

Interaction design and analysis of self-service shopping card reader

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Abstract: the 21st century is an information age, the resulting POS machine market is bound to be a great market. Combined with the rapid development of intelligent technology, according to the characteristics of the current consumption mode, design an efficient and practical self-service shopping card reader. This card reader adopts the display design of double touch screen, for the traditional card reader, the touch screen card reader is convenient and fast, easy to operate, more convenient to use, concave stick card area and swallow card insert area layout, the appearance looks simple and generous, fashionable shape, compact structure and reasonable layout. The self-service shopping card reader solves the customers' long waiting time in the checkout line. This shopping process is a completely independent shopping mode for customers.

Keywords: Self-help; Shopping credit card; Interaction; Analysis of the.

1. INTRODUCTION

1.1 Research background

Through the investigation, it is found that the current POS system setting page is not eye-catching enough, and consumers cannot timely focus their attention on the key areas in the display screen during use. At the same time, the operation of some types of card reader is complex, which requires multiple operations to complete a certain function. The regional setting of card reader or rf card is not reasonable enough, resulting in low work efficiency. For consumers, the problems of long payment queue time and low cashier efficiency are all problems that need to be solved when they consume. Throughout the history of human development, it is actually a history of design progress. The invention and development of any labor tool are constantly improved in use. In view of the shortcomings and shortcomings of shopping card reader in use, this paper considers the ergonomics, design psychology and human-computer interaction, finds out the solution, and puts forward a new design scheme, which is the main content of this study.

1.2 Purpose and significance of the research

With the rapid development of social economy, the scale of business operation is expanding, and the types of goods are becoming more and more abundant. The traditional manual settlement method can no longer meet the needs of modern business, and the cash register integrating computer and information processing technology is gradually replacing it. Among them, POS and POS system are

widely used in commercial sales terminal settlement, and almost become a necessary equipment for supermarkets and other retail stores. With the penetration and promotion of information technology into the banking industry, the bank card business has developed rapidly in recent years. The overall level of bank card consumption is still in the initial stage of development. Whether the bank card can be more widely used depends on the improvement of the use environment of the bank card, among which the amount of POS machines and whether the communication lines are unblocked are two very important factors.

At present, in star hotels, large shopping malls and supermarkets, consumers can usually carry the card for consumption, while in other areas of consumption, such as e-commerce distribution fees, catering takeout, large commodity exhibition shopping, etc., due to the site and limited communication lines, the card cannot be carried out consumption. In people's impression, POS only exists in those fixed places and special lines need to be laid. In recent years, with the rapid development of wireless communication technology, traditional POS products have undergone new changes, and their commercial value has been fully reflected. It is possible to use GPRS wireless technology to transmit financial data, and a kind of mobile POS that is not subject to site and line constraints was born. It is by using GPRS mobile communication system to connect IP data network, and then connecting mobile and financial systems through DDN line that mobile POS and financial system host can realize data transmission, build wireless mobile consumption platform and realize convenient card payment. Mobile POS not only brings more space for bank CARDS to be used, but also helps many dormant bank CARDS to be put into use. At the same time, it also avoids the trouble of merchants and Banks to count a large amount of cash when collecting and paying, which provides convenience for both merchants and Banks and saves transaction costs. In the past, retail, catering industry needs to be served by people, and now facing the era of electronic service, can be completed by self-service equipment. As the concept of POS terminals is gradually transformed from point-of-sale to point-of-service, functions of POS terminals are gradually diversified.

2. DEVELOPMENT TREND OF POS MACHINES

2.1 Development history and status quo of POS machines

The development of China's POS machine has been more than 20 years, from the early stage only simple accounting function, to now has formed a complete POS machine system including the cash box bar code scanner, receipt printer, card reader and other multimedia peripheral products; From the 1990s to the present, domestic POS machine manufacturers have firmly occupied the middle and low-end market, and gradually moved towards the high-end market. From the first type of POS machine to the current fourth type of POS machine; From the popularity of DIY POS to the rise of embedded POS, all these indicate that the POS machine industry has ushered in a good development opportunity. At present, with the development of the burgeoning POS machine market, a large number of manufacturers have entered the market. Apart from foreign brands, there are no less than several hundred domestic POS machines. In order to adapt to the needs of different markets, each merchant has launched a large number of various POS products.

