

## Wireless Network Video Collection and Transmission Based on ARM

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**Abstract.** Wireless video collection and transmission system has been widely used in many remote video monitoring system and portable equipment. This system was to use S3C2440 as the main control chip, through the Z301P for camera collection video, and through the wireless network card RT3070 chips for video wireless transmission. We uploaded collected video to Mozilla Firefox, and then wireless network video collection and transmission system was built quickly.

### Introduction

SAMSUNG's S3C2440 is developed with ARM920T core, a 16/32-bit ARM920T RISC processor designed by Advanced RISC Machines. Because the S3C2440 has advantages of low power consumption, processing speed, high precision, reliable system performance, cheap and so on, thus the S3C2440 is used as the central processor of the system so that the wireless network video can be collected, handled and transferred accurately and in real time.

### System Design

We see S3C2440 as network video server, then the video collected by camera is transferred to PC's Mozilla Firefox through the wireless network card. This is whole process of video acquisition and transmission. System structure is shown in Fig. 1.

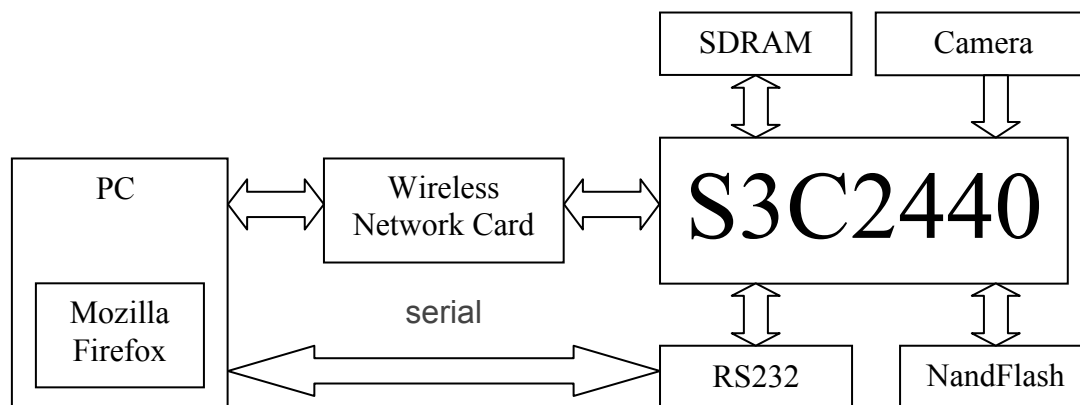


Fig.1 System Structure

**Hardware Components.** The system hardware mainly includes S3C2440, RS232 interface, SDRAM, NandFlash, USB wireless network card, USB camera and power supply and reset module.

The main control chip is S3C2440 which is produced by SAMSUNG and developed with a 16/32-bit ARM920T RISC processor.

The SDRAM is composed of 2 piece of memory chip MT48LC16M16A2-75D, and it is connected with 32 data cable of S3C2440. It's working voltage is 2.70 ~ 3.60 V.

We select K9F2G08U0B as NandFlash chip, and this chip's storage capacity is Mbytes \* 8 bit. It's working voltage is 2.70 ~ 3.60 V.

The Z301P is produced by VIMICRO, and it's speed is 30fps/s, and it's pixel is 300 thousand.

The RT3070 is produced by Ralink Technology Corp, and has compatible with IEEE 802.11 B/G/N standard, and support 64/128 bit WEP data encryption technology, and support WAP/WAP - PSK, WPA2 / WPA2 - PSK security mechanism.

We use power supply is the DC of 5 V which provide the 3.3V system power supply produced by the AS2815AR-3.3 chip of low-dropout(LDO) voltage regulator and the 1.26V CPU power supply produced by the MAX8860EUA chip of low-noise and low-dropout(LDO) voltage regulator. So we set up power system(exclude PC power) successfully.

Hardware components is showed in Fig.2 and Fig.3.

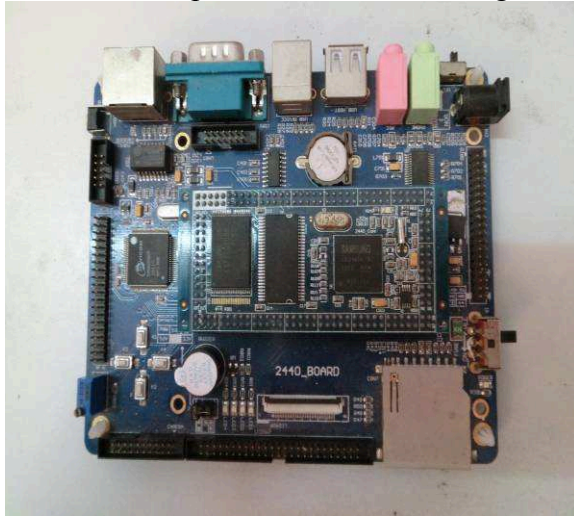


Fig.2 S3C2440



Fig.3 Camera and Wireless Network Card

**Software Design.** We chose version 2.6.30.4 of the Linux kernel, and version 4.3.3 of the arm-linux- kernel cross compiler[1]. This system use mjpg-streamer as network video server. System software can be divided into three levels: the top of the mjpg-streamer application, linux kernel, and the bottom driver of wireless network card and camera[2].

