

The Taxi Meter with Voice Broadcast

Jiahui Hu^{1, a}, Yan Su¹ and Qun Ma²

¹North China Electric Power University, Baoding 071000, China;

²Hebei University, Baoding 071000, China.

^ahu111878@163.com

Abstract: With the development of the economy led to the development of human living standards, resulting in people for the service industry requirements are constantly improving. Now the taxi in our lives has been very common, and the taxi on the meter is also more intelligent and humane. The improvement of the taxi meter has also made a lot of help to our daily life. We use the microcontroller to complete the design of the system, but also further deepen the application of single-chip. According to the requirements of this project based on STC89C52 single-chip taxi meter, it has LCD1602 LCD screen, speakers, voice chip, clock chip, button batteries, microcontroller, memory chip, motor start chip, Hall detection circuit, Set the key circuit, a reset button circuit and power interface and other components. Distance measurement, the starting price, the price of the day and night, waiting for the charges can be set through the button, through the LCD screen display; voice chip and speakers will make the meter at the end of the pricing at the same time with the voice broadcast The total cost of this trip. And through these components to make the system through the button to simulate the taxi starting price, waiting for the cost of the total cost. The realization of this function makes the function of the taxi more perfect, in a great sense for our daily life to provide a convenient for the city's appearance added luster. At the same time we will continue to work for the future of the service industry to make greater contributions.

Keywords: LCD1602 liquid crystal, single chip microcomputer, Holzer sensor, voice broadcast.

1. INTRODUCTION

The taxi meter calculates the total cost by a function between the distance traveled and the price. (The waiting fee will be calculated by waiting time). The taxi meter calculates the actual number of travel routes based on the pulse signal provided by the gearbox. At present, the taxi meter on the market only shows the distance and the total cost, and the meter that can broadcast the total cost by voice is still relatively rare.

The taxi appeared to facilitate our travel. We also know that China has more than 1.3 billion people, and we are on the road to a well-off life. The poor still exist. In order to facilitate our better travel, we sometimes have It is really necessary to take a taxi to meet our needs, because there are many factors

that will affect our travel. For example, some things take time to solve. If walking will waste us a lot of time and it will reduce the efficiency of our work, then we will Need to take a taxi to reach the destination for efficient work; there is no bus at night, and we have to arrive at a certain location, this time also need a taxi to play its role to help us solve the problem. There are more and more people who need to take the bus, and the number of taxis will increase. It is obviously necessary to make a practical taxi meter.

The more the taxi meter function, the higher the cost, so some areas still use the meter that can only display the mileage and total cost, but it is not convenient for some people with weak vision. In order to cause unnecessary misunderstandings, we will provide an effective solution: an additional module for voice announcements will be placed inside the device, provided that the meter can perform some basic functions. This not only makes the function of the taxi meter more convenient for passengers, but also reduces the equipment cost of the taxi company, and also enhances the image of the city.

2. BASIC SITUATION OF THE DESIGN OF THE METER

2.1 Basic functions of taxi meter design

For everyone, the more the function of the meter is in line with the requirements of our daily travel, the better, in order to make it easy for everyone to apply, the functional requirements of our design are as follows:

Starting cost: Also known as the starting price, it is the cost of the taxi when the distance traveled does not exceed a fixed distance.

Driving mileage billing: The sensor and gearbox in the meter calculate the total distance traveled based on the pulse signal sent. Then calculate the total cost of the trip based on the mileage and the unit price corresponding to the time, and the fee will be displayed on the corresponding position on the display.

Waiting for billing: On the road, you will inevitably encounter a waiting traffic light, and when the speed of the car is lower than the set value, it will be detected by the sensor, waiting for the middle of the billing program to wait for the program to start.

Voice broadcast: At the end of the pricing, the meter will broadcast the total cost required by the speaker.

2.2 Parameter design of taxi meter

The billing standards are as follows:

When the car travels no more than 3 kilometers, the price is the starting price (the starting price is 6 yuan during the day and 7 yuan at night).