At present, there are at least 40 domestic and foreign POS machine brands in China's domestic market, including foreign, Taiwan and mainland brands. The representatives of foreign brands are IBM,

WINCOR and NCR. Taiwan brand is to partner, treasure profit, kun shen based; In mainland China, hisense, zhongke yingtai, sitong, sunda longjin and chuantian are the main brands. In recent years the rise of manufacturers are easy jietong, zhongqi, guan shuo, wei Ken, ji cheng, yi sheng, wei tuo and so on.

According to the technical characteristics of POS machines, China divides them into three categories. The first category is represented by Casio117, 30ER, TEC85, 156, 186, 31.5, ECR, MICROXT, 2000, TOWA1110, hangko TCCR1110, 2212, Sanyo cash register, samsung 320 and other brands. Their main characteristic is to only use single, can not be connected to the Internet, there is no printer function, similar to the electronic calculator, can be calculated, can record the name of commodity, can complete basic and simple summary function of charge to an account, but not classified accumulated, not for query records at any time, type of POS machine can only manage the amount in the commercial retail and key goods tracking management. The second type of POS machine brands mainly include HPC3000, NCR2113, sitong 3150, shinoda MINI/XT and so on. They are characterized by a small LCD display, printer and memory chip, with calculation summary, query, printing and other functions, is used for all types of retail and commercial enterprises. Because it has a variety of login means and communication capabilities, such as built-in Modem, telephone interface, RS232 interface, bar code interface, etc., it can carry out commodity management, and allow multiple payers to apply the same POS machine. The third type continues the functions of the second type. Based on the PC, it has the same display screen, CPU, network card, modem, special printer, special interface and independent operating system as the PC. It is equipped with telephone and can run the business management information system. It is a combination of microcomputer technology, network technology and software technology, so that the cash register from a simple information acquisition tools into multi-functional information processing tools. This kind of machine can be used alone in small retail enterprises, also can be used in large and medium-sized commercial enterprises. In terms of product demand type, the domestic POS machine market is developing rapidly, and the demand for type ii and type iii POS machines is constantly increasing. By 2009, the domestic POS market demand exceeds 100,000 sets. Now IBM, Siemens, more rich, NCR, Fujitsu, casio, tec, towa, HPC, sanyo, samsung, nec, omrod, bush norda, four-way, hisense, lida, navigation, soft, such as brand, basic has formed the situation in which domestic companies and international companies to participate, but in the third class market, IBM, rich, NCR, Fujitsu Siemens four foreign brands still have obvious advantages.

2.2 Development prospect of POS machines

With the development of market economy, facing the challenge of modern information technology, each operator to improve the efficiency of commodity circulation, reduce operating costs, give play to effect of scale integration, consumer demand for goods is becoming more and more diversified, the diversification of product variety, commodity management way is chaining and scale, as well as commodity behavior in the process of digital information. In order to meet the needs of consumers, reasonable processing information data, grasp the market dynamics. A new concept of POS machine came into being under the call of the market.

3. MARKET POSITIONING

Nowadays, the first-tier cities are full of supermarkets and catering enterprises, and large POS enterprises occupy this field like fish in water. In order to expand more survival road, at this time sensitive retail enterprises will focus on the second - and third-tier cities. In the second - and third-tier cities, large profits can be made as long as economies of scale are established. This is an indisputable fact. Some even do the enterprise of chain supermarket in urban and rural fringe department, the basin that can earn likewise is full bowl full. Undoubtedly, this is a super blue ocean for POS machine manufacturers. With the improvement of people's living standard, the purchasing power of the residents in the second and third-tier cities increases, and the commercial network of the first-tier cities tends to be saturated, the relevant policies in China's current urbanization process are also in the competition pattern of a large retail enterprises, becoming more complex. As a result, customers are more uncertain about the purchase price and tend to prefer small and medium-sized cities and inland cities, which provides a good investment environment for retailers and brand owners. It is not surprising that major retailers and brand owners are flocking to the second - and third-tier cities.

After 30 years of reform and opening up, China's economy has developed rapidly. Its GDP has accounted for 6% of the global economy, 25% in the United States, 9% in Japan and 33% in the European Union. In 2009, the GDP of the United States, Japan, the European Union and other western countries is negative growth, and China will be eight to nine. Now China is not only the world's largest population, political power, economic has played a decisive role. In such a rapidly growing China, consumer spending plays a very important role, and in these consumer activities, POS consumption is an important way of capital flow.

