Design and Simulation of Automatic Locking Cabinet Based On MCU

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Abstract. The main controller used in the locker system of this paper is MCS-51MCU, which has the function of simultaneously managing and controlling the access of multiple lockers, which is simple and convenient. When the visitor needs to save the package, he needs to press "save" or "storage" to protect the box. This is the door that will pop open for the tourists to save the package, but be sure to close the door. After completing the above operations, the locker will automatically generate a set of eight random passwords, which visitors need to remember and use until they are picked up. The packet retrieval operation is very simple. Just the password that the above remembers will be entered by the visitor. Enter the random password on the keyboard. At this time, the system will recognize the password you pressed and compare the passwords. After the comparison is completed, open the password. The locker is for the tourists to get back the parcel. The automatic locker not only has the utility of facilitating tourists, but also brings benefits to the enterprise.

1. Introduction
With the advancement of the times, people are traveling, playing, and paying more attention to light clothing when shopping. [1-3] At this time, the items carried by the tourists will become cumbersome, and a good automatic locker system will give visitors a different experience. The old artificial deposits were not only time-consuming and labor-intensive, but also the safety was not guaranteed, so the automatic lockers came into being. We can see them in some large public places such as supermarkets. For this reason, it is very meaningful to study automatic lockers.

2. System expansion
From the introduction of the 8031, we know that it has a strong extension function, [4-6] so when using the 8031 chips to encounter features that it does not have, we will use its powerful extension function. As far as I know, there are two functions that need to be expanded, such as I/O extension.
3. Design of the display system
The LED display will appear in my paper, so it is more convenient for us to understand the working status of the automatic locker, so that we can make changes, and the automatic locker system is more perfect.

We have selected LED digital displays from commonly used displays such as large-screen displays, recording instruments, and LED displays. LED has the following characteristics: obvious display, low price, many acquisition channels, simple structure and small finished product.

Figure 2 shows the hardware structure of the LED digital tube. We can clearly see that the LED digital tube is composed of diodes. Different things are emitted by the things that are used to make them. We can also see that the LED digital tube used in this design is composed of 7-segment digital tubes, and the 7-segment digital tube is also the most widely used.

4. Design of the Keyboard system
The keyboard is a combination of numerous buttons that the operator can use to intervene in the system. The matrix keyboard is part of the keyboard.

The matrix keyboard automatically recognizes the pressed key and sends the corresponding information to the CPU. The matrix keyboard has many advantages, such as cheap and convenient, etc. I think this kind of keyboard will be used in my automatic locker design. Figure 3 is the matrix keyboard interface.
Figure 3. Matrix keyboard interface

In this design, I chose a 4*4 matrix keyboard. There are 0 to 9 number keys and '=' function keys, as shown in Figure 4.

Figure 4. Schematic diagram of the keyboard

5. Design of the system software

As shown in Figure 5, first, when the automatic storage cabinet is connected to the power supply, after starting, the 8031 MCU starts to power up, and then the initialization process is performed, in which not only the initial external interrupt but also the initialization of the counter/timer, etc. Many system initial parameters were also designed at this time. If we initially regard the status of the automatic storage cabinet as initial, then press the save button, the system will automatically scan the status of the storage package, and an empty storage cabinet number appears on the LED digital tube, and a random number will appear. The password and the corresponding storage cabinet will also open. When you take the package, just enter the password you got through the keyboard.
6. Simulation of the system

a). In this locker system, I will use Proteus simulation to write the written program into the MCU and then simulate it through the software. We can use LED lights to see if there are items to access, and if there is light, there will be, otherwise it will not. Because of the limited conditions, I have a password display instead of a barcode to simulate.
b). Press the save button, the corresponding diode will light up, and the system will generate a random password in the LED light, which can be used when you need to take the package.

Figure 7. Random password

Figure 8. Corresponding diode bright

c). Press the pick-up button, enter the password, the password is correct, and the corresponding light is off.

Figure 9. Close the hardware diagram corresponding to the cabinet door

7. Conclusion
Automatic lockers, because they are operated electronically, many people call them electronic lockers, which is a major breakthrough in the field of human hosting in the new era. In this paper, the automatic locker cabinet is designed, which is researched from several aspects such as system
expansion, display system design, keyboard system design, system software design and system simulation. Finally, a qualified automatic locker is designed to achieve the expected goal.

References

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