

"Three Preventions" System Design Based On Single-Chip Microcomputer (SCM) Control

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Abstract. With the rapid development of social economy, Science and technology level are increasingly improving, especially accelerated pace of life, People demand for fireproof, anti-theft and anti-gas equipment is greatly increased, and for theft, fire and other accident monitoring and alarm system requirements are also higher. In the research of this thesis is based on AT89S52 SCM as the core of the fireproof and anti-theft alarm system, not only can call the police, but also can display the alarm information category. This system selects the smoke sensor, gas sensor, pyroelectric infrared sensor for detecting element, and uses multi-sensor information fusion technology designed to be used for fire and theft alarm in small-scale agricultural production, etc. This design is reasonable, the product performance and reliable, and can replace some expensive product.

1. The basic principle of "three prevention" system design

1.1 This design includes two parts of hardware and software design. Module is divided into smoke acquisition, temperature acquisition, AD conversion, sound and light alarm module sub functions.

1.2 The infra-red anti-theft alarm system consists of pyroelectric infrared sensor, alarm, SCM control circuit, LED control circuit and related control management software. User terminals complete information acquisition, processing, data transmission, function setting, local alarm, etc.

1.3 Functions of the system implementation. When the detector working, pyroelectric infrared sensor to detect movement if someone broke into, infrared sensor set on monitoring points will transform IR radiation of the human body into electrical signals, electrical signal via an amplifier circuit, comparator circuit to the threshold switch, open the gate valve send TTL level to AT89S52 SCM, after a single-chip processing operations, drive to perform alarm circuit warning voice. If detected by temperature sensor DS18B20 collecting temperature above or below the alarm value, the acousto-optic alarm. Also with MQ-2 smoke sensor detects smoke, after ADC0832 conversion to the microcontroller, and then to drive the acousto-optic alarm. With MQ - 5 combustible gas sensor detecting combustible gases such as methane, when the gas leak, sound and light alarm driving.

1.4 Infrared is concealment, design a beam of infrared light in the open air protection place, it can be easily detected if anyone out. Design key points of such kind of device: one is to effectively judge whether there is someone entering and the other is as far as possible to increase the protection scope. Of course, the stability and reliability of the system is also an important indicator.

2. Hardware structure design of "three prevention" system

This system has the function of anti-theft and anti-fire and prevents the poisonous gases such as carbon monoxide, Smoke sensors and combustible gas sensors can detect smoke and carbon monoxide concentration. If the concentration of carbon monoxide exceeded, the microcontroller will drive the acousto-optic alarm, when the pyroelectric infrared sensor detects someone or when the room there is a fire phenomenon, SCM pin level conversion which also drives the acousto-optic alarm circuit alarming. The system hardware structure diagram is shown in FIG 1.