After driving for more than 3 kilometers during the day, it will be charged at 1 yuan per 1 kilometer, and at 2 yuan per kilometer at night.

Waiting fee: During the day when the driver master stops driving for more than 5 minutes, he charges 0.5 yuan per minute during the day and 1 yuan per minute at night.

Due to the different prices at night and during the day, we can also make manual settings. (Set 6:00~20:00 for daytime and 20:00~6:00 for evening time)

3. SYSTEM SOFTWARE PART TEST

3.1 Software development and functions

3.1.1 Introduction to the software development environment

The software system designed this time was programmed using Keil μ Vision4. Keil C51 is a kind of single-chip C language software development system developed by Keil Software Company of the United States. Compared with assembly language, C language is more convenient and practical to use.

3.1.2 Main function design

In general, it is necessary to initialize the LCD1602 liquid crystal display and initialize the timer, then read the data stored in the AT24C02, and the button is detected and processed to determine whether it is in the normal mode. If it is not the normal mode, it needs to continue to detect. Pre-processing, if it is in the normal mode, it is judged whether the pricing starts. If the pricing starts, it will enter the display pricing interface. If the pricing does not start, the total price of the driving will be displayed and the detection and processing will continue until the normal mode is detected. The specific flow chart is shown in Figure 1 below.

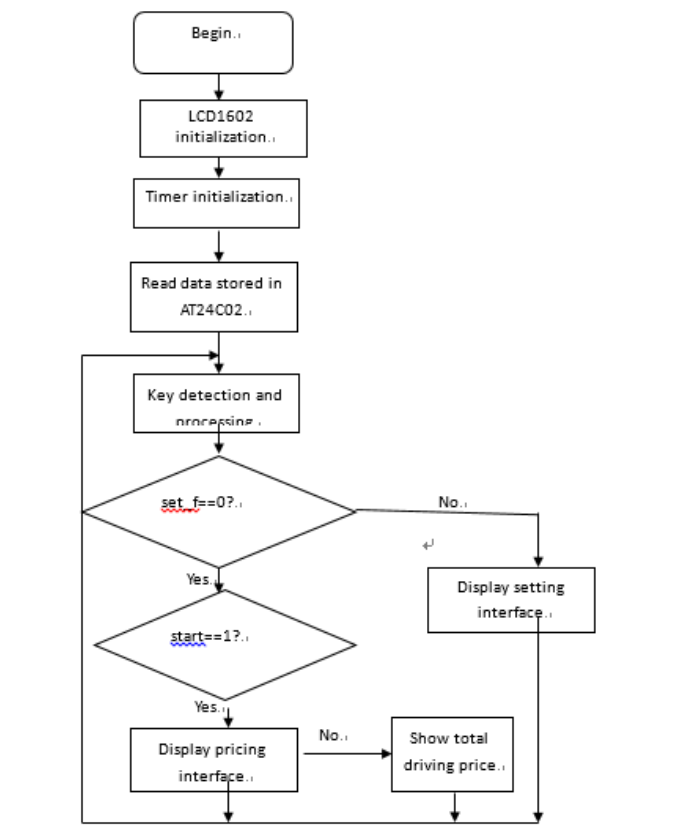


Fig.1 Main function flow chart

3.1.3 LCD1602 display function design

The display of the LCD 1602 requires software to control the display of the liquid crystal.

