Research and Development of Smart Home Security System Based on Wechat Control

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Abstract. With the improvement of living standards, people's requirements for safety and comfort gradually improve, which requires us to constantly improve home security. With the rapid development of the Internet of things (hereinafter referred to as IOT), we have set up a smart home security system (hereinafter referred to as SHSS), which can be controlled by wechat. Through the IOT technology, the SHSS can contact various subsystems according to the needs of users, including lighting control, security protection, fire prevention and anti-theft, which will bring more humanized operation experience. Through wireless communication technology, we can monitor all kinds of indoor environment in real time, which will prevent illegal intrusion and other behaviors. At the same time, with the popularity of Android, IOS and other mobile platforms, SHSS has been developed into a variety of applications, such as wechat, which can realize remote control of indoor devices. Firstly, this paper analyzes the overall architecture and control module of SHSS. Then, this paper analyzes various subsystems, which can complete the system development in more detail.

Keywords: Wechat Control, Smart Home Security System, Development

1. Introduction

The 21st century is an era of rapid development of science and technology, which also continuously improves people's living standards, including safety, comfort and convenience [1]. Through smart home, we can build a comfortable and harmonious living environment. However, multiple products often do not use the same information transmission protocol, which will cause users to control different intelligent security products across platforms [2]. Therefore, the effect of user experience has declined sharply, which requires us to improve the information interconnection between products. Through ZigBee network, we can quickly achieve the functions of collecting, detecting data, transmitting and processing information, detecting and controlling environment, which will be better for service design.
[3-6]. By optimizing the service process, we can improve the ability to prevent and deal with crisis, which will provide a pleasant system experience [7].

2. Architecture of SHSS

2.1. Overall design of SHSS

SHSS includes anti-theft alarm, fire alarm, gas leakage alarm, emergency help and other subsystems. The function of SHSS is mainly divided into two key parts. First, real-time monitoring. With the help of cameras and other sensor equipment, we can monitor the real-time state of the environment, which can judge all kinds of situations. Second, call the police immediately [8]. With the help of Internet or 4G module, we can send out alerts, which can allow users to process quickly. Through the demand analysis, the SHSS includes the following key functional modules, as shown in Figure 1.

![Figure 1. System function structure diagram.](image1)

2.2. Equipment control module

Device control module is the most important functional part of smart home system. Under this module, wechat can connect to the whole smart home system through VPN remote access or WiFi network. At the same time, through ZigBee's 2.4G wireless network, the control center can communicate with ZigBee nodes, which can connect all terminal node devices to ZigBee pins [9]. The network composition diagram of equipment control network module is shown in Figure 2.

![Figure 2. Equipment control network.](image2)

3. Development principle of SHSS

3.1. Anti theft intelligent system
The anti-theft intelligent system mainly detects the radiation signal of human body, which can use pyroelectric infrared sensor. The sensor signal will not change greatly, so special signal processor should be selected to process the collected signal [10]. For example, through BISS0001 digital analog hybrid ASIC, we can achieve a variety of functions, such as voltage comparator, state controller, delay time timer and so on. We can form passive infrared switch circuit by using digital analog hybrid integrated circuit and pyroelectric infrared sensor. Therefore, integrated circuits can work in two different ways. Through SW1, you can choose the working mode freely. When the switch is connected with port 1, the selected working mode is repeatable triggering. When the switch is connected with 2 ports, the selected working mode is non repetitive triggering. The passive infrared switch circuit is shown in Figure 3.

![Passive infrared switch circuit](image)

**Figure 3.** Passive infrared switch circuit.

### 3.2. Gas leakage detection and alarm circuit

The main function of family safety intelligent system is to inform the user in time if there is an accident at home. The intelligent gas leakage detector can effectively collect the combustible gas concentration in the air, which can automatically drive the gas manipulator to cut off the gas source in case of gas leakage. At the same time, the intelligent system can link the exhaust fan or open the window for ventilation. For example, smoke detector realizes fire prevention by monitoring the concentration of smoke. Wireless ZigBee water leakage detector can detect whether there is water leakage in the home. Wireless ZigBee weather sensor can detect whether it is windy or rainy. Wireless ZigBee gas leakage detector can always detect combustible gas in the home, if there is leakage, close the gas valve, and alarm at the same time. Combustible gas alarm is a detector that responds to the concentration of single or multiple combustible gases. If there is gas in the air or the gas concentration reaches a certain value, the resistance value between A and B points decreases rapidly, the current flowing through RP increases, and the potential at B point increases, which can charge the capacitor C2. Therefore, the U850 is on, which can make the driver chip sound alarm [11]. The alarm circuit of gas leakage detection is shown in Figure 4.
3.3. Fire smoke alarm circuit

Smoke detector realizes fire prevention by monitoring the concentration of smoke. The fire smoke alarm circuit has double alarm devices. When the smoke or combustible gas reaches the predetermined alarm concentration, the 109 resistance of the gas sensor will be reduced to make VD3 trigger on, and the buzzer will sound the alarm. In addition, in the early stage of fire, due to the abnormal rise of ambient temperature, the thermal sensor will act and drive the buzzer to alarm. The fire smoke alarm circuit is shown in Figure 5.

3.4. Photoelectric smoke sensor

In the photoelectric smoke sensor, we generally choose the infrared light-emitting tube with high power and obvious light-emitting as the light-emitting device. At the same time, we can choose semiconductor silicon phototube as the light receiving device. With the increase of smoke concentration, the resistance of light receiving devices will decrease, which can choose the photoelectric combination kit of SHSS as the receiver and detector. As shown in Figure 2-7, the circuit principle of photoelectric smoke sensor is as follows. 555 circuit will generate pulse waveform, which can be controlled and adjusted to meet different drive output. On the other hand, 555 circuit can effectively reduce energy consumption. After the circuit is connected, the output signal of 555 circuit can be amplified after 8050. After the infrared emitter gets the voltage signal, we can transmit it to the triode to change the current. After the appropriate voltage signal, the current of the transmitting stage will be directly converted into a voltage signal. By

Figure 4. Gas leakage detection alarm circuit.

Figure 5. Fire smoke alarm circuit.
adjusting the resistance, we can transmit these voltage signals to CC2430. The principle of photoelectric smoke detection circuit is shown in Figure 6.

4. Conclusion

We must pay attention to the development of SHSS based on IOT, which can real-time monitor and control system software development. Through the home environment perception module, we can integrate into the SHSS, which can be more convenient for community security and community management. Through the IOT technology, we can achieve a variety of intelligent functions, such as automatic positioning, automatic alarm, automatic data collection, transmission, etc., which can provide accurate information for home safety. Through the SHSS, we can provide users with safe and satisfactory home experience.

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