



Research on UI Design of Touch Screen Interface of Intelligent Classified Trash can Based on Green Design Concept

Tianshuang Zhang¹ , Xue Wang² , and Yunfeng Ma³

¹Shenyang Jianzhu University, No.25, Hunnan Middle Road, Hunnan District, Shenyang, 110000, China

²Shenyang Jianzhu University, No.25, Hunnan Middle Road, Hunnan District, Shenyang, 110000, China

³Shenyang Aerospace University, No.37, Daoyi South Street, Shenyang Daoyi Economic Development Zone Shenyang, 110000, China

EMAIL: zhangtianshuang@sjzu.edu.cn (Tianshuang Zhang);
2623682460@qq.com (Xue Wang);
rcdxph@126.com (Yunfeng Ma)

Abstract. In recent years, with the continuous promotion of the national sustainable development strategy, garbage classification has become a key issue. In today's construction of urban domestic waste classification and treatment, intelligence and informatization play a role in promoting it. Smart trash cans are widely used in various regions, effectively solving the problem of waste classification. However, most of the smart trash cans have complicated operation interfaces. Based on the green design concept, this paper studies the UI design of the touch screen interface of the intelligent classified trash can, which greatly reduces the difficulty of operation, improves the user experience, and simplifies the garbage classification and delivery mode.

Keywords: green design, intelligence, garbage classification, garbage can, UI design

1 Introduction

At present, China still treats garbage treatment with traditional methods such as centralized landfill and harmless incineration as the main means. With the continuous improvement of the living standards of urban residents, a series of problems such as the increase of garbage emissions have been brought, and the shortcomings of traditional garbage treatment methods such as low efficiency and high energy consumption have gradually been exposed. In the face of this problem, a garbage classification policy has been implemented in the country, and the new intelligent trash can has been widely used. In this paper, a series of optimization has been carried out for the operation

process of the intelligent garbage bin to make the use of the new intelligent trash can more convenient.

Based on the green design concept, this paper designs a community intelligent classified trash can, which includes classification guidance, automatic warning, information collection, analysis and positioning functions, and optimizes and upgrades the UI operation interface of the traditional intelligent trash can. The design and research are more humanized and the delivery method is more simplified, which not only stimulates the enthusiasm of residents to participate in the process of garbage delivery, but also can collect residents' feedback information, sort out and analyze the intelligent classified garbage cans sent to relevant departments^[1], which provides the basis for decision-making for the continuous upgrading of the functional design of intelligent garbage cans in the future, and lays the foundation for the reduction, recycling and harmless treatment of urban garbage^[2]. At the same time, the national environmental protection policy has been fully implemented.

2 Green design

2.1 Concept of green design

The so-called green design is to ensure the basic function and economic practicality of product design from the beginning of product production to the use, recycling and reuse of the whole process, pay attention to energy conservation and environmental protection as well as the harmonious coexistence of human, nature and society, and emphasize the realization of sustainable development on the basis of meeting people's demand for products.^[3] Green design is an inevitable trend of sustainable development in China, and green design also plays a key role in future environmental protection design.

2.2 Principles of green design

The main principles of green design include safety, energy conservation and ecology, which are also the inevitable requirements for product design put forward by today's social development. Therefore, the design of the intelligent garbage bin should not only focus on its functionality and aesthetics, but also on its energy conservation and environmental protection. Combining the "green design" concept with the intelligent garbage bin UI design, it not only follows the natural rhythm, but also conforms to the internal rhythm of users' psychology.

3 User characteristics and user requirements

Garbage classification refers to a series of activities that classify, store, deliver and transport garbage according to certain regulations or standards, thus transforming it into public resources. The purpose of classification is to improve the resource value and economic value of garbage and strive to make the best use of things.^[4]

The intelligent trash can is the performance and requirement of the continuous improvement of people's quality of life, expanding the market of artificial intelligence in the field of life. The intelligent trash can is designed professionally, equipped with intelligent equipment, and upgraded and optimized by means of sensor technology and image processing technology.^[5]

3.1 User demand questionnaire and analysis results

Question setting: take Shenyang urban residents as an example, according to the current situation of garbage classification of Shenyang urban residents and their expectations for smart trash cans, use the questionnaire survey method to collect and analyze data, launch the relevant smart classification trash can UI touch screen interface demand section and carry out the actual operation of the questionnaire.

