Intelligent Home Control System Based on ARM10

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Abstract. Intelligent home is becoming the hot spot of social attention in the 21st century. When it is in China, it is a really new industry. However, there is no doubt that Intelligent home will become a new economic growth point of social development; it will change the life-style of human being. To develop the intelligent home, we should keep up with the development trend of technology. This is the reason why I talk about the intelligent home control system here.

In this paper, intelligent home control system is designed for alarm and remote control on gas-leaking, fire disaster, earthquake prediction, etc., by examining environmental changes around house. When the Intelligent home control system has detected an accident occurs, the processor will communicate with the GSM module, informing the house keeper the occurrence of accident. User can receive and send the message to the system to cut the power by mobile phone. The system can get access to DCC through ARM10 JTAG interface, using DCC to send and receive messages. At the same time, the debugger on the host is mainly used to receive the user's command and send it to the debug component in the target system. The data that returned from the target system is received and displayed to the user in a certain format.

1.System design

The system can be divided into CPU control module, GSM communication module, stepper motor drive module, display module, sensor module, AD conversion module and calendar module and so on. The system uses ARM10 as CPU master, with TC35 module for remote communication. It uses relay module to control the main circuit that is on and off; CPU can detect sensor group to gain the data. Power module is responsible for providing the power supply to all modules. It is to read the TC35 that the system can receive the contents of the message to control the corresponding external relay, or control the data acquisition system. However, it sends the corresponding data to TC35 module through the serial port, and then deals with the data. You can also press the button to control the curtain switch. The block diagram of the system is shown in Figure 1.
The system requires to receive short messages, you can automatically disconnect the power supply system, so it uses the relay module. The relay module has six interfaces, such as the signal side, VCC, GND, normally open, common, normally closed. When the signal terminal is low and the common connects with the normally closed terminal, the circuit turns on to guarantee that the system has normally power supply. When the signal terminal is high and the common connects with normally open, the circuit is disconnected to stops supplying the power for the system. Power control system circuit is shown in Figure 2.

2. System software design

The system software design uses C language to develop it high efficiently. It is divided into the main system and an attached system. The main system is divided into main program and subprogram. Meanwhile, subprogram mainly includes temperature sensor acquisition program, PCF8591AD conversion program, LCD12864 LCD display program, GSM short message transceiver program and so on. The attached system has clock chip program, key program, display program.

2.1. The main system design. The main program is the main part of the microcontroller program, the program execution is carried out mainly through the main program. The whole system is basically completed in the functions of the main function. In this process the main program calls the subprogram and interrupting service program. The flow chart of the main function is shown in Figure 3.
2.2. **GSM communication program design.** In the software design of this system, the GSM module through the serial port sends AT commands to the GSM module in order to achieve the function of sending and receiving short messages. The short messages must initialize before sending or receiving text messages. The flow chart of the relevant program is shown in Figure 4.

3. **System debugging**
The system results are debugged here. The test of the system that is mainly from the test of several major modules starts to carry on GSM short message communication test, gas test, flame test, raindrop test, vibration test, light test, human body infrared test, temperature test, etc.

Gas Test is used to simulate gas with a combustible gas in the lighter. If the MQ-2 gas sensor detects a flammable gas leak, it will send a short message with the message "Send high CO concentration, please note property safety" to the victim's mobile phone. GSM SMS test is that the phone receives short messages, once again it sends "Close The Power" of the message to the system, the system can automatically cut off the main power supply. Flame test is used to contact the flame sensor with the flame of the lighter to see if it is displayed on the screen and sends short messages.

The rest of the test is a reason, it simulates the sensor detecting environment with a tool to see if there is a display, a short message prompt. This is the whole system diagram shown in figure 5.

4. ARM10 JTAG Interface Communication

The debugger can also see the R and W bits when querying the DCC control register through ARM10 JTAG interface shown in figure 6. When reading the write registers of communication data, it can set W bits to scan and output the data. The DCC control register is read-only, which enables synchronization between the processor and the debugger. When the processor wants to send a message to the debugger, it is necessary to check whether the DCC data register is in the idle state by checking the W bit in the DCC controller. The processor reads the DCC controller to check the status of the W bit. In addition, it sends messages from the debugger to the processor. At this point, debugger can query and debug the R bit of communication control register. When the read register of communication data is free, the data is written to the JTAG interface.
Send data function as follows:

```c
void* send (void* data)
{
    int c='0';
    printf("send data\n");
    while (STOP=true)
    {
        c++;
        c%=255;
        write(fd, &c, 1);
        usleep(100000);
    }
    return NULL;
}
```

Receive data function as follows:

```c
void* receive (void* data)
{
    int c='0';
    printf("read modem\n");
    while (STOP=true)
    {
        read(fd, &c, 1);
        write(1, &c, 1);
    }
    printf("exit from reading modem\n");
    return NULL;
}
```

5. Acknowledgements

The system has the function of disaster prevention, mitigation, protection, removal, and can realize automatic detection and remote alarm. According to the information collected by each sensor, it
determines whether there is abnormal situation. If there are unusual circumstances, it will send a text message to the victim through the GSM module, to remind them to pay attention to property safety. Users can also send text messages, remote control to cut off the power supply to prevent accidents. The system has the function of disaster prevention, mitigation, protection, removal, and can realize automatic detection and remote alarm. According to the information collected by each sensor, it determines whether there is abnormal situation. If there are unusual circumstances, it will send a text message to the victim through the GSM module, to remind them to pay attention to property safety. Users can also send text messages, remote control to cut off the power supply to prevent accidents.

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