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ARM-based Embedded Video Surveillance System

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Abstract: The embed video monitoring system take that embedded technology, the video coding technology and the network communication technology as the core, Compared with the traditional video monitoring system, It has the advantages of low cost, small size, compact structure, good scalability and stable performance, and has a broad application prospect and market demand. This article mainly elaborates the design of an embedded network video monitoring system based on B/S architecture. The system USES the S3C6410 processor based on ARM11 core as the core hardware platform, adopts the embedded Linux operating system, and realizes video data collection through the USB camera. Combined with H.264 video coding technology and streaming media transmission technology, the system makes full use of network resources to achieve the purpose of remote monitoring.
Keywords: Video monitoring; B/S; ARM; Embedded Linux.

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1. INTRODUCTION

The design of this system is based on b / s mode design idea, realize video acquisition and coding in the server. Compared with the C/S mode, the B/S mode not only reduces the development difficulty, facilitates the system upgrade and maintenance, but also facilitates the promotion and use of the system. The whole network video monitoring system is mainly used for remote monitoring, using the existing IP network, to meet the requirements of authorized users to remotely watch and monitor live video images. The system consists of monitoring point front-end equipment, transmission network and client play control terminal.

2. THE OVERALL ARCHITECTURE OF THE SYSTEM

Fig.1 shows the structure of the entire monitoring system. The system mainly realizes the real-time acquisition and compression of video data, and the processed video data is transmitted remotely through the network. The video server is responsible for collecting video image data from the camera and encoding, compressing and transmitting the image. A video playback control embedded in the client browser is responsible for receiving, decoding, and playing video images.

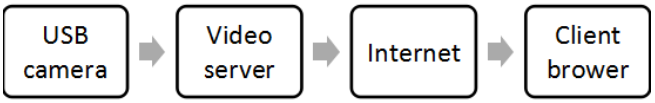

Fig 1. System structure

The server side of video surveillance system adopts s3c6410 processor, which mainly realizes video data acquisition and compression.[1] The peripheral interface circuit mainly includes power module, flash and ram memory module, serial port module, network card DM 9000, JTAG interface, USB interface, etc.

3. SYSTEM HARDWARE PLATFORM

System server hardware includes: S3C6410 chip, USB camera, SDRAM and NANDFLSH, power module, network card and so on. The hardware structure of this system is shown in fig.2.

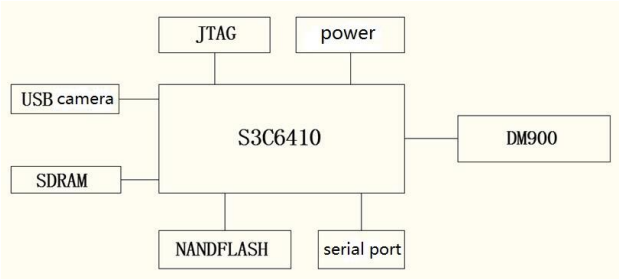

Fig 2. The hardware structure of the system

3.1 Processor

The main control chip that this text system designs uses S3C6410, its supportable internal bus can reach 64, the working frequency is in 533MHZ, the maximum frequency that can run can reach 667MHZ [2], the speed of processing data is very fast, and have very high computing ability. S3C6410 the structure is shown in Fig.3.

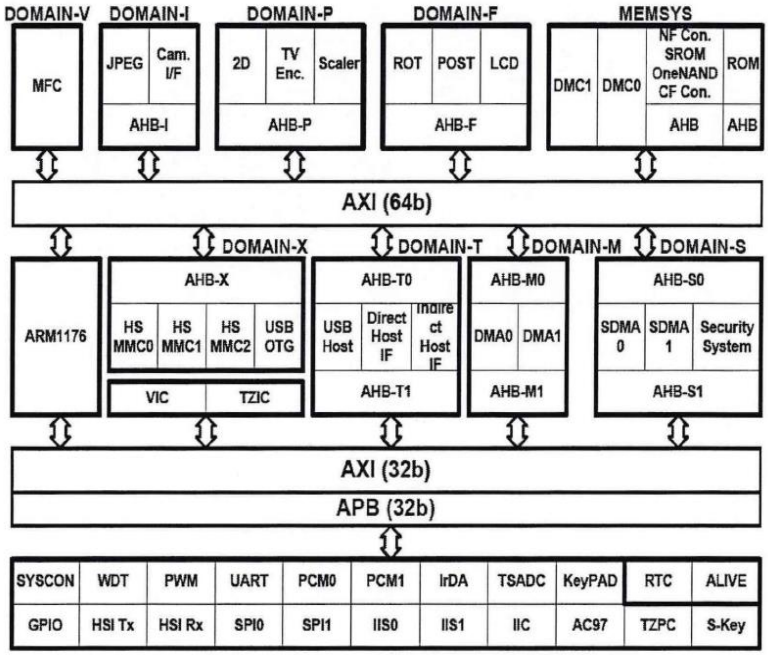

Fig 3. The structure diagram of S3C6410

3.2 Video storage module

The data collected in this paper is video, which takes up a large amount of memory, so 1GB of NANDFLASH [1-2] memory is used. NANDFLAS design circuit shown in Fig.4.