The specific process is as follows: first initialize the LCD, set the displayed coordinates, and then determine whether the LCD is busy. If the LCD is busy, continue to judge. If the LCD is not busy, start writing commands, continue to judge that the LCD is busy, and continue to judge if busy. Until

the LCD is not busy, if it is not busy, write the data, and then cycle the operation until the end of the display. Display function flow chart shown in 4.2

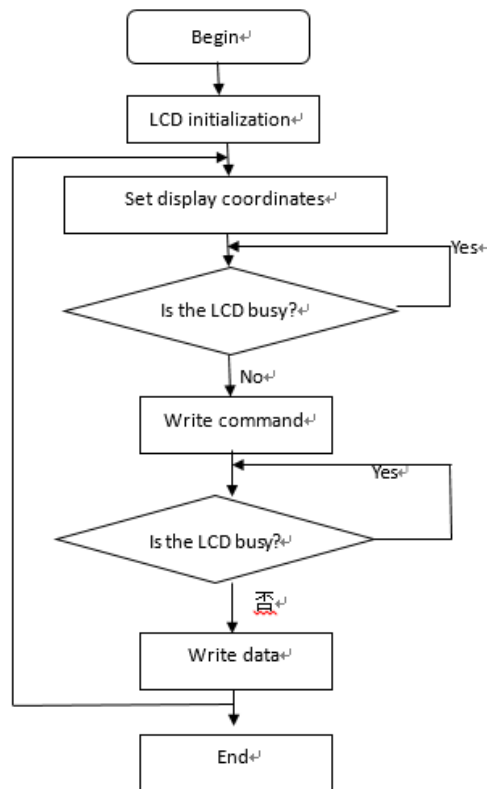


Fig.2 Display function flow chart

3.1.4 Design of DS1302 read time function

The DS1302 contains a total of 31 RAM registers. In this design, the year register, the month register, the day register, the time register, the minute register, the second register, and the day of the week register are mainly used. When a value is given to the DS1302's second register, the DS1302 can begin to accumulate seconds from this value and automatically carry it. To read data from the DS1302, you need to send the register address first, then read the low-order bit of the eight-bit data before the high-order bit, and when sending the data, the low-order bit is sent first. Among them, the falling edge is valid when writing data, and the rising edge is valid when reading data. The operation of the DS1302 clock chip can be performed according to the timing diagram and related command words provided in the data sheet. The specific DS1302 read time function flow chart is shown in 4.3.

3.2 Voice broadcast and software testing

3.2.1 Design of 1SC8065 voice broadcast

To control the SC8065 to play voice, you must first know the voice address you want to play. When playing, the MCU needs to first control the RESET pin to maintain a high level signal of 100us, and then wait for 100us and then send DATA to N 100us pulse signals. After sending the pulse signal and waiting for 200us, the SC8065 will automatically start playing the Nth address. Voice, BUSY pin output high level. At this time, the MCU should wait for the end of playback, and continuously detect whether the BUSY pin outputs a low level. If it is low, it means the end of playback. If you do not wait for the end of playback, it may cause the interval between two playbacks to be less than the time

for voice playback, and confusion may occur. The specific SC8065 voice broadcast flow chart is shown in Figure 4.4.

