Inclusive Public Terminal Device Design: A Self-service Ticket Vending System

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Inclusive Public Terminal Device Design: A Self-service Ticket Vending System

by

Zhuoyi Zhou

A Thesis submitted in Partial Fulfillment of the Requirements for the Degree of Master of Fine Arts in Visual Communication Design

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Inclusive Public Terminal Device Design: A Self-service Ticket Vending System

Thesis Title

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Abstract

As information and communication technologies continue to be integrated into every aspect of people's daily lives, a wide variety of public terminal devices that provide self-service have begun to emerge in a variety of public spaces. Its rapid development covers a wide range of industries, including banking and finance, medical services, transportation, and tourism. Self-service terminals have gradually replaced manual services with their high efficiency, speed, and low cost. At first, the self-service is designed to reduce the burden on manual service and, it is efficient and can bring more benefits to the business. Under such conditions how to solve more problems in a faster way becomes the primary influence factor for self-service. Currently, Consumers’ attitudes toward consumption have gradually shifted from pragmatism to hedonism, which means consumers have higher requirements for the user experience of self-service. A more user-friendly public transportation service system needs to be designed to better serve users’ daily travel demand.

This thesis project will show a new metro self-service ticket vending system designed based on the Chengdu metro. The author will design a system that allows users to complete ticket purchases without resorting to the mobile phone map app. The system has main functions such as search destination/ buy tickets/ recharge metro card. The metro ticket generated by the system will be customized according to the destination and departure station, and specific information such as station name, transfer information, and approximate time will be recorded on it.

The project hopes to enable people who are familiar or unfamiliar with the city to use the subway self-service system smoothly, reduce the frustration of users in the ticket purchase process, increase the pleasure of using the Chengdu metro, and deepen the friendly impression of the city.

Keywords

Inclusive design, Public service design, User interface design, Metro, Self-service design
Introduction

With the development of technology, electronic devices are becoming more and more intelligent. Self-service public terminals devices are also appearing more frequently in everyone's field of vision, especially places like banks, shopping malls, hospitals, metro stations, and airports that have a lot of people and need to handle a lot of service demands. Compared with manual service, self-service is more cost-saving, the use time is freer and the pressure of manual service can be reduced, and the probability of error is also lower. Even though machines are very intelligent now, the interaction between humans and machines is still not completely comparable to the communication between humans. As people get in touch with more and more electronic products, the requirements and psychological expectations for user experience are getting higher. As a result, the functions and designs of some existing self-service terminals can no longer meet the needs of users. This situation is particularly obvious in China, where the development of self-service design is relatively slow.

In Asian countries like China, residents mainly rely on public transportation such as metro and buses to daily travel and go to work. In all public transportation, the subway is widely selected by residents for its punctual and efficiency. Compared with other public transportation, metro has more complex usage scenarios, and the self-service systems are used more widely. Therefore, a more user-friendly self-service system design is important in the environment of metro stations. Take the Chengdu metro self-service ticket vending system as an example. Except for the skilled users of this system, tourists and people who don't take the metro often have hard time using the ticket vending system to complete purchases without the help of mobile phone map app and manual services.

Therefore, the author wants to design a new self-service ticket vending system that can not only complete existing functions such as ticket purchase and recharge, but also allow users to smoothly complete journeys between subway stations without the help of other tools like mobile phone, and truly realize self-service travel.
Context

Choice of Chengdu Metro station

The advancement of computers and technology has changed the modern service industry, as well as the way people live and travel. In the past, people used to complete the process of asking for destination and buying tickets by communicating with the staff. Now with the help of self-service, residents can travel independently. The metro has become the first choice for more and more people because of its fast and punctual characteristics. However, the metro station carries a huge amount of people every day, and people's reaction speed and information processing ability will decline under a crowded and noisy situation. Under this premise, the unfriendly interface and interaction system will highly affect the user's travel experience and duration. This bad situation may be caused by many factors, one of which is many existing subway self-service systems directly copy the design standard of computers or mobile device when they are designed, and they cannot well meet the current needs of users.

The first reason for choosing Chengdu subway station is that Chengdu, as a well-known tourist city in China, not only has a large number of residents, but also has many tourists visiting each year. For tourists, being able to successfully use the subway to complete their trips in an unfamiliar urban environment and language environment can greatly enhance the pleasure of travel and generate enthusiasm, thereby deepening their goodwill for the city. In addition, the scale of Chengdu Metro has highly developed in recent years, there will be 13 metro lines with a total mileage of 500km in 2021. For such a huge metro system, a good self-service system is important.