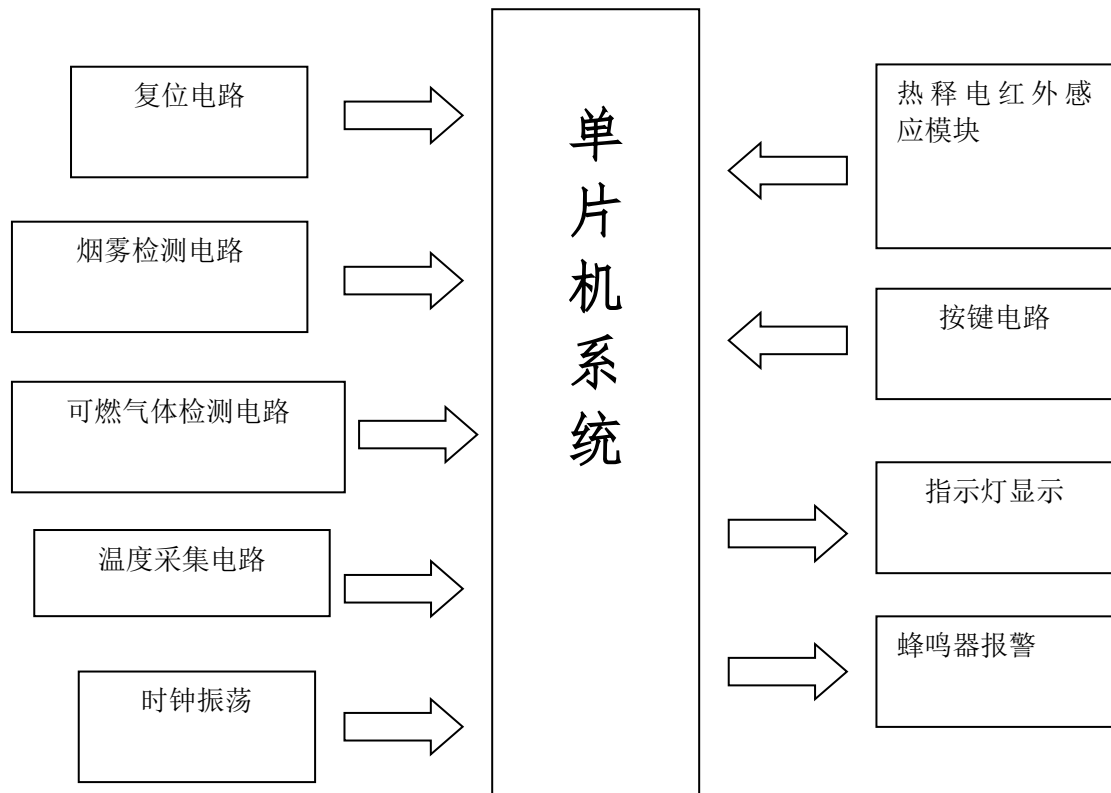


Fig. 1 system hardware structure diagram

复位电路	Reset circuit
烟雾检测器	Smoke detector
可燃气体检测电路	Combustible gas detection circuit
温度采集电路	Temperature acquisition circuit
时钟震荡	Clock oscillation
热释电红外感应模块	Pyroelectric infrared sensor module
按键电路	Keys module
指示灯显示	Indicator light display
蜂鸣器报警	Buzzer alarm
单片机系统	SCM System

3."Three prevention" system software design

The main program flow chart is shown in FIG 2. The system enters monitoring status after the program initialization.

