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The Designs of Intelligent Bedroom Network Monitor System

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Abstract

This system is composed of a 8-bits 51 kernel MCU, various security alarm, many household appliances control component. Host and slave, operators and controlled by popular GSM network and the 315MHz mature technique, communication frequency wireless network using the phone key-press mode, mutual communication operation mode and SMS operating mode, wireless remote operating mode of the three ways of manipulating the house appliances. Once in place, the system will alert sirens alarm, remote phone local language alarm 2 ways and alarm to subdue the illegal invasion and inform residents to take prompt emergency response thus maximum possible to reduce unnecessary losses. Because the system completely using wireless communication mode, makes the system is convenient in installation; Friendly man-machine interface that allows operation is simple; using universal communication protocol, making the system in expanding peripherals with relative ease. This design in safety, humanity, generality, practical wait for a respect to have breakthrough innovation.

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Key Words: Bedroom intelligent; MCU; Network monitor; DTMF decoding; SMS information extraction

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0 Introductions

As the global information age continues to heat up, the social is quickly developing and the standard of living is continuously improving, people's life-style and work habits also begin to leap quietly. Coupled with the arrival of the era of Internet time, people is not only for the location , traffic greening, the surrounding environment and house structure of the conditions of traditional demanding, but also is long for the living room with a personalized and intelligent pursuit. People will pay more attention to healthy, safe, convenient, comfortable and pleasant bedroom environment. With the rapid development of China's construction market, unprecedented market demand will appear in the smart household and related fields. Today's intelligent household products can be aimed at tailored to individual housing construction, application engineering and cost is quite high. However the most popular housing is still civil dwell and for the more engineering intelligent household its promotion range is limited. So it will have quite important significance and development prospect for the intelligent household system.

1 The main module introductions

1. 1 SIM300D GSM module

SIM300D GSM module is mainly used for the way of messages or telephone in the system, It is a small volume plug and play perfect module in three frequency/four frequency * GSM/GPRS. Solutions use industry standard interface which make it have GSM/GPRS 900/1800/1900 MHz function of the SIM300D realize voice, SMS, data and fax information transmission with high speed in small size and low power consumption. This three frequency/four frequency GSM/GPRS module is the overall size of 40 x33x2. 85 mm and supports the users' custom-made MMI and keyboard/LCD embedded powerful TCP/IP protocol stack. This module is controlled by AT commands .It is shown in the table one.

Table one Introduction a few AT instructions

Command	Functional Description
AT+OFF	Shutdown and restart
AT+CSDH=0	In the text mode, return values don't show the detailed information of the head
ATE0	Turn off command echo
AT+CMGF=1	Select SMS message is text mode
AT+CMGS	Send SMS message
AT+CMGR	Read SMS message
AT+CMGD=0	Delete all SMS message
ATA	off-hook
ATH	on-hook

1.2 WT588D speech module

Speech module is using WT588D voice chip. This chip can storage 8 M Flash speech signal. Its role is to simulate people's speech signal when you answer the telephone. It also offers voice navigation and reminds for user, which will be convenient for the user to use. When we erase or write to chip of FLASH memory PXX SPI-25 by the PC software, we choose three serial port control mode. The I/O port P01 is

defined as the DATA port, P02 port as the CS chip selecting port, and P03 port as the clock port. Microcontroller can control WT588D voice control module by three ports. P17 port is as BUSY signal output terminal. It can be set to light LED or put out LED in the play status. The voltage range of SPI-FLASH memory PXX 25 needs to guarantee from 2.8 V to 3.5 V, VDD- SIM is the serial power management input port of the voice chip WT588D, the VCC of 25PXX will be connected to this port, which can automatic balance the serial voltage between WT588D and 25PXX. PWM's output is forbidden to connect to the capacitance or the ground. The port of PWM+/DAC and PWM is cautious of being short-circuit.

2. The composing and the principle of Bedroom monitor system

This system is composed of a kernel MCU and some slave kernel MCUs, GSM communication module, audio (dtmf) decoding circuit, wireless receiving-sending module, household appliances control module, Display module, remote module, speech module, alarming sensor and so on.

2.1 The system host

System host is responsible for the normal operation, Receives the controlling instructions sent by the remote control operation, the telephone key operation, Short message service(SMS). Through the decryption process the instructions are compiled into other type of controlling instruction and then Sent to the corresponding household appliances controller. It will realize the remote control for household appliances at last.

