Design and application of mobile phone anti loss based on electronic information

Jiachun Luo¹, Ming Yuan², Shen Chen³, Sun Yong⁴, Tianyu Chen⁵

¹School of Physics and Optoelectronic Engineering, Xidian University, Xi'an, Shaanxi, 710127, China
²Zhengzhou Institute of Aeronautical Industry Management, School of Civil and Architectural Engineering, Zhengzhou, Henan, 450046, China
³Business School, Chen Shen University of New South Wales, NSW 2052
⁴Institutes of Science and Development, Chinese Academy of Sciences, Beijing, 100190, China
⁵College of Environment Science and Engineer, Suzhou University of Science and Technology, Suzhou, Jiangsu, 215011, China

Abstract. With the continuous development of science and technology, artificial intelligence technology has gained a good opportunity. It has brought many conveniences to human production and life, and solved many problems that could not be solved before. How to apply electronic information technology has become the focus of attention. It can quickly solve different difficult problems in each link, improve work efficiency and design accuracy. And in the design process to improve and improve the actual design requirements at the same time to ensure the quality level. This paper designs a mobile phone anti loss device, which is mainly composed of STC89C52 minimum single chip system, Bluetooth module, power supply and anti-loss device. The anti-loss system of mobile phone needs a smart phone supporting Bluetooth to connect with the Bluetooth main board. The data between the single chip computer and Bluetooth is transmitted to the anti-loss device of mobile phone through the serial port. When the Bluetooth of the mobile phone is successfully connected to the Bluetooth main board, the anti-loss device shows that it is connected. When the distance between the mobile phone and the Bluetooth main board exceeds the safe distance, disconnect the connection and alarm the mobile phone and the Bluetooth main board at the same time.

1. Research background and significance

1.1. Background

With the continuous progress of the society, science and technology are constantly developing. People spend almost two-thirds of their day outdoors and on the road. People on the road have become bow headed people, mobile phones occupy people's sight and life [1]. With the mobile phone becoming more and more intelligent, people are more and more inseparable from the mobile phone. Because it records a lot of important things, so mobile phones are more and more important to people. No matter going out
to play or going to work, almost everyone will hold a mobile phone. With such a fast pace of life, forgetting and stealing will greatly increase the possibility of cell phone loss.

However, the loss of mobile phones not only causes economic losses, but also important things recorded in mobile phones. No matter what job or occupation, it will be a disaster. Bluetooth anti-loss device, a device to determine whether the goods are safe according to the connection distance [2]. Anti-loss device can not only be applied to mobile phones, computers, cars, wallets, and even children. When the Bluetooth equipped mobile phone or other devices supporting Bluetooth are far away from the Bluetooth main board or beyond the coverage of the Bluetooth signal, the Bluetooth main board will make a sound, the indicator light will flash, and the mobile phone will also make a sound, so that people can pay attention to their property safety. The designed Bluetooth anti-loss device can not only remind people when valuables are lost, but also be widely used in other fields. Due to its advantages of high security, practicality and convenience, the loss preventer will have a better development in the future.

1.2. Significance
In order to prevent the loss of mobile phones to people, the anti-loss device is particularly important. Anti-loss device can not only be applied to mobile phones, computers, cars, wallets, and even children. When the mobile phone is lost or not within a safe distance, the anti-loss device will give an audible alarm to remind people of their property safety. Due to its advantages of high security, practicality and convenience, the loss preventer will have a better development in the future.

2. Design requirements for mobile phone loss prevention based on electronic information
The main part of Bluetooth loss preventer is Bluetooth [3]. Bluetooth technology and SCM are used to work together to realize the function of loss prevention. STC89C52 is selected as the control system in this design, which is connected with the serial port of Bluetooth chip through the serial port. Make a specific Bluetooth anti loss app, through which you can manually or automatically set whether to alarm. In the anti-loss device app of mobile phone, search the Bluetooth name of the Bluetooth main board, connect with the Bluetooth of mobile phone, after the pairing is successful, if the mobile phone is inadvertently lost, the Bluetooth main board will give an alarm, and the mobile phone will also give an alarm automatically for easy retrieval. If the phone is stolen, you can use the Bluetooth motherboard to start the automatic alarm function to remind the phone to be stolen. Alarm is to use buzzer and LED light to realize sound and light alarm at the same time.