Survey process: The questionnaire is divided into two parts, and information is collected in the form of single-choice questions and multiple-choice questions. The first part is about the implementation of garbage classification and the acceptance of intelligent garbage cans; The second part is about the reasons and problems of people's low implementation of garbage classification.

Survey results: In this survey, a total of 1000 questionnaires were prepared and 975 valid questionnaires were collected.

In this survey data, only 19% of household garbage is "classified regularly", 47% is "classified occasionally", 23% is "rarely classified" and 12% is "never classified". In the "disposal of waste batteries and metals" issue, only 23% of people realized that waste batteries are hazardous waste and should be treated separately, while 42% only treated them as ordinary waste, and even 5% threw them randomly. It can be seen from the statistical results that most people only know the difference between recyclable and non-recyclable garbage, and the concept of recyclable and non-recyclable garbage is not clear, and the awareness of hazardous waste treatment is very weak. See Figure1.

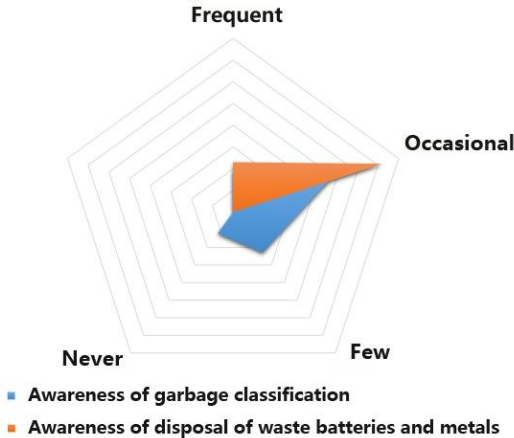


Fig. 1. Proportion of residents' awareness of garbage classification

As for the current garbage classification, the survey on "the reasons why people are unwilling to use intelligent classified garbage cans" shows that a large number of people choose "no operating motivation", "weak awareness of garbage classification", "fuzzy garbage classification standards", "functional defects", "complex operation" and "poor regular cleaning". These data clearly show that people are still unable to carry out active, targeted and preliminary classification of garbage, resulting in the virtual application of intelligent garbage cans, the low popularity of garbage classification, the inability to achieve effective classification of garbage, a large number of recyclable resources can not be recycled, resulting in a large amount of waste of resources, and the classification performance of garbage cans needs to be constantly upgraded. See Figure 2.

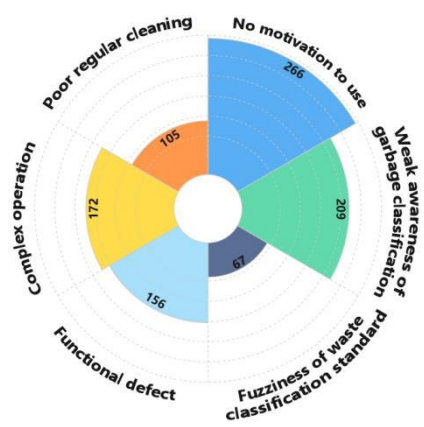


Fig. 2. Operation difficulties of intelligent sorting trash can

3.2 User demand analysis of intelligent sorting trash can UI touch screen interface

By integrating the results of the survey data, we have made clear the user's operating difficulties and intentions for the touch screen of the intelligent sorting trash can. Therefore, based on the commonness of intelligent devices, the following summary is made on the design of the touch screen UI of the intelligent sorting trash can:

- Functionality

The garbage classification function is the main research direction of intelligent garbage can technology at present. Smart trash can is the integration of garbage identification, garbage separation, garbage storage, body cleaning, human-computer interaction and other technologies, rather than the simple superposition of smart devices. The realization of functions such as voice broadcasting, infrared recognition, online shopping mall, and self-control system on the intelligent trash can has achieved initial results. The concept of "one card for one bag", two-dimensional code recognition, and Internet of Things database have also been constantly put forward. However, due to the lack of

fixed and unified standards, there are certain technical barriers in the existing intelligent trash can industry.^[6]

- **Simplicity**

Smart trash products can only be better accepted if they fully adapt to the needs and habits of diverse consumers. In this process, the UI design of the intelligent sorting trash can should try to simplify the operating procedures, avoid the use problems caused by complicated operation, and provide more efficient and convenient experience, so as to promote people's enthusiasm for using the intelligent sorting trash can.