When operating the call button, there will be a voice message for navigation which will facilitate the users. After the message operation, users can receive a return from the information system. If operation is successful it will return "OK". When the host receives alarm information sent by security alarm (The system can decode the generally wireless security alarm of the market, So it can be convenient for user to expand alarm size and improving effect, for example Access alarm, infra-red alarm, Smog announciator, liquefied natural gas leaking alarm and so on) through the way of wireless, the users can get the warning information through comparing the information and alert category. Though the whistle of the local alert and dialing the user's telephone, finally it will realize the alert's constant monitoring and there will be no omission and no misstatement. In order to achieve the above functions, the system uses STC89C52 for MCU microcontroller. MT8870 chip and its peripheral circuit implement the decoding of phone button key's value. WT588D speech module stores all kinds of necessary speech information and realizes voice navigation. Through a serial port the SIM300D GSM module transfers information content to the MCU, so as to realize the control function of SMS. SIM300D GSM module, cabining with voice export, is connected to the MT8870 circuit in order to realize the decoding of the buttons key's value for dialing in the phone. 315 MHz wireless receiving-sending module is to receive various controls and alarm information and to send home appliances control instructions. Host's principle diagram is shown in the diagram 1.
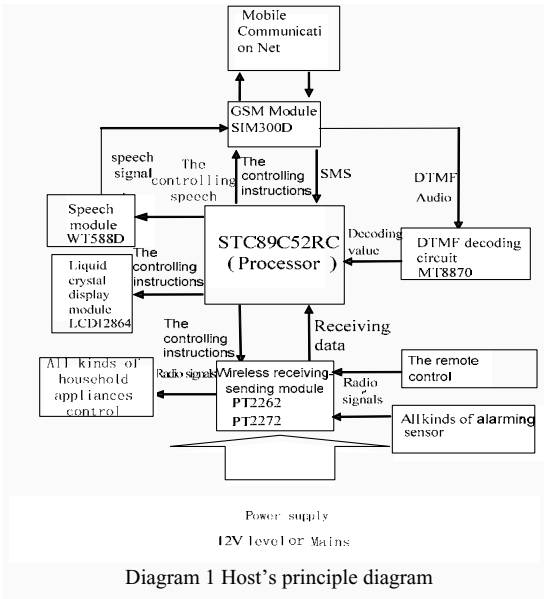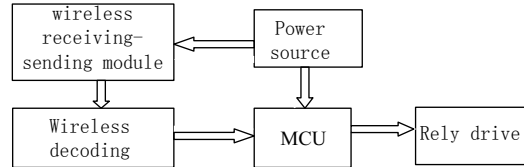
Diagram 1 Host's principle diagram

Diagram 2 the household electric apparatus controller's principle diagram

2.2 The system slave (Household electric apparatus controller)

Household electric apparatus controller's function is to receive kinds of command control from the host through of the way wireless communication and according to the type of the corresponding command to control household appliances, which saves much trouble of cabling wiring and burying lines and also makes the system more flexible. The household electric apparatus controller's principle diagram is shown in the diagram 2.

3 Software design of Bedroom monitoring system

The developing environment of Bedroom monitoring system software is KEIL4, using C language. KEIL4 is a Integrated developing environment of a complete microcontroller, ARM and so on, it is also one of the best and most popular development environments, and provides a very convenient software developing platform for Software developers. The host of Bedroom monitoring systems is mainly composed of the four parts of main host, security check subroutine, remote control subroutine, and home appliances control subroutine. Flow chart is shown in Figure4. Bedroom monitoring systems slave (Household appliances controller) is mainly composed of the three parts of main program, home appliances status subroutine and home appliances control subroutine. Flow chart is shown in Figure 5.
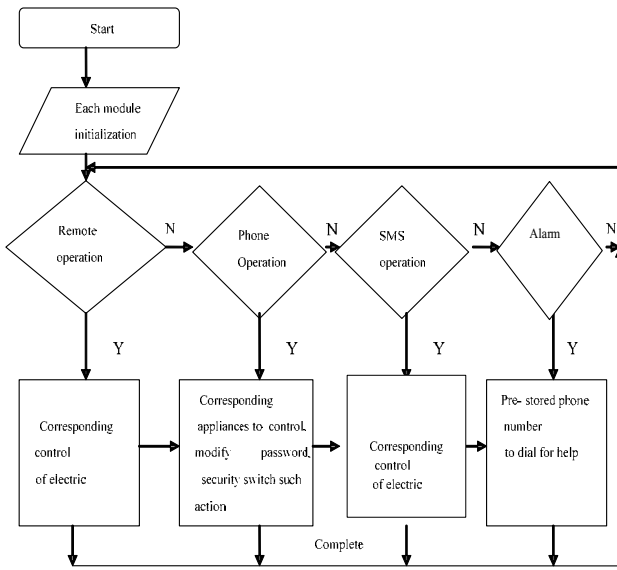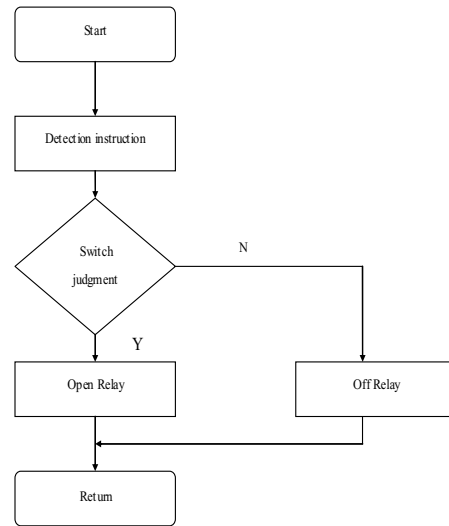
Figure 4 System software flow chart of the host

Figure 5 System household appliances controller flow chart

4 Conclusions

This design is mainly using the existing network systems and other resources to control the various home appliances quickly and easily, to enhance the function of guard against theft, air-conditions, fire prevention, waterproof and preventing gas leak together, and what is more, the system adds to the health care system, making it more humanity, which made up for the shortage that only have security design or only home control on the market. The Integration of the three systems can effectively reduce system costs, and enhance market competitiveness and high economic benefit. The design is a large-scale system, but between the host and slave and between the control and manipulation are using wireless communication, which not only eliminates the trouble of wiring and reduces the projects greatly, but also makes the installation of equipment decided by the users themselves. And the designing fully takes into account people's habits, which lets the system be used in more human way. Before designing this, a lot of research has been done. This design has strong promotions, which are not just limited to household, but also can be used in small and medium companies, factories and other places. It undoubtedly also will increase the economic benefit.

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