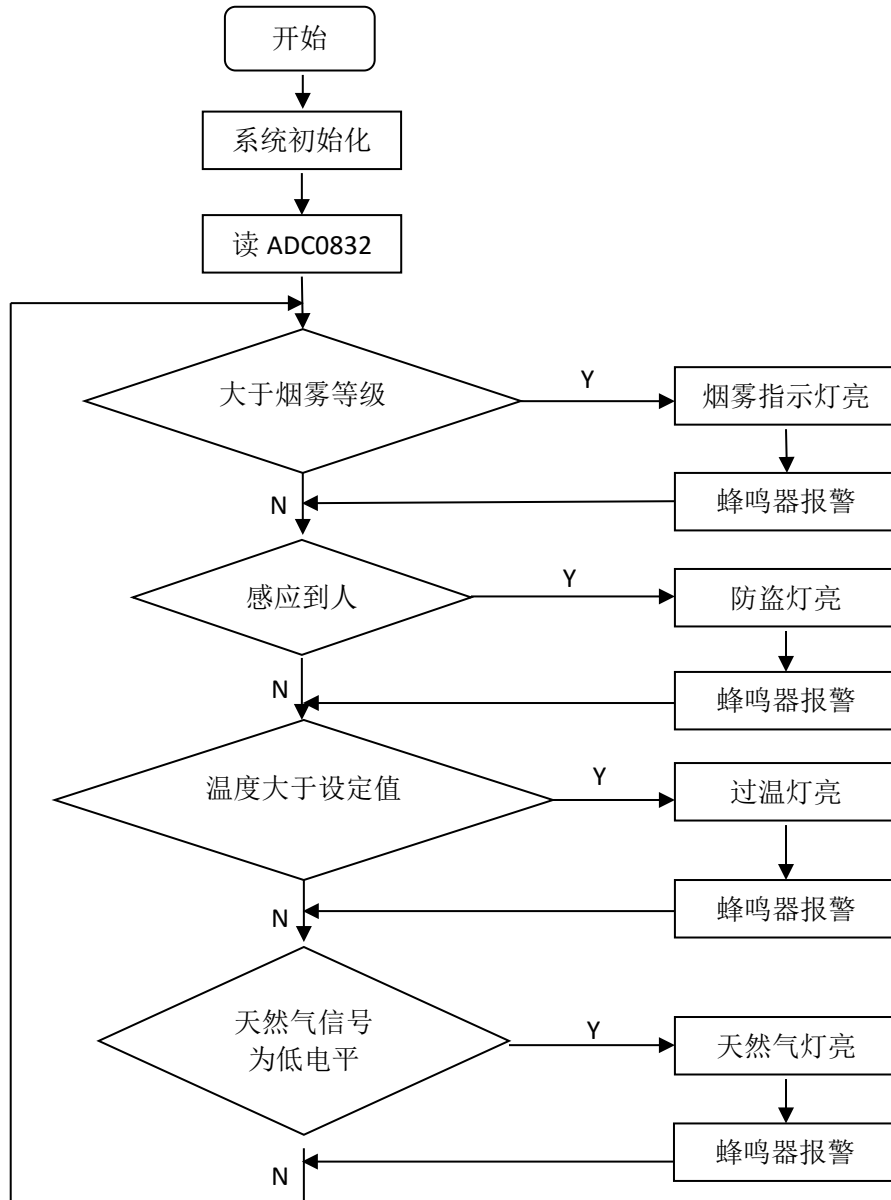


FIG 2 The main program flow chart

开始	Start
系统初始化	System initialization
读 ADC0832	Reading ADC0832
大于烟雾等级	Greater than smog rating
感应到人	detect someone
温度大于设定值	Temperature greater than the set value
天然气信号为低电平	Natural gas signal is low level
烟雾指示灯亮	Smoke indicator light on
蜂鸣器报警	Buzzer alarm
防盗灯亮	Anti theft lamp on
过温灯亮	Over temperature lamp on
天然气灯亮	Natural gas lamp on

The main function of the temperature subroutine is to read 9 gigabytes of RAM, when reading out it required CRC checking and no temperature data rewriting if checksum error. For each command of DS18B20 timing requirements are particularly stringent, it must in accordance with the required sequence to achieve the desired purpose. Meanwhile, We should pay attention to read

incoming data is High digit behind low digit, a total of 12 digits, four decimal and integer seven, and a sign bit.

Smoke A / D conversion flow chart shown in FIG 3. The main component of smog acquisition circuit is smoke sensor and smoke signals collected by the smoke sensor, and then convert into analog electrical signals. A/D converter circuit convert this analog electrical signal to digital signal which SCM can be identified for data analysis to determine whether greater than or equal to a preset value, if greater than or equal to the buzzer alarm.

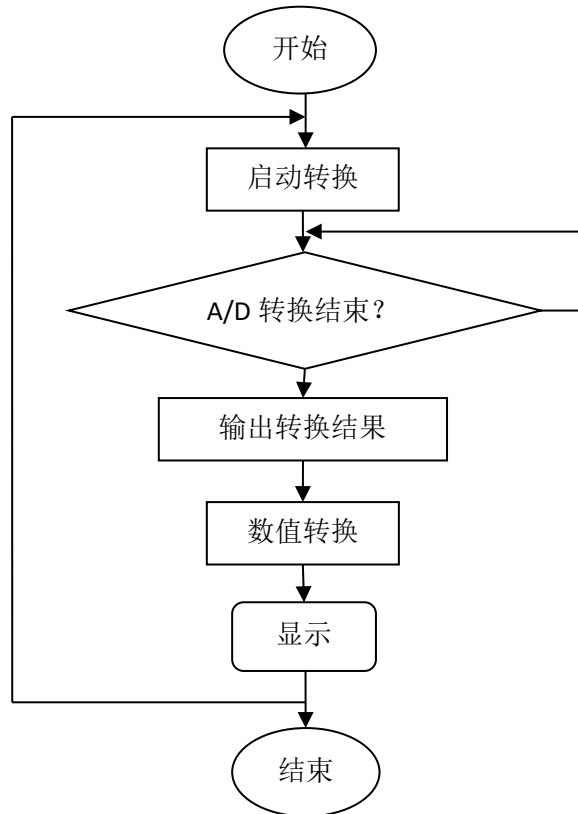


FIG 3 Smoke A / D conversion flow chart

开始	Start
启动转换	CONVST
A/D 转换结束	the A/D conversion finish
输出转换结果	Output conversion results
数值转换	Numerical conversion
显示	Display
结束	Finish

Pyroelectric module work flow chart shown in FIG 4, the whole system is working in the system software control. Infrared sensor set on monitoring points will transform IR radiation of the human body into electrical signals, electrical signal via an amplifier circuit and send TTL level to AT89S51 SCM, Drive circuit control signal is amplified and promote the acousto-optic alarm. The alarm detect whether there is any person after a period of time, if nobody is automatically lifted and continues to monitor waiting for the next alarm. When the alarm eliminate, reset circuit to reset the system.

