THE HIGHER SECURITY SYSTEMS FOR SMART HOME USING
ADVANCED TECHNOLOGY

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Abstract

By Using 3G and ARM9 Technology we are developed an System for home security with using the S3C2410 hardware platform for increasing the high level safekeeping. By using the third generation communication it is capturing the video images and sends it to our mobile phones in the place of anti theft alarm, fire alarm, gas leak alarm systems etc. In present security systems has so many issues to avoid them To resolve these shortcomings and scarcity, and meet people's needs for intelligent home, therefore, adopting image processing technology and 3G communication technology and designs smart home security system based on ARM9 and 3G. Another, It carefully analyses and studies Video data compression of USB digital camera and the 3G network transmission. Thus, a design of a convenient and economical device on real-time video capture and transmission is realized.

Index Terms: ARM9, 3G, S3C2410’s H/W design, Linux, Video monitoring.

1. INTRODUCTION

The 3G communication represents a combine the wireless communication and the multimedia communication. Once there is illegal personnel have intruded, gas leak or firing, etc., it will immediately issue a warning signal to the processor. The processor will determine which and where the alarm is, the scene immediately sends a sound and light alarm and takes emergency treatment, by controlling the camera to capture video images, and then put collected video image data into buffer, and then run the image display program which is transplanted to Embedded target platform, for processing and displaying the buffer zone of the image data. Further, which can be saved into a data file format and labeled UDP packets, through the 3G network send images to the remote user mobile phone. The 3G communication can process the images, music, video stream and other forms of media, which can also provides many kinds of information services, such as web page browsing, conference call and e-commerce. In order to provide such services, the wireless network must be able to support different data transmission speed, which means that it must respectively support the transmission speed of 2Mbps 384kbps(kilobits/ second) as well as 144kbps in the indoor, outdoor and vehicular environments at least[2]. In current, the 3G mobile phones (3G handsets) have three kinds of standard criteria in the world. They are the WCDMA standard in Europe, the CDMA2000 standard in America and the TD—SCDMA standard.

2. SYSTEM DESCRIPTION

The Block diagram of the scheme is shown in Fig 1. The
illegal person have intruded, gas leak or firing, etc., it will immediately issue a warning signal to the CPU. The CPU will determine which and where the alarm is, the scene immediately sends a sound and light alarm and takes emergency treatment, by controlling the camera to capture video images, and then put collected video image data into buffer, and then run the image display program which is transplanted to Embedded target platform, for processing and displaying the buffer zone of the image data. Further, which can be saved into a data file format and labeled UDP packets, through the 3G network send images to the remote user mobile phone. In addition, even if the host is away, he may master the situation at home through the 3G network, and set defending or withdrawing mode to achieve remote monitoring function.

3. SYSTEM HARDWARE DESIGN

The hardware structure of the system shown in figure 2. The system consist of ARM, video processing module and alarm input and output circuits.

3.1 Arm Module

S3C2410 are the SOC chip based on ARM9T, low-power, high performance, very suitable for embedded product development. With LCD controller, 3-channel UART, 4-channel DMA, IIC and SPI bus interface, 117 Universal I/O port, two USB host interface and a USB device interface and other resources. These resources based on S3C2410 can meet overall system requirements for the processor.

ARM main control module is composed of the ARM Controller, FLASH, SDRAM and related peripheral circuits. The ARM controller's main functions are operating alarm input and output I/O port and other parts, at the same time, achieving the acceptance and transmission of video data, GPRS network communication and other functions, Therefore, the system need to choose more general-purpose I/O port and rich external resources for being easy to build chips of peripheral circuits. So, select Samsung S3C2410 as the system’s processor, AM29LV160DB and 28F128J3A as FLASH, which store separately boot loader guide code and source code. And two HY57V561620 as SDRAM for constituting the capacity of 64MB high-speed dynamic random access memory.

3.2 Video Processing Module

For USB camera itself, drive program need to provide basic I/O interface functions including the achievement of open, read, write, close, The interruption of processing, memory mapping function, as well as the control interface of the function to achieve for I/O channel and so on. Linux video collection sketch map as shown in figure 3:

4. SYSTEM SOFTWARE DESIGN

Figure 4: Generic algorithm for system program flow
Operating System use Linux2.4 core with powerful network and excellent transplant and a powerful process, interrupt, memory, and equipment Penny rationale to support a variety of file system, Built a complete TCP / IP protocol and the system needed for a variety of devices such as the driver, used to manage a wide range of applications software to achieve real-time systems and multi-task. File system using EXT3 file system, the system all the files and directory tree structure to the formation of the overall directory hierarchy in order to facilitate system management of documents and 292 equipment. User applications to be completed by a series of a function of the corresponding functional components, including alarm monitoring procedures, image acquisition compression procedures, 3G communication procedures etc. System software mainly includes boot loader, operating system, file system and user applications. Boot loader using VIVI, mainly used to initialize the processor and hardware equipment, download system image and initialize the operating to be ready to implement. So to all devices on the system to prepare the driver and the corresponding user applications in order to achieve the required system functions of the system, the main generic algorithm is shown in Figure 4.

4.1 Video Compression

The advantages and disadvantages of the popular networks video encoding MPEG-4, H.264 in the market, the system uses a simple and efficient MPEG-4 algorithm. MPEG-4 (officially named 150/IEC14496) was published in November 1998 with the characteristics of low bit rate, transmission rate between 4.8 -64kb/s, the resolution of 176X144, which uses a very narrow frame of the reconstruction and data compression technology, with minimal data in order to get the best image quality. MPEG-4 is based on the object content of the image compression coding technology, and compared to the previous compression standards, it was first introduced to study the visual, visual objects, including video object, static texture objects, mesh objects, objects such as human faces.

4.2 3G Communications

3G communication flow subroutine with AT commands to prepare, including 3G module initialization, 3G network parameter configuration, alarm message to send, message receive and make calls, such as part of the base TCP / IP protocol to complete the wireless data transceiver. GPRS module used to initialize + + +, ATV0, ATH and ATE0VQ0 such instructions, enter the command separately to MC35i, data, hang up and return the results of the form of status.

5. CONCLUSION AND FURTHER RECOMMENDATIONS

From the Hebei University of Engineering Handan, China some young scientists gave a some new technologies for increasing the high security for smart security home based on 3G but in our paper we are giving a innovative idea for ARM-based embedded, video processing technology and 3G wireless networks Smart Home Security System, full use of embedded in the image processing, network communication on the advantages and the existing 3G network resources, not only achieve a rapid security alarm, record evidence and features such as remote monitoring, and high reliability, low False Alarm, cost-effective and less loss of advantage. At present, the system can also be hardware and software upgrades and integration of new functional modules to meet the intelligent home security on the future development needs. Tested showed that the stable operation of the system to achieve the design requirement. The system also can be used in banks, libraries and museums, such as required security and remote monitoring of the place.

ACKNOWLEDGMENT

We thank to our principal, Prof. K .Raja Shekar Rao, for providing necessary facilities towards carrying out this work. We acknowledge the diligent efforts of our Head of the Department Dr.S.Balaji in assisting us towards implementation of this idea.

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