At present, although domestic cash registers account for the majority of the domestic market, there is still a certain gap between the quality and grade of domestic products and foreign products, and the export quantity is still relatively small. Taiwanese products have occupied a place in the world market. Therefore, the direction and goal of China's cash register industry is to improve the quality and grade of products, upgrade and upgrade, stabilize the low-end market share, move into the high-end market, and increase the share of domestic cash registers in the high-end market. The second is to encourage more manufacturers to go out to explore the international market, improve the competitiveness and market share of domestic cash registers in the world market, and develop into the largest production base of cash registers in the world.

We should learn the experience that Chinese home appliance industry develops, 30 years ago Chinese home appliance product is negligible, today Chinese home appliance and world famous brand product are neck and neck. The fundamental reason is that China's home appliance industry introduced foreign advanced equipment and production technology, increase r & d innovation, team building investment, product upgrading, product quality improved, plus we have the advantage of low manufacturing costs, that is, cost-effective, there is market competitiveness.

China register industry colleagues, have their own sense of responsibility, dare to face their own shortage, our vendor in the power of innovation and investment, in the performance of production conditions, quality testing equipment, technology and enterprise management level gap compared with advanced foreign enterprises also is very big, we are going to study the experience of foreign counterparts, to introduce advanced talents, technology and equipment, to increase investment in r&d

innovation, plan to have long-term product upgrading, dare to go abroad, to develop the international market, after ten years, twenty years of efforts, China could become the world's cash registers cash registers industry's largest production base. Kawada has started in recent years, the first step towards the kbe in this aspect, kawada has designed new products, for five consecutive years won the German IF industrial design award, China register is a promising industry, we have the confidence to also have the responsibility, with the development of Chinese economy, to achieve the goal of the development of Chinese cash registers, to create beautiful prospects for China's cash register industry!

4. PRODUCT POSITIONING

The design of electronic equipment should not only reflect the sense of technology itself, but also make the user easy to use in the functional structure design. The above four design sketches are all vertical designs. Cuboid geometry and embedded touch screen play a certain role in protecting the screen and providing a psychological sense of security. According to the man-machine analysis, the exit design of the bill is eye-catching on the upper part of the display screen to remind customers to take out the bill. Double LCD display design, concave card area and swallow card area layout, looks simple and generous. Arc design is adopted, and voice prompt area is designed on both sides of the body.

5. DESIGN ANALYSIS AND SPECIFICATION

5.1 Detailed analysis

On the current market of existing barcode scanning, the most common is handheld and fixed two. Unlike cashiers, consumers will not repeatedly scan a variety of goods for a long time. They just need to scan and confirm the part of goods they bought. If the handheld scheme is adopted, the operation of consumers will become complicated. In terms of operation feedback, there will be an audio prompt when the goods are scanned for confirmation, and there will be a light flashing reminder in the scanning area. In the process of consumer settlement, there will be corresponding voice prompt for each step of operation. For consumers, shopping receipts are very important shopping vouchers. Some consumers will carefully check the price and quantity of commodities on the shopping bill when they settle their accounts at shopping. However, for most consumers, they are not in the habit of checking the shopping bill. They often discard the bill at will without checking, and hastily settle their accounts without checking the detailed information of shopping. Shopping should carefully observe the price tag and purchase quantity, to prevent the cashier in the entry of the number of goods due to careless errors. After the settlement should leave a small note, pay attention to the comparison of advertising and promotional prices, price label prices and settlement prices. For consumers of self-service settlement, the receipt is the only proof of consumption. Therefore, after the settlement of consumers, the printing of shopping receipt is an essential content. Therefore, in the design of the display interface, only after the consumers print the receipt can the settlement be confirmed. The printing exit of shopping bill is designed in the upper part of groove, such design can prevent consumer to forget to print bill, if consumer does not have catch bill, can fall in groove area place of brush card area.

At present, the magnetic stripe card is being transformed into IC card, during which both magnetic stripe card and IC card will exist at the same time. Therefore, two ways of swiping CARDS are adopted to coexist in the design. One is that the IC card carries out radio frequency identification at the touch screen in the groove, and the other is that the magnetic stripe card is inserted into the card slot for identification. USB is an abbreviation of English Universal Serial BUS, which means "Universal Serial BUS" in Chinese. It is an interface technology applied in the field of PC. USB USES a 4-pin plug as the standard plug, which can connect all the peripherals together in the form of a Daisy chain. It can connect up to 127 external devices without losing bandwidth. USB requires the support of host hardware, operating system and peripherals to work. At present, the main board generally adopts the control chipset that supports USB function. The main board is also equipped with a USB interface socket. In addition to the socket on the back board, the main board is also reserved with USB pins. And the USB interface can also achieve dual interconnection through the dedicated USB connection line, and can be extended through the Hub more interface.