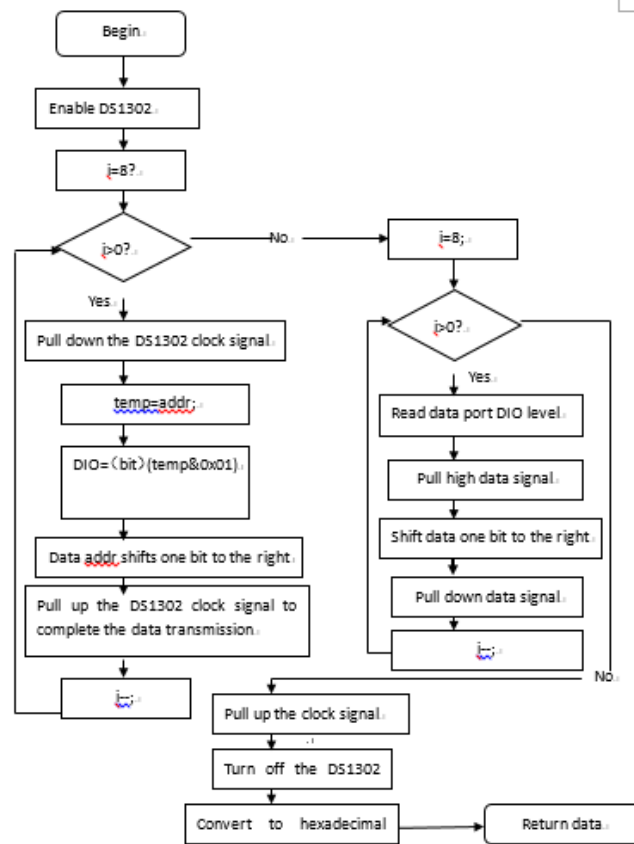


Fig.3 DS1302 read time function flow chart

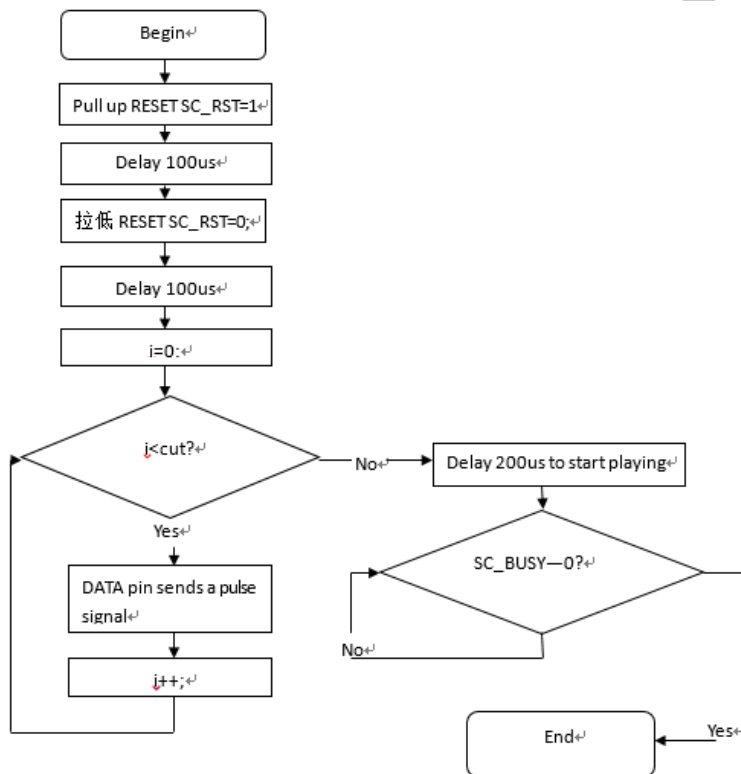


Fig.4 SC8065 voice broadcast flow chart

3.2.2 System software test

The control software of the system uses the KEIL programming software, and uses the C language as the computer language of this test. After the compiled program is successfully compiled, it is downloaded to the single-chip microcomputer through the PL2303 downloader for joint debugging. By observing the phenomenon of the physical object, it is judged whether the system can complete all the functions required by the design. If not fully implemented, analyze the source of the error according to the phenomenon, and then continue to debug after modification until all functions are implemented normally.

Problems encountered during system software debugging and how to deal with them:

(1) LCD1602 LCD After the clear screen command is issued, LCD1602 did not successfully clear the screen.

Solution: First of all, you need to find the correct clear screen command from the instruction manual of LCD1602, and then compare with the instructions on the program, and find that the command is the same, so there is no error in the command, but LCD1602 does not clear the screen, then we have to change The direction is to consider whether there is some other content after sending the clear screen command, but the processing speed of the LCD is not enough, so the clear screen command is not actually cleared. By adding a delay of 40ms, the program is re-downloaded, and then the clear screen command has been executed. After carefully reviewing the manual, it was found that the LCD1602 clear screen execution time required 1.64ms. The final program uses a 4ms delay.

(2) The AT24C02 data storage failed, and the data did not change after storage.

