Design of electronic lock based on single-chip microcomputer

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Abstract. Starting from the point of view of simple and practical, using STC89C52 and low power CMOS type E² PROM AT24C02 as main control chip and the data memory unit, combined with external matrix keyboard input,1602 LCD, alarm, unlock and other circuit modules to make electronic code lock is introduced in this paper. It can achieve the following functions: unlock when enter the correct password; alarm when enter the wrong password; code can be changed according to users' needs. The design method of code lock is reasonable, simple, safe and practical, with low cost, high flexibility, confidentiality and other advantages, which has a very good promotional value.

1.   Introduction

In today's society, anti-theft security has become a social issue. Since ancient times, lock has been an important theft-proof tool. However, most people in China are still using traditional mechanical lock now, although the probability of unlocking a counterfeit mechanical lock with foreign keys is extremely high at present. This paper starts from economical and practical angle, by adopting SCM as the main control chip, combined with peripheral circuit to compose electronic code control system. The password of combination lock has 6 digits, each with the value range of 1 to 6, set and changed by users themselves. And each password button is set with warning alarm and light. To open the lock, correct password should be input in the keyboard offered, during which prompt will occur when there is an input error. In order to improve safety, after the password is entered incorrectly for three times, it will give an alarm for ten minutes, during which period the entry of password is invalid, to prevent from malicious trial and error. Only when the six digs are input correctly, can the lock be opened (Zheng 2015). There is standby battery in the lock, only when the interior is power-on reset, can the password be set or changed. It is not allowable to modify or set the password with keys outside the door to ensure great security and elasticity.
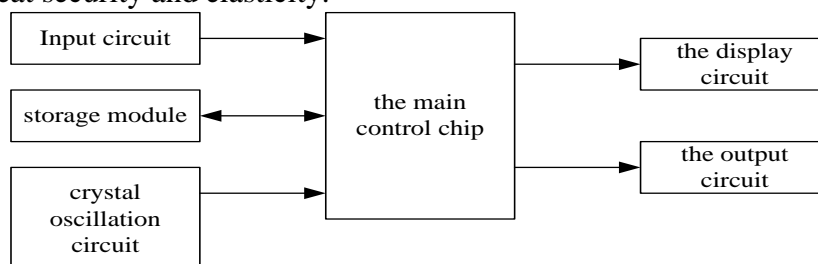

Fig. 1 block diagram of the entire design of the system

2.   Circuit Design

This design uses single chip STC89C52 as the main control chip, combined with peripheral circuit matrix keyboard, LCD LCD1602 and password store AT24C02 and other parts. (ZHENG Shi-yong 2015). Wherein the matrix keyboard is used for entering numerical passwords and realize various

functions (Zheng 2015). Enter the password with matrix keyboard connected to SCM, and then compare the input password and saved password to determine whether the password is correct, and then control the high and low level of pin to transit it to the unlocking circuit or alarm circuit for unlocking or giving an alarm. The overall system design block diagram is shown in Figure 1:
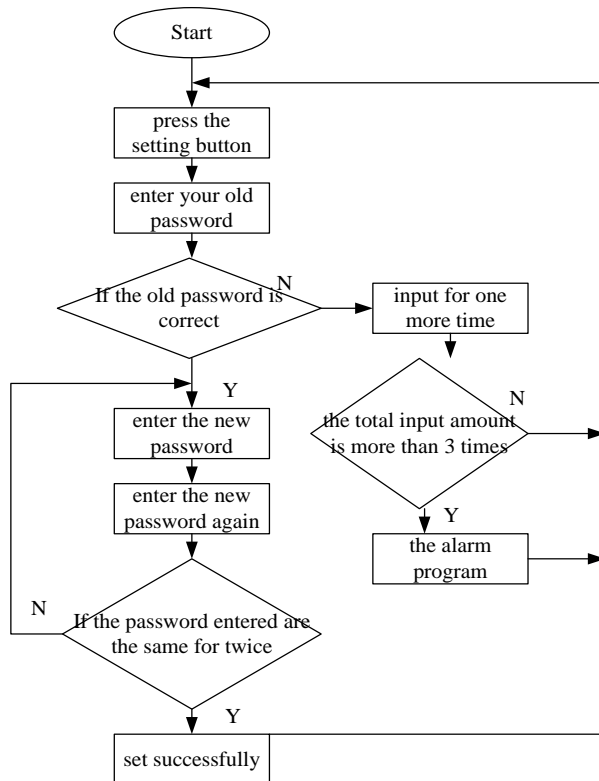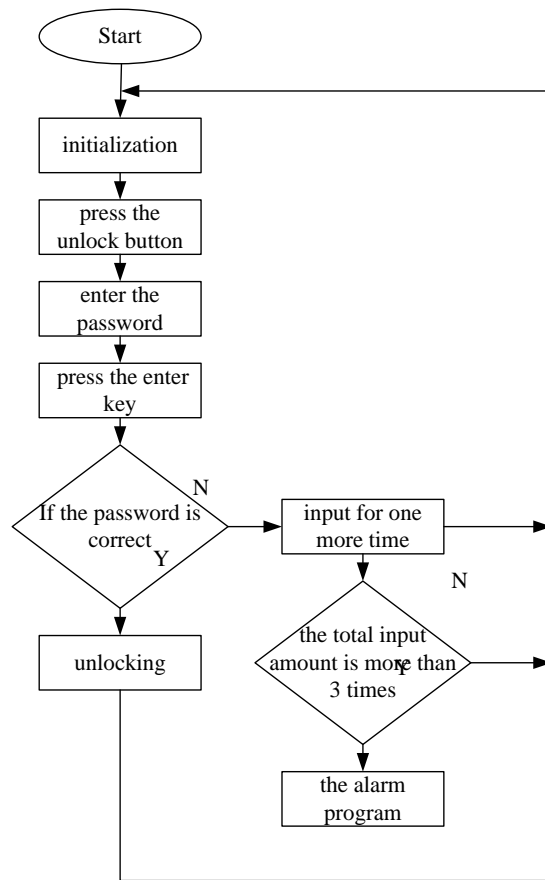
Fig. 2 the flow chart of password setting   Fig. 3 unlocking flow chart

In system operation, initialize the program settings, and then enter the password on the keyboard, and then the system scans the keyboard. If the password is correct, it will be unlocked successfully, if it is input wrong for three times, there will be an alarm. (Zheng 2016).

Figure 2 is a flow chart of password settings. Press the set key, enter the old password. If it is entered wrong for totally three times, it enters into the alarm program (Zheng 2015). Figure 3 is a flow chart of unlocking. Press the unlock button, enter the password, if it is entered correctly, it will be unlocked successfully. If it is entered wrong for totally three times, it will perform the alarm program.

3. Conclusion

The electronic combination lock is designed to be input password on the keyboard manually. With an increasingly better high-tech today, the remote control becomes increasingly more important. In the future, the electronic combination lock will possess password key input remote interaction technology assisted by infrared technology or radio technology, which is able to realize password input by long-distance control. The traditional mode of entering password with keys may be abandoned, while voice control with the use of sensor technology, or face recognition technology, or fingerprint input method will be used, to make it more convenient to unlock the door.

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