In this POS card reader, a standard USB data interface is set up to connect the data in the POS machine with the switchboard controlling the POS machine. All of the POS consumption information will be sent via the USB interface to the operator, total opportunities for each POS data read, save the details of every transaction to each POS real-time monitoring, at the same time when the POS machine malfunction, control operator can have the USB interface transmission of abnormal data determine the failed machine, and stop the credit card transaction function of the machine, to prevent the interests of consumers damaged as a result of failure.

5.2 Color analysis

The color of electronic products has great influence on people's visual appreciation, psychology and physiology. Beautiful color makes product modelling more beautiful, give a person with comfortable, happy feeling, be helpful for improving the working quality of the person and working efficiency, also can enhance the competitive ability on product market. Electronic equipment box color selection is the main color selection. Different tonal meeting produces different psychology to feel. When choosing, should satisfy the functional requirement of electronic equipment above all, make tonal choose agree with the function, in order to benefit the effect bear that gives full play to equipment. Such as military electronic equipment mostly choose grass green color, in order to help the military needs; And a few home appliance allow to use more gorgeous or showily tonal (be like orange tone), in order to facilitate domestic display. Secondly, it is necessary to consider the requirements of man-machine relationship and achieve man-machine coordination, so as to improve the efficiency of electronic equipment and reduce errors and accidents, which is conducive to the physical and mental health of operators. For example, some electronic equipment adopt green tone and gray tone to reduce eye fatigue. The tonal also should consider the tonal photograph of machine room wall even sometimes harmonious with electronic equipment, if use the electronic equipment that cream color wall and green attune, or the electronic equipment that shallow brown yellow wall and blue attune wait. The Times feeling that still should consider colour finally, use popular color as far as possible namely, in order to satisfy people to beg "new" psychology.

Determine the color of self-service shopping card reader from its own characteristics and using environment. The three main colors are black, gray, white and white, giving people a bright, clean

and pure feeling, as shown in figure 5-6. Alone white is more drab can use with other color contrast, be like blue white, green white, black and white contrast. Black gives a person with have quiet, grave, easy, mysterious feeling. Gray is right to eye stimulation moderate, feel fatigue not easily, have quiet, serious feeling, make the person gets rest is shown in figure 5-6. Black gives priority to tone to reflect sedate with major figure 5-8. Blue gives a high, deep and cool feeling. The blue interface gives people the feeling of bath and technology. The font is white. Gold and silver can give a person with brilliant, precious, luxuriant, decorous feeling. Widely used in industrial electronic products for decoration and embellishment, but should not be used in large areas, generally used for the partition of the decorative strip.

5.3 Man-machine analysis

At present, most consumers in large and medium-sized supermarkets are women. According to the national standard of Chinese adult measurement data (GB/ t10000-1988), the average height of an adult woman (i.e. the 50 percentile of her height) is 1570mm. Consumer distance monitor between 400 mm to 300 mm, depending on the area of the best range of horizontal in about 20 °, plus see 5 ° on the center line to turn right or left in his head, it is concluded that consumers best visual field for 30 °, horizontal a few away from the midline or so every 15 °, as shown in figure 5-9. In this field of vision, the normal person can recognize the shape in this area for a short time.