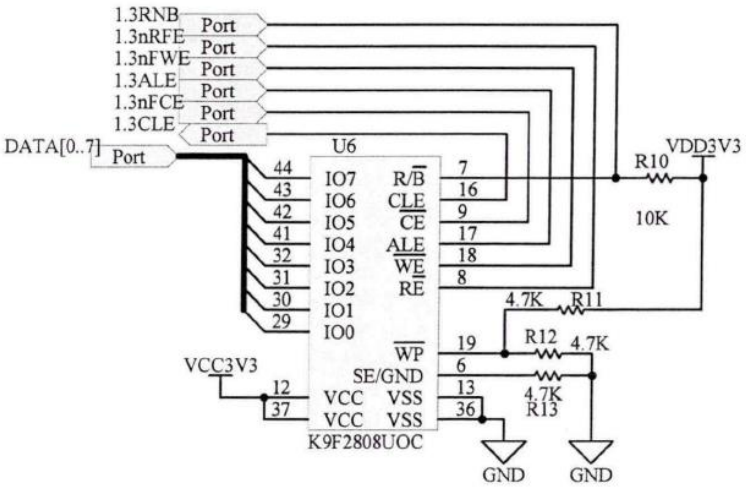

Fig 4. Nan flash circuit

3.3 Peripheral circuit

(1) Power supply circuit

The power supply circuit supplies power to the entire development board. Powered by 5v DC power supply with two power input ports, cn1 is supplied with 5v power adapter socket, S1 - bit power switch, con 5 - bit 4 - pin socket.

(2) JTAG debug circuit

JTAG is an international standard testing protocol, which is mainly used for chip internal testing.[3-5] This development board uses JTAG to contain a complete standard wire and a 10 - pin JTAG interface. The interface circuit is shown in fig.5.

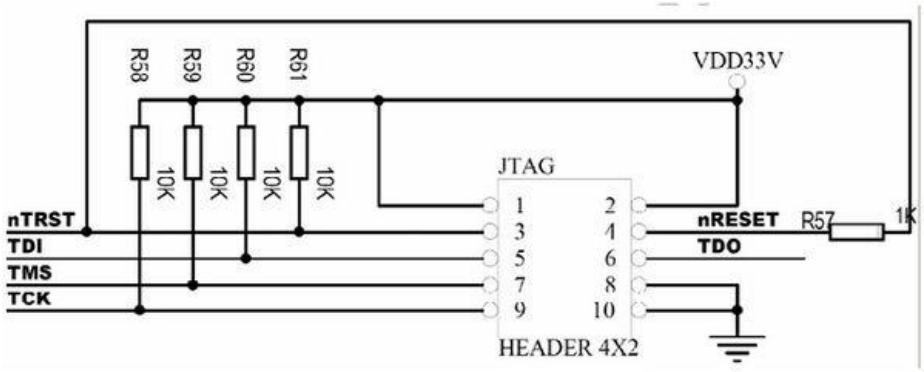

Fig 5. JTAG interface circuit

(3) Network interface

The Ethernet circuit of the system is composed of DM 9000 network card control chip, with low cost, low power consumption and simple register operation. It can also automatically configure the network bandwidth according to the need and adapt to the 10 / 100 m network. The feint 7 interrupt signal is used by the processor.

(4) USB interface circuit

The development board of this system has designed three a - type USB host 1.1 interfaces, which are the same as the USB interface of ordinary PC, and can be connected with common USB peripherals through this interface. It can also be extended by USB hub, development board also designed mini USB (2.0) interface, commonly used to download the program to the target board.

4. SOFTWARE DESIGN ON SERVER SIDE

Considering the real-time and network support functions of the operating system, the embedded Linux system is selected for the development of this system [5].The software design of server side mainly includes Linux system level design and application level design. Linux system level mainly includes the establishment of cross-compilation environment, transplantation of u - boot, configuration of kernel (including configuration of various drivers) and the establishment of root file system, through these steps to establish a complete embedded Linux system, using TCP / IP protocol; The application layer is mainly composed of video acquisition program, video data h 264 coding program and data transmission program. The data is sent in socket mode based on UDP protocol.

5. CONCLUSION

This paper mainly introduces the main framework of a b / s mode embedded video surveillance system. The overall framework, hardware framework team and system software framework diagram of the system are given. This paper introduces the working mode of arm embedded processor and the basic peripheral interface circuit of s3c6410 chip, and selects the operating system as embedded Linux.

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