- **Spiritual needs**

Provide online consumer feedback service platform and point exchange mechanism, people can feedback and solve various problems encountered in the process of use at any time, and can also greatly mobilize people's enthusiasm for "garbage classification". The offline links should be cleaned up and repaired in time, and the conditions for garbage classification should be continuously improved, and the awareness of garbage classification should be enhanced by strengthening guidance and using network media to promote, so as to cultivate green and healthy living habits.

4 Design method of touch screen UI interface of intelligent sorting trash can

The design of the UI touch screen interface of the intelligent trash can constantly makes the garbage classification operation simpler and more humanized. On the premise of meeting the general garbage bin functions, the garbage classification awareness is constantly implanted, which not only ensures people's participation in the process of putting garbage, but also can collect garbage classification information and problem feedback from different locations in real time, and achieve intelligent garbage supervision and garbage classification information collection and analysis, It will provide a basis for the continuous improvement and upgrading of the performance of the intelligent garbage can in the future, and implement the "garbage classification" policy more realistically.

4.1 Optimization and upgrading of trash can function

According to the survey of the current garbage classification of traditional garbage cans on the market, most of the traditional garbage cans have no garbage classification prompt function, which greatly increases the difficulty of users' garbage classification, leading to the vast majority of residents dropping garbage without classification. In view of this situation, this design scheme not only accurately distinguishes garbage classification, but also optimizes the UI operation interface, which greatly reduces the difficulty of use and gives users a better experience.

When designing the UI operation interface of the intelligent trash can, the factors such as the operation difficulty and precise classification of the product are fully considered, and they are allocated according to the average value. See Figure 3.

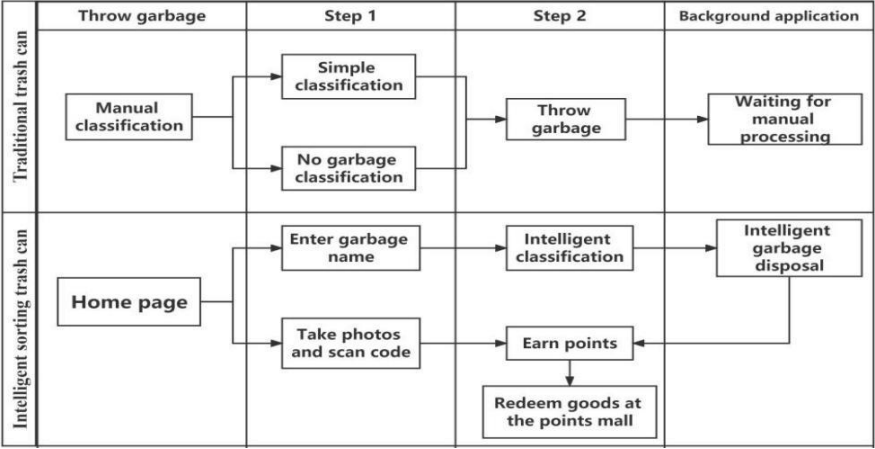


Fig. 3. UI design function optimization diagram of intelligent sorting trash can

4.2 Intelligent and accurate classification and identification of garbage

Because the knowledge of garbage classification has not yet been popularized nationwide, many urban residents do not have the ability to identify the types of garbage, resulting in the low use of intelligent garbage cans. This design upgrades the garbage identification and classification function. Users only need to enter the detailed name of garbage in the operation interface of the intelligent garbage can to carry out garbage classification and identification. At the same time, we try to classify and summarize the common domestic garbage, identify and classify the garbage entered by users through the data background, and update the database in time to ensure that the garbage classification data are collected as much as possible. See Figure 4.

