances into a single central panel or mobile app enables users to manage all their devices from one interface. Simplified, intuitive operation and visual interfaces further reduce learning costs and make the product easier to use. For instance, employing graphic user interfaces and voice-guided commands allows users to easily engage with the product.

3.3 Emotional Design Strategy

Emotional design enhances the connection between the product and the user, infusing smart home devices with a deeper emotional resonance[9]. The product's aesthetic design should focus on elements such as shape, color, and material to create a visually warm, comfortable, and personalized effect. For instance, soft lighting and rounded shapes in smart lighting products evoke a sense of calm and comfort. Some smart speakers, made with wood material, enhance the tactile experience and foster a closer, more natural connection with the user. In terms of interaction design, the focus is on emotional engagement. Products should demonstrate care and respect for the user through humanized prompts, animations, and feedback mechanisms. For example, a smart device may provide positive feedback and encouragement after the user completes a health monitoring task or offer helpful suggestions when errors occur during operation.

3.4 Security Assurance Design Strategy

Both technological and managerial approaches are essential in ensuring the security of smart home products, safeguarding user information, and protecting the devices themselves. From a technical standpoint, securing user data during transmission and storage requires the implementation of advanced encryption algorithms, firewall technology, and intrusion detection systems. To prevent device hacking, it is also crucial to strengthen the management of device firmware, regularly conducting security vulnerability tests and updates. On the managerial side, a robust data security management system and user privacy protection policies must be established. These policies should clearly outline the company's responsibilities and obligations in data collection, usage, storage, and sharing. Furthermore, enhancing employee training in data security practices and compliance with safety protocols is vital. Collaboration with third-party security certification organizations will help verify the product's safety and reliability, ensuring that users can trust the devices. Additionally, third-party security audits and certifications can further reassure users about the integrity and safety of the product.

4. Case Study

4.1 Xiaomi Smart Home Ecosystem

With its diverse product range, excellent cost-performance ratio, and outstanding user experience, the Xiaomi Smart Home ecosystem has won the favor of a broad user base. In terms of functional experience, Xiaomi Smart Home covers various areas such as smart appliance control, health monitoring, environmental adjustment, and security surveillance. Users can control their home's smart devices through Xiaomi smart speakers, mobile apps, and other terminal devices, enabling intelligent automation across multiple life scenarios. For instance, health metrics such as exercise data and sleep quality can be monitored in real-time through the Xiaomi Band and synchronized for analysis and management in the mobile app.

In terms of emotional experience, Xiaomi Smart Home focuses on personalized product customization and community building, dedicating significant research to both aspects[10]. Within the community, users can share experiences, engage in creative endeavors, and strengthen their sense of identity and belonging to the brand. From an interactive experience perspective, Xiaomi Smart Home has embraced natural interaction technology. The Xiaomi smart speakers support voice commands, enabling users to easily control smart devices in their home through speech, effortlessly managing tasks such as music playback, information queries, and alarm settings, thus achieving seamless operation. Regarding data security, to protect user data and personal privacy, Xiaomi enforces encryption for both storage and transmission of user information, while strictly adhering to confidentiality protection policies. On the product security front, Xiaomi Smart Home devices undergo rigorous quality inspections and security certifications. They are equipped with tamper alarms, leakage protection, and robust safety features to ensure the protection of users.

4.2 Huawei Smart Home Solution

Huawei's smart home solution draws upon the company's advanced communication technologies and intelligent capabilities to offer users a highly integrated and automated home environment. In terms of functionality, Huawei's solution provides comprehensive perception and intelligent control of household devices, using smart hubs and sensors to monitor and manage the entire home ecosystem. Through the Huawei Smart Life app or an intelligent central control screen, users can centrally control and configure various home systems, such as lighting, curtains, air conditioning, and ventilation. These devices can be seamlessly coordinated across different scenarios, allowing users to easily manage elements like lighting, curtains, and sleep modes.

Regarding emotional experience, Huawei enables users to adjust lighting parameters, including brightness, color temperature, and hue. With the smart lighting system's scene settings, users can tailor the atmosphere to suit different times of day, moods, and personal needs. For example, during dinner, the lighting can be automatically adjusted to a warm yellow tone, creating a cozy and romantic dining environment. In terms of interaction, Huawei's smart home solution offers a variety of natural and intuitive methods. In addition to supporting voice commands and mobile app control, it also enables interaction through an intelligent central control screen, gesture recognition, and facial recognition technology. This diverse range of interactive options ensures a smooth and user-friendly experience. When it comes to data and device security, Huawei takes rigorous measures to safeguard both user privacy and home safety. For data security, Huawei employs end-to-end encryption to protect information during transmission and storage. In terms of device security, all Huawei smart devices undergo thorough safety testing and certifications. These include advanced protective features such as tamper alarms on smart locks and leakage protection on smart appliances, ensuring a reliable safeguard for users' homes.

5. Conclusion

The user experience design of smart home products under the concept of healthy living is a comprehensive system project, encompassing various aspects such as functional experience, emotional experience, interaction experience, and security experience. By deeply studying the key elements of user experience and integrating strategies such as user-centered design, functional integration

and simplification, emotional design, natural interaction design, and security assurance design, it is possible to significantly enhance the user experience of smart home products. This will meet users' aspirations for a healthy, comfortable, and intelligent lifestyle. In the future, the design of smart home products should continue to focus on the evolving needs of users. Companies should actively apply new technologies and concepts, continually optimizing product design to provide users with higher-quality, more convenient, and safer smart home products and services, thereby fostering the healthy development of the smart home industry. Future research could focus on the following key areas: First, to achieve a higher level of smart experience, there should be further exploration of the deep integration of artificial intelligence and IoT technologies within smart home products. Second, to cater to a more diverse range of user needs (e.g., elderly, children, disabled individuals), there is a need to strengthen applied research on smart home products. Third, research could examine the impact of smart home products on family relationships and social interactions, providing a more holistic theoretical foundation for product design from a social and cultural perspective.

Acknowledgements

References
[1] Zuo Zilei. Research on Smart Home System Design based on Context Awareness. Jiangnan University, 2017.

[2] Yu Jiatong. Research on the User Experience Evaluation Model of Smart Home Application Products Based on Context Theory. Tianjin University, 2018.

[3] Qin Qilu, Ling Tingxi, Zhong Haixiong. Research on the Development of Elderly-Friendly Smart Home Products. Ju She, 2025, (06): 31-33.

[4] Wang Linping, Lyu Meiyu. Design of an Intelligent Refrigerator Dietary Management System Based on AR Scenarios. Design, 1-5 [2025-03-11].

[5] Gao Jianping. The Integration of New Technologies Opens a New Era for Smart Homes. China Security & Protection, 2025, (Z1): 87-91.

[6] Li Han. Research on the Impact of Smart Home Systems on Interior Decoration Design. Foshan Ceramics, 2025, 35(01): 114-116.

[7] Gu Shuo. Holly System: User-Centered Approach to Assist Digital Transformation. Automation Panorama, 2024, 41(09): 20-21.

[8] Zhang Wei, Wu Changxu. Human Cognition and Simulation Modeling and Its Application in the Voice Interaction Design of Smart Homes. Packaging Engineering, 2025, 46(04): 226-236. DOI: 10.19554/j.cnki.1001-3563.2025.04.019.

[9] Li Yuhan, Li Haibo, Jiang Hongbin, et al. Applicability Boundary of Emotional Factors in Home Design. Household Appliances, 2024, (10): 56-60.

[10]Zhang Lianliu. Research on the Ecological Balance of Smart Home Design Ecosystems. Wuhan University of Technology, 2020.