Choice of Self-service ticket vending system

The subway self-service ticket vending system is the first machine that all users come into contact with when entering the metro station, and it is also the machine that starts users’ journey. A smooth ticket purchase experience can largely determine the mood of users when they start the journey. The accurate purchase process also determines the success and safety of the journey. The existing ticket purchase system of Chengdu Metro cannot completely guide users through the process from searching for a
destination to successfully purchasing a ticket and transferring within the station. The user still needs to use the mobile phone to check the nearest subway station to the destination and then use the self-service ticket vending machine to search then purchase. This means that users must inquire about the destination site in advance, otherwise they will face the dilemma of searching on phone while standing in front of the ticket vending machine in crowded subway stations.

In addition, the existing map navigation can work well in the outdoor environment, but once users enter the indoor environment, the map cannot be used. The metro station is a complex indoor environment with a huge flow of people, especially the large hub station with multiple lines transiting, and transfer in such station is as complicated as finding way in a large-scale commercial complex. Without the assistance of mobile phone maps and no other guidance, transfers will cause a lot of psychological burden and frustration to passengers, and even cause more time to spend. In this case, it is very necessary to carry out transfer guidance according to the itinerary of the passenger.

**Evolution**

**Case studies**

Before starting the design, I collected the interfaces of the metro self-service ticket vending systems in five cities including Chengdu in China, Shanghai in China, New York in USA, Paris in France, and London in UK. Then analyzed their advantages and disadvantages, visual and interactive modes, and summarized the user flow to comparing with the interface of Chengdu.
Figure 1.1 Homepage of Chengdu metro self-service ticket vending system and user flow

Figure 1.2 Homepage of Shanghai metro self-service ticket vending system and user flow

Figure 1.3 Homepage of New York metro self-service ticket vending system and user flow
After analyzing these five systems, the author summarized the following findings: Except for the New York system, all other systems have guidelines and instructions for payment. Only the metro in Shanghai and Chengdu can see the route map and select the station in the map. London and Paris metro tickets are divided into adult and child tickets, and the ticket price of all cities except New York are based on distance. The London system has the function of searching for the destination station, but the user needs to knows the name of the station in advance.
Literature review

By reading articles related to self-service design, public terminal design, and kiosk design cases, the author tries to identify factors that affect people's access to information technology. The author collects the important elements of self-service device in previous studies, including interaction methods, visual design, and user habits.

User interview

Before designing, the author interviewed 12 people who are in different age groups from 20 to 50 years old, and occupations include students, housewives, white-collar workers, doctors, teachers, designers, etc. 6 of the participants have used Chengdu system before and the other have not. The interfaces of Chengdu system will be shown to the participants who have not used this system before. Questions about the experience of using the Chengdu Metro self-service ticket vending system and what aspects need to improve for later interfaces function development will be asked.

- Do you often take the metro and are you familiar with using the self-service ticket vending system?
- Do you usually know how to get to your destination before taking the metro?
- Have you asked for help when you buy the ticket? And which step stops you?
- Do you need to see the information about the ticket all the way you purchase the ticket?
- Do you feel confident in transferring inside the station?
- Have you used the metro line map when you purchasing the ticket?

Figure 2.1 Interview questions

The author summarized three types of persona from the interview feedback. The three types of persona are divided into two categories, one is skilled users and the other is unskilled users. For unskilled users, one type is like tourists who are unfamiliar with the city and its traffic. When they come to a strange city to use public transportation and buy tickets, it is very important to be able to search for the destination directly on the ticket vending machine. When transferring in the station it is also very important for them to get guidance, especially when they are in an unfamiliar language environment. Another type is like the elderly, they may know this city but they are not good at using the self-service ticket vending system. For
these people clear instruction and readable interfaces are important. For skilled users like freelancer, making a quick purchase and adding a return-trip ticket that can prevent them from repeating the purchase operation when returning is crucial.

Figure 2.2: Interview feedback
The user flow

Through the results of the preliminary investigation and interview, the author summarized and sorted out the user flow, and determined the key functions: search for destination stop, increase the types of tickets, optimize the payment process, add the waiting prompt page, and design customized tickets to guide users move and transfer inside the station.
The interfaces

The whole system is mainly to help users buy metro tickets. On the homepage, users can clearly see their current location on the map and nearby subway stations. The map can be zoomed in, zoomed out and moved using the buttons on the bottom right. In the left column, users can perform functions such as finding destination sites, recharging, viewing subway lines, and switching languages.
In the interface of finding the destination, the user has three ways to obtain the destination information. For users who are unfamiliar with the system they can input the destination with the keyboard, the system will automatically display nearby stations below or directly select popular places in the right column. For the users who want to quickly choose the destination, they can use the subway line map and choose stations from it.
After completing the selection of the destination station, the user can select the ticket type. There are two types of tickets, one-way and round-trip. For the persona like Freelancer, the round-trip can avoid them to repeat purchase ticket when return from the work.