Solution: After adding a delay directly to the two storages, the data starts to be stored normally. It may be that after the first data is stored, the chip does not store the data and executes the next data.

4. PHYSICAL

4.1 Physical display and setting

Figure 5 is the physical map:

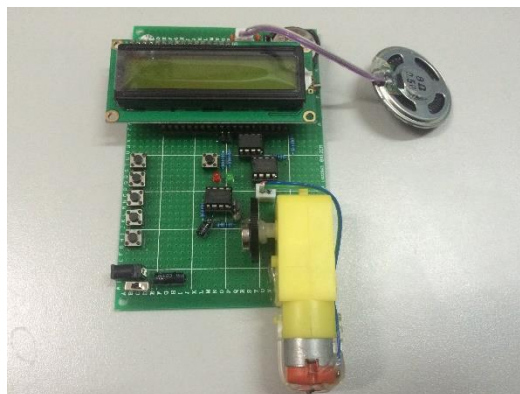


Fig.5 Physical map

From this object we can see LCD screen, speaker, voice chip, clock chip, button battery, single chip, memory chip, motor start chip, Hall detection circuit, 5 set button circuit, 1 reset button circuit and Power interface.

4.2 Default time display

The interface displayed when the hardware system is turned on is the default time display, as shown in Figure 6



Fig.6 Default time display

4.3 Start price setting

Pressing the third button is to set the charging standard. The first is to set the starting price, the fourth button is to add one, and the fifth button is to reduce one. The starting price setting interface is shown in Figure 7



Fig.7 Starting price



Fig.8 Day price

4.4 Unit price setting

Then press the third button to set the price per kilometer during the day, as shown in Figure 8.

Continue to press the third button to switch to the setting for the night price, as shown in Figure 9.



Fig.9 night price

4.5 Waiting time setting

Press the third button again to set the daytime waiting time as shown in Figure 10.



Fig.10 Daytime waiting time

Then press the third button to indicate the setting of the waiting time at night, as shown in Figure 11.



Fig.11 Night waiting time

4.6 Time setting

Press again to set the time. The setting interface is shown in Figure 12.



Fig.12 Time

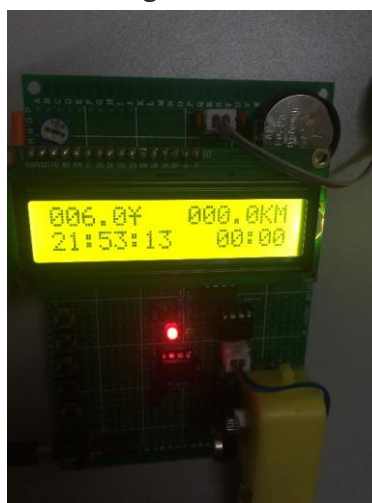


Fig.13 Pricing begins

4.7 Pricing start setting

Press the first button when you need to price, the interface is as shown in Figure 13.

4.8 Waiting time setting

The second button turns on and waits, then press to end waiting. As shown in Figure 14, waiting time

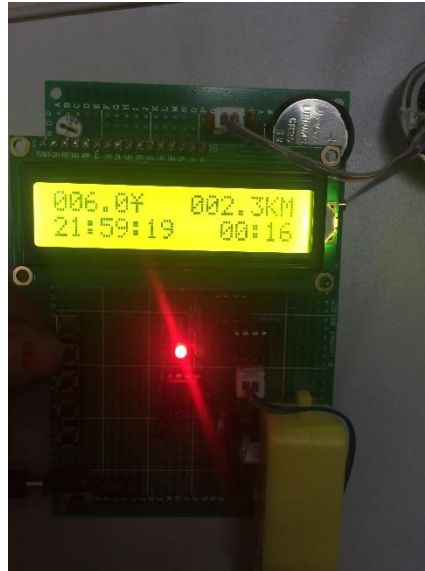


Fig.14 Waiting time

4.9 End of valuation

Pressing the first button will display the total cost and voice announcement as shown in Figure 5.11.