System software structure is shown in Fig.4.

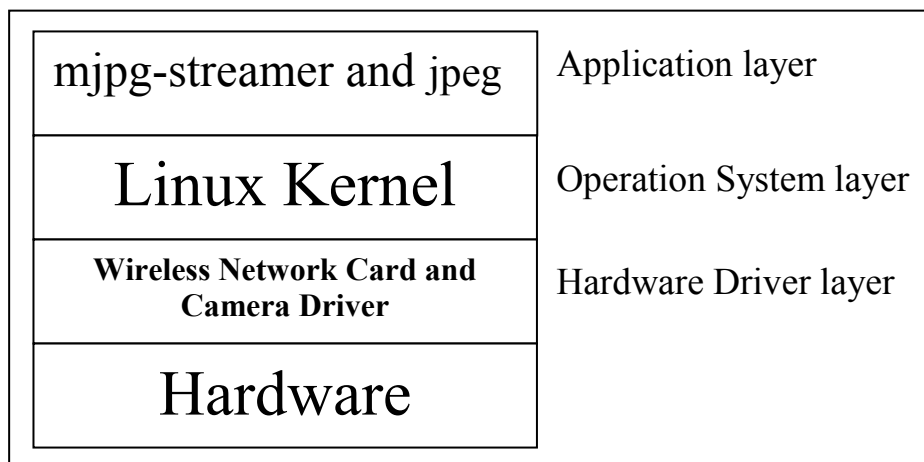


Fig.4 System Software Structure

**Mjpg-streamer Migration.** Mjpg-streamer is one video server software, and open source, you can modify the source code, and migrate cross-compiled file into embedded system, so as to realize the remote wireless network video collection and transmission system based on ARM.

We can download mjpg-streamer [3] and jpeg [4] source packages from the website, and extract it into root directory, and then write mjpg\_streamer\_builder script file and run it. The script file content as follow:

```
#!/bin/sh
mkdir /jpeg
mkdir /mjpg-streamer
cd /jpeg-9/
./configure CC=arm-linux-gcc --host=arm-unknown-linux --prefix=/jpeg --enable-shared --enable-static
```

```

make
make install
cp /jpeg/lib/* /mjpg-streamer
sed -i 's#CFLAGS += -O1 -DLINUX -D_GNU_SOURCE -Wall -shared -fPIC#& -I/jpeg/include
# /mjpg-streamer/mjpg-streamer/plugins/input_uvc/Makefile
sed -i 's#$(CC) $(CFLAGS) -o $@ input_uvc.c v4l2uvc.lo jpeg_utils.lo dynctrl.lo $(LFLAGS)#
& -L/jpeg/lib#' /mjpg-streamer/mjpg-streamer/plugins/input_uvc/Makefile
cd /mjpg-streamer/mjpg-streamer
make CC=arm-linux-gcc
cp *.so mjpg_streamer start.sh /mjpg-streamer/
cp -rf www /mjpg-streamer/

```

Major work completed by script file as follow:

Two folders, /jpeg and /mjpg\_streamer, that are used as installation directory of jpeg and mjpg-streamer are created in root directory. Configuration and compiling work of jpeg include configuring compiler and installation directory, enabling shared and enabling static, and coping compiled library file to /mjpg\_streamer directory.

Makefile of /mjpg-streamer/mjpg-streamer/plugins/input\_uvc/ directory is modified. The include and lib from library file of jpeg are added to Compiler Options by means of -I and -L. Mjpg-streamer is compiled by arm-linux-gcc cross-compiler. Copy library file, mjpg\_streamer, start.sh and www folder to /mjpg\_streamer directory. Copy whole /mjpg\_streamer directory to NandFlash of this system.

**Wireless Network and Camera System.** Download driver source file of RT3070 [5] chip from the website, and modify Makefile file of driver. We should change PLATFORM to SMDK and modify LINUX\_SRC and CROSS\_COMPILE in Makefile file. We choose RT3070 chip, so we should enable initialization functions of RT30xx in chips/rtmp\_chip.c file. We must Change if (IS\_RT3390(pAd)) to if(0), and shield off RT33xx\_Init (pAd). Run make order. Copy rt3070sta.ko in /tftpboot/ directory to NandFlash of this system, and then run insmod rt3070sta.ko order[6].

Run network configuration order as follows:

```

ifconfig ra0 192.168.1.6 up // configure an IP address and open network card
iwlist scan // Search network
iwconfig ra0 essid "xxxxx" // Connected to the "xxxxx" network

```

We only configure the corresponding driver in linux kernal and don't install additional driver because version 2.6.30.4 of the Linux kernel support driver of Z301P.

**Video Acquisition and Transmission.** Run /mjpg-streamer/start.sh script file in the terminal of this system. We write http://192.168.1.1:8080/?action=stream to address bar of Mozilla Firefox, and then we will see video collected by remote camera in Mozilla Firefox.

## Conclusions

Because this system use ARM as core processor, and use camera to collect video data, and use mjpg-streamer as Network video server to realize video wireless acquisition and transmission so we quickly and successfully build wireless network video collection and transmission based on ARM.

## References

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