Design of Remote Monitoring System for Household Appliances and Home Security Based on GMS Network

Huawei Pang
School of Information Science and Engineering, Hebei University of Science and Technology, Hebei, China
panghuawei@hebust.edu.cn

Abstract - This paper introduces a SPCE061A MCU as the core of the system, it has remote control and remote alarm function. The system uses speech recognition technology and GSM communication network to control the state of the electrical equipment of indoor multi-channel. It also has real-time safety monitoring function and remote alarm function. If dangerous occurs, it can call by dialing. The instrument has a multi-function, versatility features.

Index Terms - Remote control. Remote alarm. GMS network. speech recognition.

I. Introduction

With the gradual increase of the national standard of living and awareness of security, people began to be more and more concerned about their living environment. [1] Requires not only user-friendly and comfortable home environment, but also for the intelligence and security of a higher demand. The field of research and development have emerged, new technologies, new products and styles. The design will be introduced advanced GSM wireless communication network, appliance control system and safety monitoring system. GSM-based voice and voice recognition technology to remotely control home appliances control system has good scalability and value in use. [2]Intelligent appliance control system can go out during the entire residential home appliances for remote control, improve the utilization of the user time. Security monitoring can real-time monitor the living environment. The monitoring ranges indoor burglar alarm, fire alarm, gas leak, water pipe burst insecurity, protecting user’ security of life and property. [3]Once the security incidents, intelligent monitoring through the GSM network will be immediately passed to the head of the household. Get the information, the head of the household, to take immediate and effective emergency measures, such as the call to the local property 110 center or 119 Fire Center.

II. Design Ideas

In order to solve the problem of incompatible between different controllers, the system control objectives from the electrical equipment itself transferred to electrical equipment connected to the power outlet. The overall structure of the system is shown in Figure 1. The hardware structure of the monitoring module is divided into two parts, one part is based on of Sunplus SPCE061A microcontroller as the center of the monitor motherboard, including peripheral driver circuits. The other part includes a wireless phone and external circuit module. To the Remote control, the user call the mobile phone for monitoring through the GMS public wireless networks, it received the voice messages and passed the voice messages to Sunplus SPCE061A MCU. The microcontroller uses voice recognition technology, It gets instruction content by analysis of the user's voice. Through the relay (Figure 1 switch driver circuit, followed by a circuit describes). The I/O respectively connected to respective electrical equipment. Users can control the electrical equipment’ working condition by relay.

III. Hardware Design

A. Power module circuit

In figure 3 it is a circuit of the power supply module, The
4.5V DC voltage supplied from the battery pack after SPY0029 becomes 3.3V power supplying to the entire system. SPY0029 is a voltage regulation IC, and CMOS process, with a low quiescent current, driving ability, and excellent linear adjustment. In the figure 3, VDDH3 is for SPCE061A’ I/O level reference, if the point link to pin 51 of SPCE061A, allows I/O output to 3.3V, VDDP is the power for the PLL, it is connected to SPCE061A’ 7 pin, VDD and VDDA are digital power and analog power, respectively are connected to SPCE061A 15 pin and 36 pin, AVSS1 for Analog signal ground is connected to SPCE061A’ 24 pin, VSS for digital signal ground is connected to SPCE061A’ 38 pin, AVSS2 is connected to AVSS2, Which is on the audio output circuit.

B. The audio circuit

The audio circuit is composed of an audio output module and an audio input module. The function of each part is: first, through the audio input circuit it can receive a control signal, it can achieve functions of hardware through the embedded speech recognition system. Second, through the audio output circuit, it can play alarm recording. In Figure 4 it is shown as a 2-channel 10-bit resolution DAC, It only needs an external power amplifier circuit to complete the voice playback. In the figure 4, SPY0030 is an audio amplifier chip. It can work at range from 2.4V to 6V, Its maximum output power is up to 700mW.

IV. Software Design

The monitoring system usually continues to detect the alarm signal. The system automatically sends voice alarm information to the user’s phone. Also it can receive the monitoring controlling instructions, then the program executed, the corresponding function is realized.

A. The main program flow chart

The microcontroller powers up to run the main program and starts the initialization. First it loads speech recognition program, then calls the voice recognition function and opens the hardware interrupt scanning button, detects accidents. When accidents start, The hardware interrupts. If there is no the hardware interrupt, it waits for monitor telephone. The main flow chart is shown in Fig.7.

B. The speech recognition program flow chart

The monitoring is of a voice monitor, voice recognition process is shown in Figure 8 below: First of all, it gets the recognition results to determine whether there is a voice trigger. If there is a trigger, a ID number is returned, The ID
number is corresponding to a name or corresponding to an action. If the ID number is for the name, then it enters to the program of movement to and from. If the ID number is for the action, the voice informs action to be performed, and performs the action. The main program of voice recognition, is divided into four parts: initialization part, the training component, identification of parts, re-training part.

C. The voice playback program flow chart

The initialization mode of the voice player is SACM_S480 mode. SPCE061A is a voice product, Sunplus company provides a variety of audio codec algorithm and its API library, the SACM-LIB (file name SACMV26e.lib 26e is the version number). The library is made of A/D module, encoding module, decoding module, storage module, and D/A module. Each module has its own application program interface namely API, The users only need to understand the function and its parameters to each module. The flow chart of the voice player is shown in fig.9.

V. Acknowledgment

The system uses speech recognition technology and GSM communication network to control the state of the electrical equipment of indoor multi-channel. It also has real-time safety monitoring function and remote alarm function. If dangerous occurs, it can call by dialing. The instrument has a multi-function, versatility features.

References