3. The design of mobile phone anti loss hardware based on electronic information
3.1. Overall structure
The anti-loss system of mobile phone is mainly composed of Bluetooth module and STC89C52 MCU minimum control system. Turn on the Bluetooth switch and anti-loss device app of a Bluetooth enabled smart phone, find the Bluetooth name of the Bluetooth motherboard in the app, make Bluetooth pair with the phone, and facilitate data transmission. When the mobile phone is paired with the Bluetooth motherboard, the MCU sends the control signal to the Bluetooth motherboard through the serial port, and the Bluetooth motherboard transmits the signal to the mobile phone through the wireless data transmission. If the mobile phone does not receive the information successfully, and the distance between the mobile phone and the Bluetooth motherboard exceeds the set safe distance, the mobile phone will start to alarm, at the same time, the Bluetooth motherboard will also start to sound and light alarm, and the Bluetooth indicator will flash. When the mobile phone receives the information, the pairing of the mobile phone and the Bluetooth main board is successful. The indicator light of the Bluetooth main board is always on, and no sound will be generated. The working principle is as follows:

3.2. Single chip module
STC89C52 minimum system is the most important part to control the mobile phone against losing. It is a kind of eight bit micro controller with low energy consumption and high working efficiency.
Compared with other MCU of C51 series, there is an EEPROM space in it, which can download the effective program into MCU and run faster. STC89C52 chip has a timing function, the program memory is larger than C51, and the running speed is faster. Its bit operation instruction is very strong in erasable read-only memory. STC89C52 SCM has a watchdog timer, which can help SCM reset when the program fails, so that the program can run normally. STC89C52 20 pin GND and 40 pin VCC, two pin joint control power circuit. Generally controlled by a power supply of about 5V.

![Circuit diagram of the minimum system of single chip microcomputer](image)

**Figure 1.** Circuit diagram of the minimum system of single chip microcomputer

### 3.3. Bluetooth module

Spp-c Bluetooth chip is used as the received control signal in the anti-loss system of mobile phone. When the Bluetooth connection between the Bluetooth motherboard and the mobile phone is successful, the LED indicator light is always on. If the Bluetooth connection between the Bluetooth motherboard and the mobile phone fails or is not within the safe distance, the indicator light flashes and the buzzer starts to alarm. The TXD pin and RXD pin time serial port of spp-c Bluetooth chip are directly connected with the P3.0 pin and P3.1 pin of STC89C52 single chip microcomputer. Bluetooth module also uses serial port communication, and the same as single-chip microcomputer, can be directly connected.

The Bluetooth motherboard needs to be connected with the mobile phone, and the mobile phone needs to have an app connected with Bluetooth. The design of Bluetooth anti-loss device app requires the number of bytes that can be received without blocking, and the connection with Bluetooth device can be successful. By checking whether the pairing is successful, the signed number and the unsigned number will be received from the connected device. If the number of bytes is less than 0, the read operation will be performed before receiving. Multibytes and text are then sent to the connected device.
3.4. **Alarm module**

The alarm module of this design includes two parts, one is the sound and light alarm of Bluetooth main board, the other is the alarm of mobile phone. When the connection between the mobile phone and the Bluetooth main board is successful, neither the mobile phone nor the Bluetooth main board will give an alarm; when the connection between the mobile phone and the Bluetooth main board fails, that is, when the distance between the two exceeds the connection range of the Bluetooth signal, the Bluetooth main board starts to give an alarm sound and the indicator light starts to flash, and the mobile phone also gives an audible alarm to remind people of the loss of the mobile phone.

Passive buzzer is used. The buzzer is mainly realized by turning the high and low level of I / O port. Because the trigger of the buzzer needs a large current, but the output current of the I / O port of the single chip microcomputer is small, which cannot meet the requirements of directly controlling the buzzer to make sound. At this time, an external device is needed to increase the output current of the I / O port. Therefore, a triode is connected to P1.0 port of STC89C52 to act as an amplifier, and then a buzzer is connected. The function of triode is to amplify the output current and enhance the driving ability. The I / O port of STC89C52 microprocessor can control whether the buzzer sounds through the level reversal, that is, a square wave signal. The sound pattern of the buzzer can be changed by controlling the time and frequency of the square wave signal. If the output is low, the voltage of collector C is greater than the voltage of emitter e, no current passes through, the connection fails, the triode is not connected, the buzzer will not give an audible alarm, and the LED will not be on all the time, flashing. On the contrary, when the normal output is high, the voltage of collector C is less than that of emitter e, the connection is successful, the triode is on, the collector current passes through the buzzer, the buzzer starts to sound, and the LED is always on.