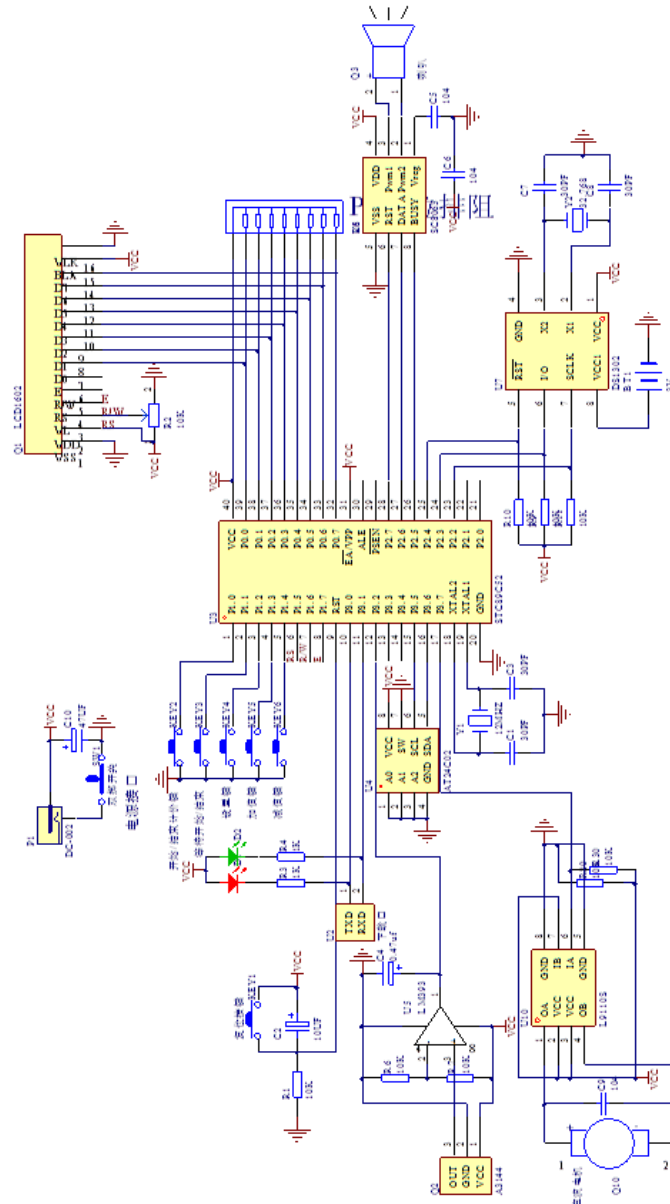


Fig.15 End of valuation

5. SUMMARY

After this period of effort, the design plan will basically be implemented. After continuous learning, exploration and practice in the early stage, and then feasibility analysis, completed a series of practical operations such as the design of the circuit schematic, the welding of the board, the programming and debugging of the program, and learned a lot of professional knowledge in the production process. I

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This design enabled me to apply the knowledge of professional courses I have learned in my four years to practice. I also realized the difference between theoretical knowledge and practical operation. Only by working hard to learn the theoretical knowledge of books can I use it better and more accurately. In practice, only constant hands-on practice can better consolidate theoretical knowledge. Through this practice, I also learned how to better query the information, which website to look for information, and I also learned a lot of extracurricular knowledge during the data review, which improved my knowledge and benefited me a lot. This harvest has given me a lot of valuable experience and lessons in both life and learning. I also have better analytical and problem-solving skills when I encounter difficulties in learning.

Due to time and energy, I still have a lot of unsatisfactory treatments for this design. I believe that after this period of hard work, I will continue to work hard to learn this knowledge, analyze problems and solve problems in my spare time. I am trying to achieve similar work in my later life or work. I can successfully complete it with a more peaceful attitude.

APPENDIX

Schematic:

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