

# WIRELESS SECURITY SYSTEM BASED ON GPRS

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**Abstract**— The wireless technology is gaining more popularity in today’s world, now a days we can find wireless technology in almost all areas of innovations .So we have proposed a wireless remote image monitoring system on basis of the conclusion of wired image monitoring system, based on GSM/GPRS and ARM9 Linux developing environment which leads to less maintenance cost compared to wired system. At the first phase we have designed the overall proposed system by analysing the structure of the system’s hardware and software.

In the next phase we have developed APIs of Video4Linux kernel to realize image acquisition of the system, through point to point (PPP) to access the GPRS, through network programming to realize the transmission of the image. Finally we have proposed to develop a prototype for the above system in a high compact manner.

**Keywords-component:** TQ2440ARM 9 Development Board, SIM 300 GSM/GPRS Modem, Video 4 Linux, ARM Linux.

## I. INTRODUCTION

Monitoring system is one of the key equipments for the agriculture, transportation, environment monitor and national defences; it is also the hot spot of the application technologies, widely used for its information content rich and intuitive. In the image monitoring system, we realize mutual information through a transmission line and multimedia equipment, to achieve a timely and interactive communication and complete the purpose of monitoring, control and intercommunication. Nowadays the lineate monitor systems occupy the monitor system market, but the applications are limited because of the physical disadvantages in some difficult situations, such as the monitors’ points distribute broadly. The wireless monitor systems are the only resolutions. With the fast development of the computer and communication technology, the

wireless monitor system combined with the embedded system technology wireless communication technology and internet technology can be realized.

## II. SYSTEM DESIGN

In order to realize the wireless remote monitoring in remote or complex regional geological environment, what’s more, at the request of system development design and develop a wireless remote image monitoring system in ARM\_Linux system based on GSM/GPRS[1]. The system consists of embedded wireless image monitoring terminal and monitoring server. Fig. 1 is the function sketch of the monitoring system.

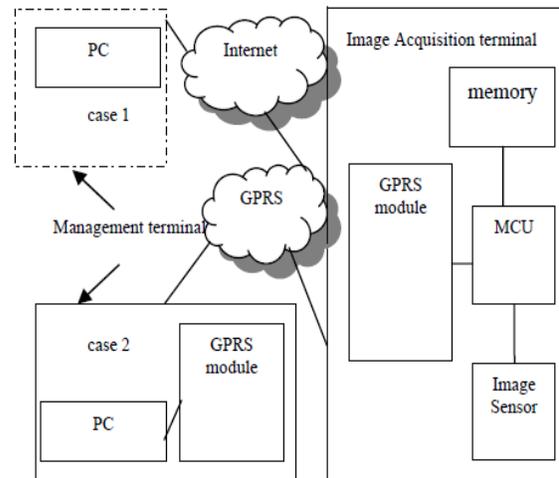


Figure 1.Schematic diagram of the monitoring system

Wireless remote image<sup>[2]</sup>, monitoring system consists of 4 modules, hardware design, operating system, software design of the monitor centre, software design of the wireless terminal.

A. Hardware environment of the system

Operating system of the embedded monitor terminal is based on embedded Linux, and the hardware platform used Samsung S3C2410 processor. In GSM/GPRS coverage region, we can transmit the image of the spot to the monitor server in the control centre by this system. If necessary the monitor server can also control monitor terminal to acquire the spot image automatically, and transmit the image to the monitor server to achieve the purpose of monitoring. The diagram of the capturing system is shown in Fig. 2.