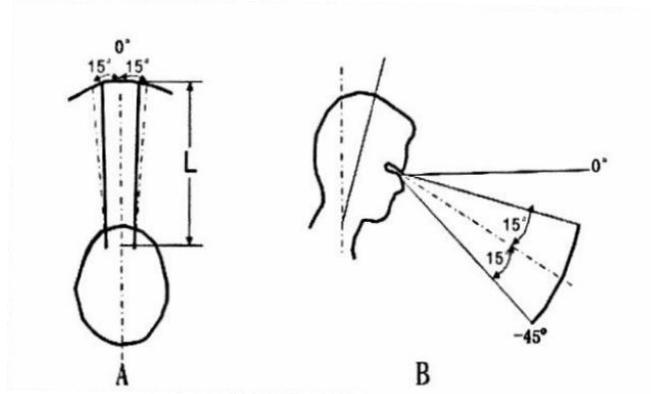


FIG. 5-9 optimal view diagram

Table 1 spatial scope and recognition effect of different visual areas

Depending on the area Center depending on the area	The scope of		To identify the effect
	The vertical direction	The horizontal direction	
The best visual areas	1.5 ° ~ 3 °	1.5 ° ~ 3 °	The best shape
Effective visual areas	Depending on the 15 ° below sea level	20 °	Can recognize clear body in a short time
The largest area	On 15 °, 30 °	30 °	It takes concentration to recognize the body
Depending on the area	The 60 °, 70 °	120 °	The form can be felt, but the outline is not clear

The self-service shopping card reader designed in this paper is a man-machine system using a single machine. The man-machine system and its working (running) state constituted by a single machine can be shown in figure 1.

This kind of process of man-machine system, as shown in figure 3 by 6 arrow circulation in: people (operators) controller (operator), operated by hands and machines according to the operation work instruction, at the same time, its running state displayed on the monitor, people receive information of sensory organs such as eyes, ears and passed to the brain, the brain through the analysis judgment, operated by hands again..... so, the working process of the formation of man-machine system.

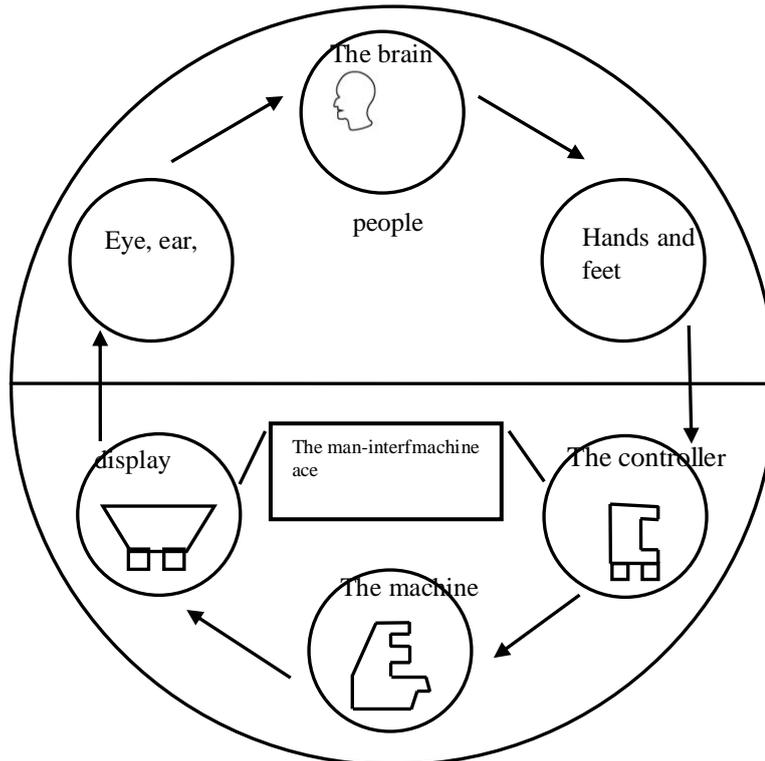


Fig.3 single man-machine system

5.4 Design description

Self-service shopping card reader is aimed at the characteristics of current consumption mode. Consumers' demand for commodities is increasingly diversified. In order to meet the needs of consumers, combined with the rapid development of intelligent technology, a card reader is designed. This card reader adopts the display design of double touch screen, compared with the traditional card reader, the touch screen card reader is convenient and fast, easy to operate, more convenient to use, concave stick card area and swallow card insert area layout, the appearance looks simple and generous, fashionable shape, compact structure and reasonable layout. The card reader on the password input area alone set up a touch screen, in order to sort the way of the number, so that the people behind the withdrawal can not be based on the traditional arrangement of the grid and write down the password of the card reader, the maximum guarantee in the process of card reader

information security. The self-service shopping card reader solves the customers' long waiting time in the checkout line. This shopping process is a completely independent shopping mode for customers.

6. SUMMARY

There is no end to technology and no end to innovation. We recall that the human form of measurement of undifferentiated labor underwent barter - precious metals - silver (paper) - bank CARDS - electronic wallets. This process is all related to the progress of technology and the renewal of ideas. We believe that in the future there will be more high-tech, new concept of payment methods, and applied to the supermarket POS system.

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