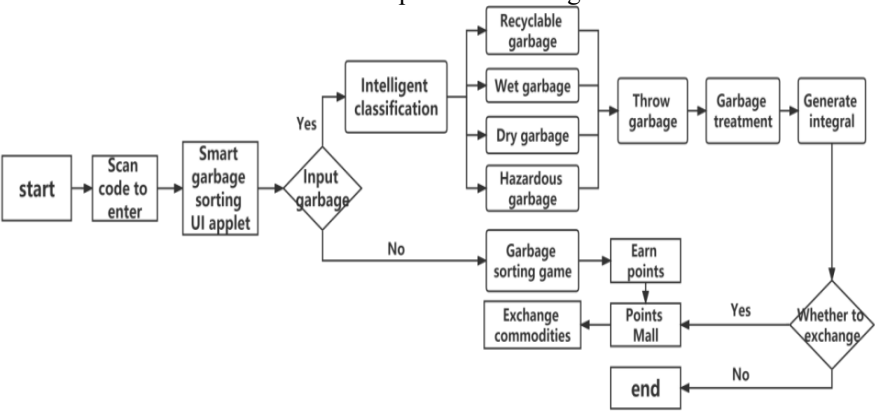


Fig. 4. Operation flow chart of UI design of intelligent sorting trash can

4.3 Mobilize users' enthusiasm

In the survey of the use of smart trash cans on the market, we found that the current use rate of smart trash cans is not high, and people prefer to use traditional trash cans. In addition to the complex brands, different functions, and difficult operation of smart trash cans, the lack of enthusiasm for use is also one of the important reasons why people refuse to use smart trash cans. Therefore, in order to mobilize the enthusiasm of users, we added the point exchange function, Users can earn points by correctly placing garbage, or by participating in garbage sorting games, and can exchange points for gifts to fully mobilize users' enthusiasm. At the same time, in terms of the background color matching of the smart trash UI interface, the optimization of the UI interface color and green environmental protection matching visual design conforms to the natural rhythm and people's psychological rhythm. See Figure 5.

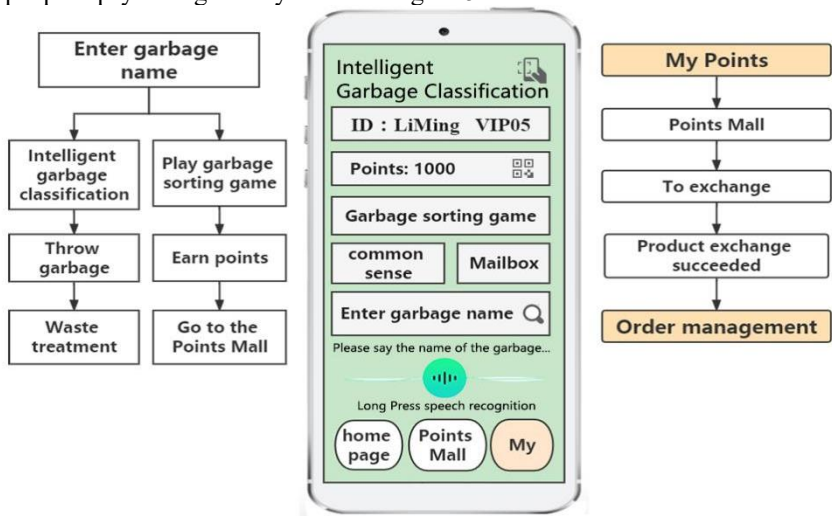


Fig. 5. Operation interface of intelligent sorting trash can point exchange

5 Conclusion

As green ecological design has become an irresistible development trend, and garbage classification and recycling as an important part of it, the promotion and use of community smart trash can fully solve this problem. However, as an emerging industry, the defects arising from the application of smart trash can cannot be ignored. The intelligent trash can improvement scheme proposed in this paper refers to user characteristics and user needs, and based on the green design concept, improves the color of the intelligent trash can operation interface, which conforms to the natural rhythm and the internal rhythm of user psychology; At the same time, this design increases the interaction between the intelligent trash can and users, and fully cultivates children's garbage classification awareness and knowledge; It reduces the operation difficulty of the trash can, increases the reward for garbage classification, and stimulates the user's

enthusiasm for using the trash can. The scheme discussed in this paper not only solves the defects of the intelligent garbage can, but also caters to the national environmental protection concept, conforms to the green design concept, and greatly promotes the promotion and implementation of the national garbage classification and recycling policy.

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