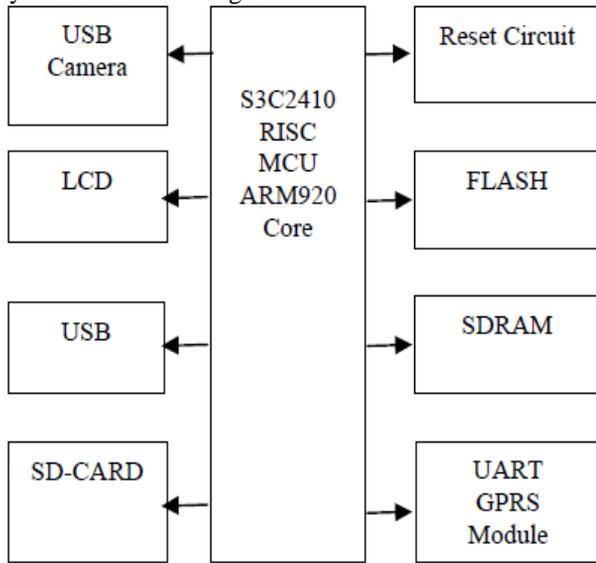


Figure 2. Topology of the system hardware

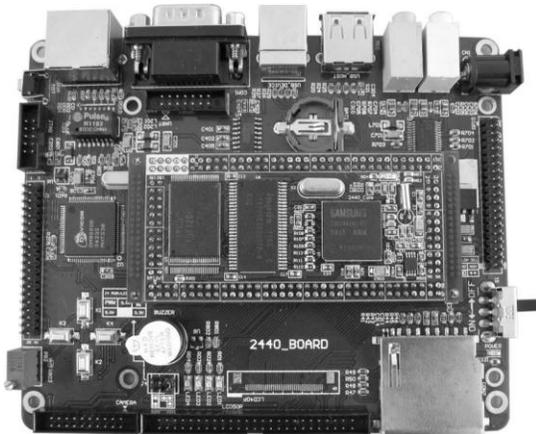


Figure 3. ARM9 development board

The GPRS modem i.e., SIM 300 modem is designed for global market, SIM300 is a Tri-band GSM/GPRS engine that works on frequencies EGSM 900 MHz, DCS 1800 MHz and PCS1900 MHz SIM300 provides GPRS multi-slot class 10 capability and support the GPRS coding schemes CS-1, CS-2, CS-3 and CS-4. It supports a downlink up to 85.4 kbps and uplink up to 42.8 kbps .The data received at the capturing device is transferred using

GPRS connection supported by the SIM 300.The images captured is sent using a smtp protocol. So the images can be emailed to given email address using smtp protocol. The circuit of sim300 is shown in the Fig.4.

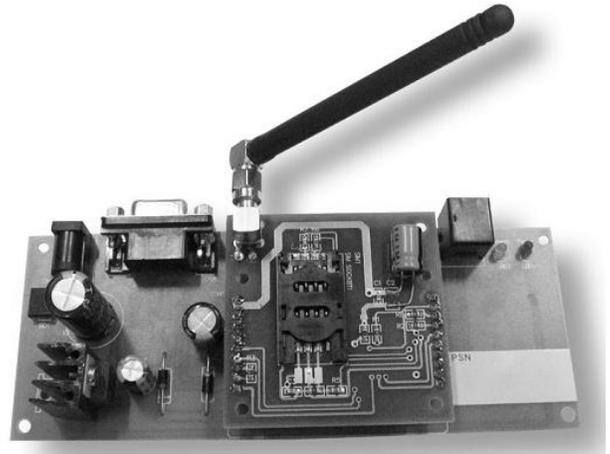


Figure 4. The Circuit of the SIM 300 GPRS modem.

B. Software environment of the system

The realization platform of this project using ARM Linux<sup>[3]</sup>, as compiler. Firstly, setup Linux operating system in a host PC, And then establish cross debugging environment in the host PC. In the process of developing, the program which needs to be transplanted to development board, such as image acquisition program, image shown program, image preservation program, and the drivers of the peripheral, wirelessly image transmission program, all are written in C language], then compiled and linked to generate executable code by the cross-debugging tools. The platform of S3C2410 using the yaffs as the file system[6], which includes application programs, modules, configuration files and libraries , etc . The image's acquisition, shown, and preservation are all constructed on the embedded Linux kernel. The software structure of the system is shown in Fig. 5.

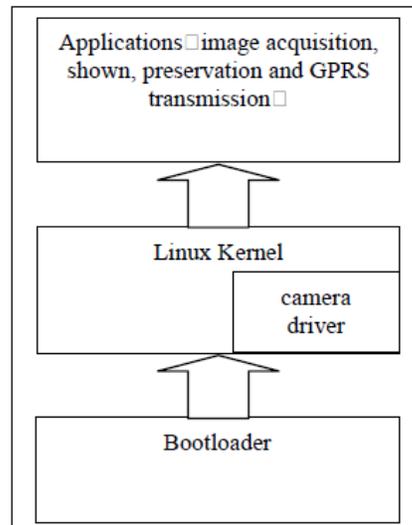


Figure 5. Software structure of the system

### III. DESIGN PROCESS OF THE SOFTWARE

#### A. The implementation of image acquisition

Video4Linux (V4L) is the foundation of Linux video streaming system and embedded imaging system, it's also a group of APIs in Linux kernel which could support imaging equipment. With appropriate video Capture Card and Video Capture Card Driver, Video4Linux can help us achieve image acquisition, AM/FM radio, video CODEC, channel switching, etc. Currently, the most important application of V4L is in the video streaming systems and embedded imaging system. There is a wide scope of its application, such as: remote learning systems, remote diagnostic systems, video conferencing, etc.[6]. Video4Linux is divided into 2-layer structure, at the top of Video4Linux are drivers of themselves, on the bottom is the imaging equipment driver. This system uses the top drivers of V4L, which is the APIs provided by the V4L for programmer. This paper mainly discusses the video image acquisition program design of USB camera equipment /dev/video0.

After the initialization of image acquisition device driver, we need prepare a video streaming application of video, so that images can be acquired.