3.5. **Power module**

The anti-loss system of mobile phone needs a stable power supply to provide power voltage, which can be powered by USB interface or 1.5V dry battery. The second power supply mode needs to use three dry cells to form a 4.5V power supply voltage to provide a stable working voltage, and it is convenient for battery replacement, without power failure.

When selecting power supply, priority should be given to the power supply that can be controlled by switch, which can protect the circuit from damage.

4. **Design of mobile phone anti loss software based on electronic information**

After the mobile phone anti-loss system is connected to a stable power supply, the single chip microcomputer automatically resets and runs. Install the anti-loss device app on the mobile phone that can support Bluetooth and GPS positioning system to prevent the mobile phone from losing alarm. After the power is turned on, the MCU is initialized, the serial port is initialized, and the data is sent to the Bluetooth motherboard through the serial port. After the mobile phone receives the data, it indicates that the connection is successful, and the LED indicator light is on for a long time. If the mobile phone does not receive the data sent from the serial port, it means that the connection is not successful. The mobile phone and the Bluetooth motherboard module give an alarm at the same time to remind people of the loss of the mobile phone.

Spp-c Bluetooth module is mainly used in the design of mobile phone anti-loss system to receive signals. Spp-c Bluetooth module is simple, convenient, small and economical. SCM and Bluetooth serial port connection, the two can transfer data between each other. When the SCM serial port communicates with spp-c Bluetooth, the Bluetooth signal is generated. Turn on the Bluetooth and anti-loss device of the mobile phone, and connect the generated Bluetooth signal to pair with it. When the pairing between the two is successful, the indicator light of the Bluetooth module is always on. When the connection between the two fails, the indicator light flashes and gives an audible alarm.
5. Conclusion

This design is mainly a single-chip microcomputer as the main component of the mobile phone anti loss system, using the combination of software and hardware, to achieve different functional requirements. The Bluetooth signal of the mobile phone and the Bluetooth main board is matched, and the single chip computer transmits the data with the spp-c chip through the serial port. When the connection distance between the mobile phone and the anti-loss device is too far, that is, when it exceeds the safety range of the connection, the mobile phone will give an audible alarm, and the anti-loss Bluetooth motherboard will also give an audible and visual alarm, the buzzer will give a sound, and the LED indicator will flash. When the mobile phone is in the safe range, the indicator light of the Bluetooth motherboard is on all the time, as shown in the figure below.

![Figure 2. Mobile phone anti-loss system](image)

It can be used not only in mobile phones, but also in other important items, such as computers, wallets, children, etc. Within a certain safety range, the anti-loss device will not alarm. If the item is not within the safe range, the anti-loss device will give an alarm. Bluetooth anti-loss device has a very good prospect in life, so I choose to study mobile phone anti-loss system. Mobile phone anti-loss system is not only safe and convenient, but also economical. Mobile phone anti-loss device is mainly composed of mobile phone and Bluetooth motherboard. The anti-loss device app installed in the mobile phone is connected with the Bluetooth main board through the Bluetooth signal. After the pairing is successful, if the distance between the mobile phone and the Bluetooth main board exceeds the safe distance covered by the Bluetooth signal, the mobile phone and the Bluetooth main board will send an alarm sound to indicate the connection failure.
References

[1] Sun Hui. Design of mobile phone anti loss system [J]. Technology and market, 2016, 23 (07): 81 – 82.

[2] Cheng Jinjun, Zhang Xiaojuan. Design of Bluetooth mobile phone anti loss alarm [J]. Shanxi electronic technology, 2020 (01): 3 - 4 + 41

[3] Peng Jinghua. Design of an intelligent anti loss voice weapon based on Bluetooth [J]. Journal of Mianyang Normal University. 2019 (02).