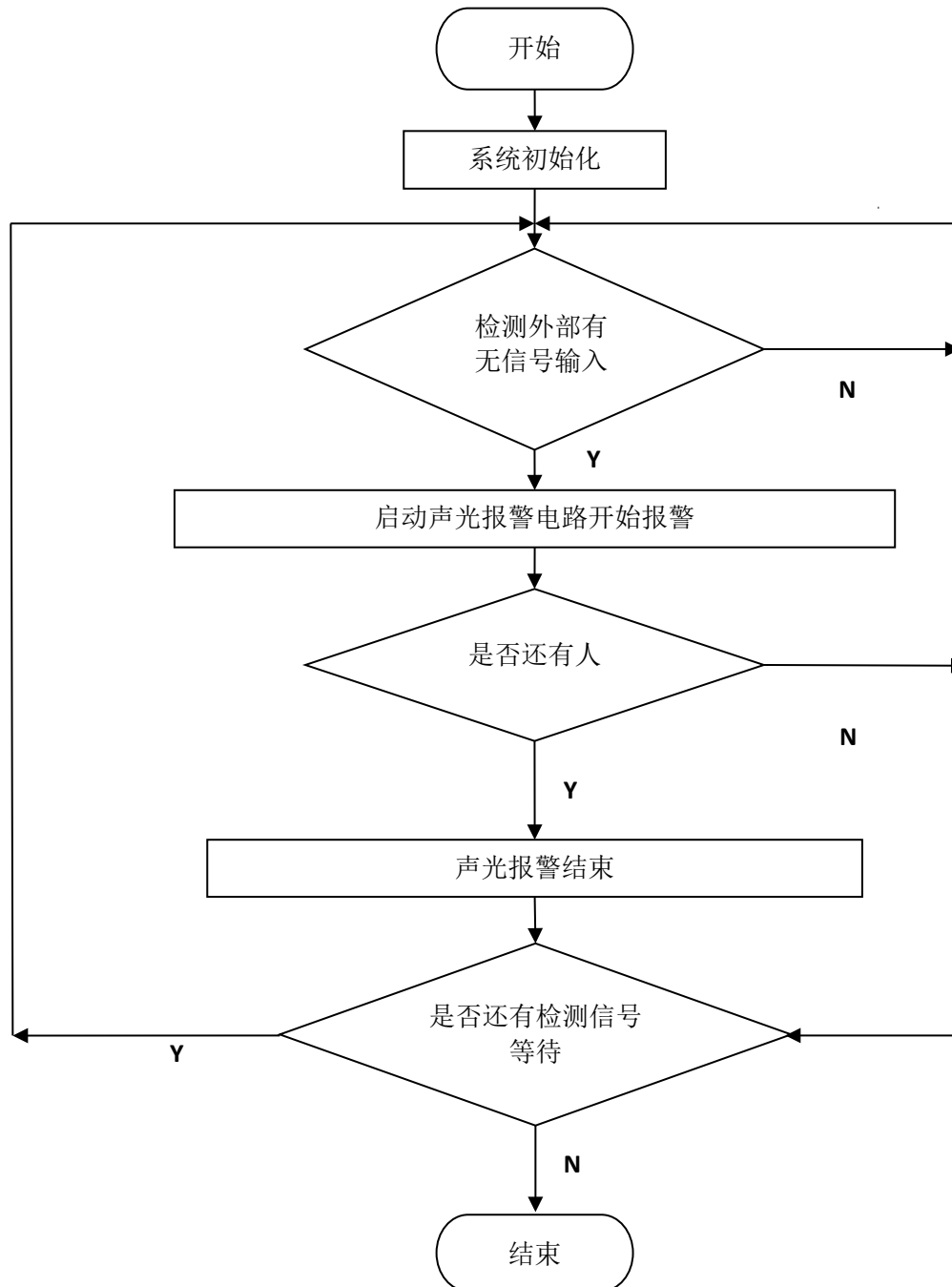


FIG 4 Pyroelectric module work flow chart

开始	Start
系统初始化	System initialization
检测外部有无信号输入	Detection of external signal input
启动声光报警电路开始报警	Start the acousto-optic alarm circuit began to alarm
是否还有人	If there is any people or not
声光报警结束	the acousto-optic alarm finish
是否还有检测信号等待	If there is any detection signal delay
结束	Finish

5. Conclusion

The design is study for a kind of wireless intelligent anti-fire and anti-theft alarm system based on SCM technology. The alarm work by AT89S52 SCM as the core processor, an external

pyroelectric infrared sensor, smoke sensor, combustible gas sensor and temperature sensor, the alarm can detect infrared radiation emitted by human body with non-contact way, and converted into a corresponding electrical signal output. It also can effectively suppress infrared light and visible light interference which over the personal radiation wavelength. This alarm could judge the level and set the indoor temperature according to smog situation and also detect toxic gas and then alarming. The biggest characteristic of this alarm is that users can easily understand and operate it flexible. And easy installation, high intelligence, low rate of false positives. With the rapid development of science and technology, and the enhancement of the modern people security awareness, we believe that the alarm will get deeper applications in a wide area.

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