##### 1) Create a cross-compiler environment

Install the Fedora9.0 development platform on the PC, and use cross compiler arm-Linux-gcc-4.3.2 to compile Linux- 2.6.12 kernel. Video Capture Module adopts USB camera of STD06FF module name.

##### 2) Boot Loader (U-BOOT&vivi)

Program is booted from the Nand Flash and copied to SDRAM in S3C2440[1]. Nand Flash controller interface is configured with a SRAM buffer. When system starts, the starting 4K bytes of code in Nand Flash is loaded into the SRAM.

##### 3) Driver transplantation

There are two driver models, including direct compile and loading driver file. As there is no ZC301P camera driver in the kernel, it needs to put a patch of usb-2.6.12LE06.patch.tar.gz and copy it under / Linux-2.6.12/driver/usb to decompression and patch. It can be seen spca5xx folder in this directory.

Driver loading steps can be described as follows: tar -xvzf usb-2.6.12LE06.patch.tar.gz patch -pl <usb-2.6.12.patch

Then compile the kernel into the linux-2.6.12 directory, and make menuconfig

- (1) Choose Multimedia devices --->
- <\*>Video For Linux, load Video For Linux Module
- (2) Choose USB support --->
- <\*>Support for Host-side USB
- USB Host Controller Drivers
- <\*>OHCI Host HCD support

- (3) Choose USB Multimedia devices --->
- <\*>USB STD06FF Logitech jpeg Cameras
- (4) make dep; make zImage; make modules.
- 4) Save settings, and then exit.

Then enter the camera driver installation directory to load driver:

```
#lsmod spcaSTD06FF.o
```

#### B. Communication based on GPRS

The modem used for the setting up the GPRS connection is SIM 300 of SIMCOM .The commands were given to modem using hyper terminal which is present in the PC. The initialization steps of the GPRS [9], connection are shown in Fig.6.The data received from the requested server can be seen in the Fig 7.

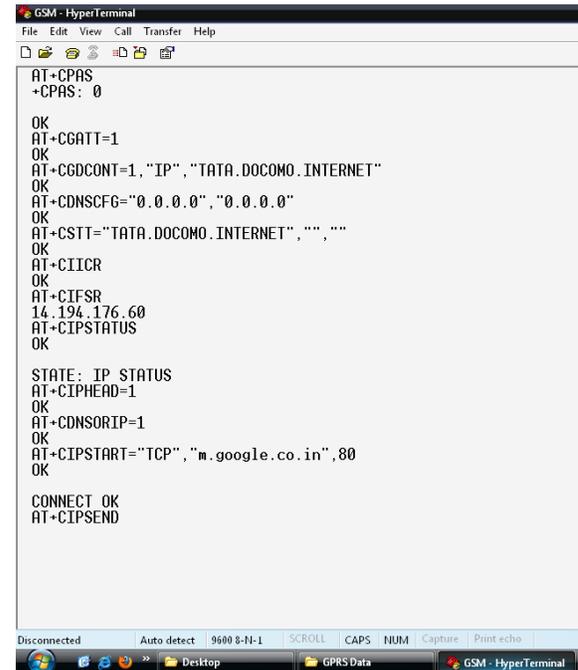


Figure 6. Initialization of GPRS using AT commands on hyper terminal

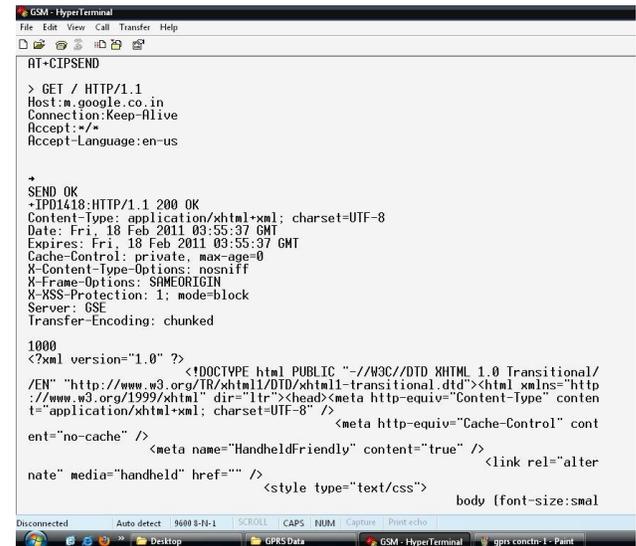


Figure 7. Data received from the remote server.

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#### IV. CONCLUSION

This paper focuses on the research by combining embedded Linux technology and the GSM/GPRS network. Proposes a wireless remote video monitor system based on GSM/GPRS. Analysis the overall design of the wireless remote image monitor system, and according to the characteristics of system choose embedded Linux operating system SAMSUNG S3C2410 processor as the hardware and software developing platform. Developed a prototype machine of the system successfully. The results show that the prototype machine can transmit the static image of the spot to monitor server through GSM/GPRS, and realize the function of wireless remote monitor.

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