The user can select the number of subway tickets after selecting the type of subway ticket, and the corresponding fares for different numbers of subway tickets will also be displayed on the interface. At this time, all the selected information such as departure station, destination station, and ticket type will be displayed on the right part of the interface for users to refer to. The user can go back to the previous step to modify the operation at any time.
The user has 4 payment methods to choose, including cash, bank card, Alipay and WeChat pay to meet different payment habits of the users. The information about the ticket and the total price will be shown on the upper part of the screen. There will be instruction on how to insert the money.
After the payment is completed, the machine will start to make the metro ticket, there will be a prompt page to remind user that the ticket is issuing. The ending screen will remind the user to take the metro ticket and changes.

Figure 4.6 Take tickets and changes

The ticket
The metro ticket will vary depending on the passenger route. The front of the metro ticket will show the departure and destination stations, as well as the name of the transfer station. The back of the metro ticket will show the metro line direction, time cost and the number of stops in detail. Users can use this ticket as guidance when transfer inside the metro station.

Figure 5.1 Metro ticket
The logo

The author redesigned a logo for the Chengdu metro, using the pattern of the subway line to spell the capital C and D to represent the Chengdu metro. The main color of the logo use the same color pattern with the interface to make them feel more like a system.

![The logo](image)

Figure 6.1 Logo

The design materials

As this system is designed for a public terminal device that serves the public, the author tries to avoid using colors with strong emotion as the main color in the interface. According to the survey by Natalie, in 2000 interviewers, 43% of men and 29% of women choose blue as their favorite color among 7 colors. So blue it is the safest color for public terminal device. Besides, blue is one of the most common colors in nature, and the emotion of blue is relatively neutral. At the same time, blue gives people a strong sense of security as app like tourism, technology, and payment all use blue as the main color. In addition, even people with color weakness can recognize blue well. The typeface of Roboto is chosen for the interface as this font also has the feeling of neutral. The screen size is 1440px * 1024px with 20px margin and gutter, the grid has 8 columns and 6 rows.
Figure 7.1 Logo design materials

Figure 7.2 Ticket design materials
The screen size: 1440px X 1024px

Roboto Bold 48px
Roboto Bold 40px
Roboto Bold 36px
Roboto Bold 30px
Roboto Medium 22px

Figure 7.3 Interface design materials

1440px X 1024px, margin 20px, gutter 20px, 8 columns, 6 rows

Figure 7.4 The grid
Test

After completing the design, in order to test the usability, the author ask the 12 interview participants to use the newly designed system and record their user experience. The author put the interfaces on the iPad to let testers try to buy tickets and record the use process and points of confusion.

![Test the interfaces on iPad](image)

Figure 8.1 Test the interfaces on iPad

Body of Work

The final delivery of the thesis includes self-service ticket vending system, customized ticket and logo. The system is used to purchase the ticket and the customized ticket is used to guide user inside the metro station.
Figure 9.1 The interfaces

Figure 9.2 Ticket and logo

Evaluation & Discussion
In the usability test, all 12 users successfully completed the purchase process. Compared with the original ticket vending system in Chengdu, the participants all think the interfaces are clearer and more readable. The color of the new system is thought softer and calmer. Participants found it useful to be able to search for destination sites so that they don’t have to search on their mobile phones when purchasing. Simultaneously, the customized ticket is thought to be helpful when transfer inside the station.

**Conclusions**

In conclusion, the new Chengdu metro self-service ticket vending system designed by the author not only optimizes the original ticket purchase process, but also adds the function of finding the destination, and issuing metro tickets according to the user's route. In the usability test, the newly-added functions and newly designed tickets are considered helpful, and can guide users travel inside the station without using other tools such as mobile phones.

The author hopes that the system can increase the efficiency of the self-service system, reduce the demand for manual services to reduce the cost and pressure of manual services. The successful experience can also enhance users’ confidence when riding the metro, then increase user friendliness and intimacy towards the city. Increasing users’ goodwill towards public service terminals, reducing users’ resistance to using public service terminals, increasing users’ acceptance and confidence in using public service terminals, and laying a good foundation for the future development of self-service.
References


The screen capture of the website: