

Fast and Robust Multiple Moving Object Tracker for Security Based on ARM 11

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Abstract *this paper introduces a security system in the restricted areas based on the technology of ARM11 and 3G communications to improve the mobility of the traditional video surveillance system; this paper puts advanced design of embedded video surveillance system based on 3rd generation mobile telecommunications. It uses ARM11 hardware platform and embedded Linux operating system to implement the real-time display of the video images on the development area. It presents structure and design work principles of the system, puts emphasis on the hardware processing circuits and design of video image software as well as the foundation of 3G remote communications. The proposed system uses webcam which is connected to ARM11 board through USB host. Whenever person enters into the room then only the camera will captures the person's image and send it to controller. The controller will process the information and send it to mobile through 3G modem. By using the wireless technology which is used to give indication that somebody entered into the room by giving buzzer sound as an indication which is just used to alert the people inside the restricted areas. Another, It carefully analyzes 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.*

Keywords— ARM11; camera; 3G modem and touch screen;

1. INTRODUCTION

With the rapid development of the electronic technology, multimedia technology and 3G mobile communication technologies, video monitoring system is going to the embedded, digital and wireless direction. With the advantages of small size, better real-time and high stability, the application of the embedded technology in monitoring is becoming a new hot field. Compared with the previous video codec standards, the new H. 264 standard has higher compress performance, better network compatibility and better error-resilient, and it can adapt to the radio channel with high packet loss rate and serious interference. So the H.264 standard has very broad application prospects [1]. The whole video surveillance system adopts c/s

(client/server) structure which contains two parts: the server and the client. The client-side is based on the arm1176jzf-s microprocessor and embedded Linux environment. in the client-side, the built-in much module in arm11 and the 3G wireless module are adopted to complete H.264 coding and wireless transmission. digital satellite TV quality, for example, was reported to be achievable at 1.5 Mbit/s, compared to the current operation point of mpeg2 video at network protocols hand around 3.5 Mbit/s [2]. because of multi-picture inter-picture prediction, new transform design features and entropy encoding, H.264 has enhanced compression performance. The algorithm of the H.264 can archived the data required about mpeg-2 for the 36%, h.263 for the 51%, and mpeg-4 for the 61% [3]. H.264 is the most efficient video compression standard. It follows the general concept of most of today's video codec, a macro block-based coder that uses inter picture prediction with motion compensation and transform coding of the residual signal. The encoder outputs slices: a bit string that contains the macro block data of an integer number of macro blocks, and the information of the slice header (containing the spatial address of the first macro block in the slice, the initial quantization parameter, and similar information). Macro blocks in slices are arranged in scan order unless a different macro block allocation is specified, by using the so-called flexible macro block ordering syntax in-picture prediction is used only within a slice [4].

The server will provide video display and sql server database which stores user information, video information and other relevant information. And the java is chosen as the development language for server-side application which realizes the functions of real-time video display and graphical control console. The server-side then sends feedback RTCP packets to the source in order to inform it about the congestion status. Thus, the server-side will decrease its transmission rate once it receives the RTCP packet. This way, the source can always keep up with network bandwidth variation and the network is therefore utilized efficiently [5]. the main aim of the project is to design a motion detection system which is based on arm 11 micro controller and embedded Linux. The existing motion detection system will make use of any camera which is interfaced to a micro controller of any type. the main disadvantage of this type of systems is they will

continuously capture or continuously record the video and it will not check whether any object or person or any other thing is present at that location or not. So it will cause wastage of power of the total motion detection system and at the same time wastage of the memory used to store the data base of the captured image or video.

The hardware of the video surveillance system which based on arm11 is composed of the main controller module, the 3G module and the camera module. The main controller module is the core of the whole client-side, adopts the S3C6410 microprocessor produced by Samsung. the 3G wireless data card which can transfer video data over a wireless network the USB camera which can output you video data is chosen as the camera module in the system the S3C6410 development board has many interfaces, and camera module is attached to the main controller with the USB camera.

2. SYSTEM DESIGN MODEL

2.1 Hardware module implementation

This paper introduces a security system in the restricted areas based on the technology of ARM11 and 3G communications. It uses ARM11 hardware platform and embedded Linux operating system to implement the real-time display of the video images on the development platform. It presents the structure and work principles of the system, puts special importance on the hardware processing circuits and design of video image software as well as the foundation of 3G remote communication.

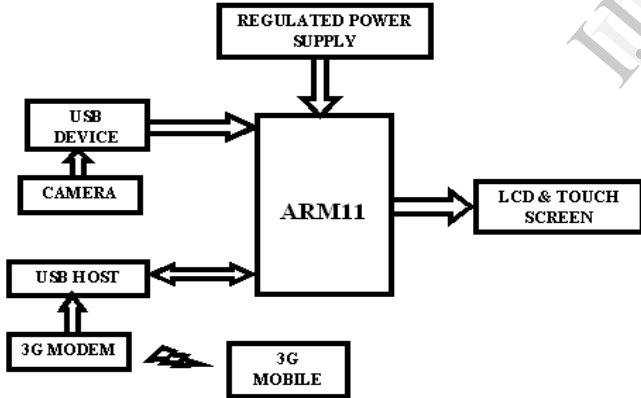
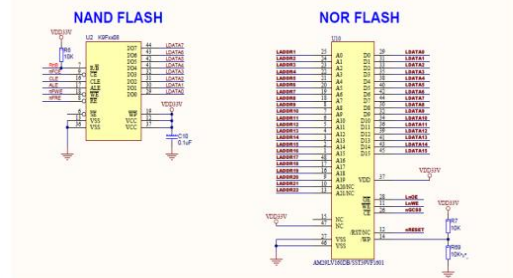
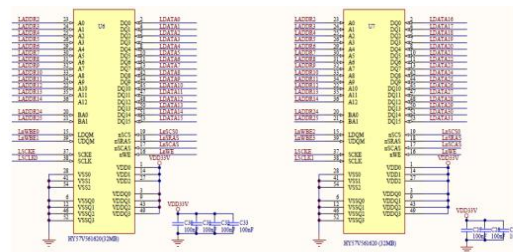
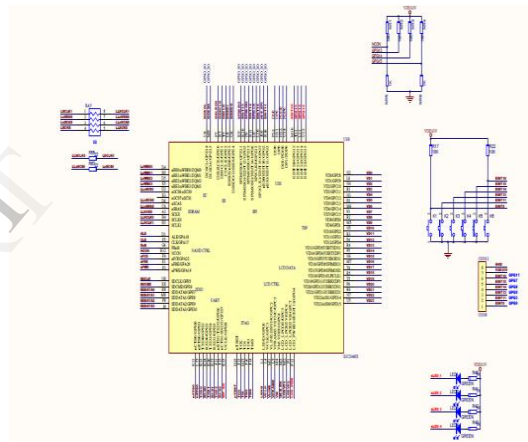
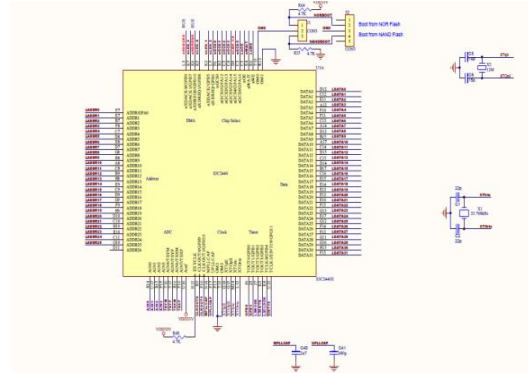
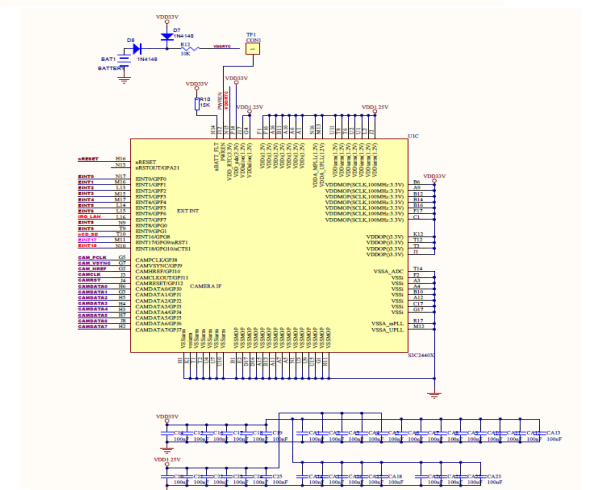
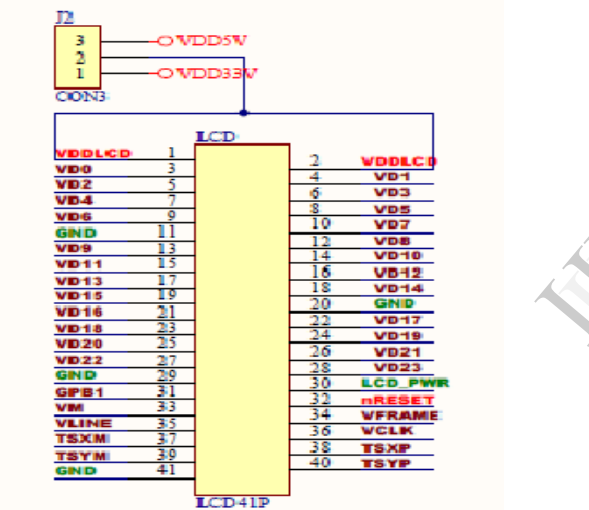
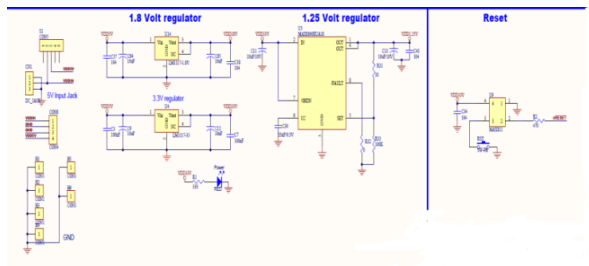
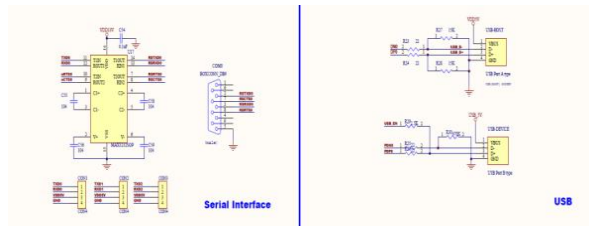


Figure: 1 implementation block diagram

The project uses webcam which is connected to ARM11 board through USB host. Whenever person enters into the room then only the camera will captures the person's image and send it to controller. The controller will process the information and send it to mobile through 3G modem. Another, It carefully analyzes and studies video data compression of USB digital camera and the 3G network transmission. Thus, a design of a convenient and good characteristic device on real-time video capture and transmission is realized as shown in the figure.

2.2 design and development of hardware main circuit diagram and its overall operation:





2.3 Software module implementation

The proposed motion detection system makes use of USB camera which is interfaced to lower power consumptive and highly advanced micro controller like S3C6410. S3C6410 is a Samsung company’s microcontroller which is designed based on the structure of ARM 1120T family. This microcontroller works for a voltage of +3.3V DC and at an operating frequency of 700 MHz the maximum frequency up to which this micro controller can work is 533 MHz

We cannot get S3C6410 microcontroller individually. We will get it in the form of FRIENDLY ARM board otherwise we can call it as MINI 6410 board.

In order to work with ARM 11 micro controllers we require 3 things. They are listed below.

1. Boot Loader
2. Kernel
3. Root File System

Boot loader: The main functionality of boot loader is to initialize all the devices that are present on the mother board of MINI 6410 and at the same time to find out whether any problem or any other fault is there in the devices that are present on that mother board of MINI 6410. The other feature of the boot loader is to find out what are the different operating systems that are present in the standard storage devices and to show it on to the display device so that user can select between the operating systems into which he wants to enter. One other feature of the boot loader is to load operating system related files byte by byte into the temporary memory like RAM. In our current project we are using boot loader like Super vive which is MINI 6410 specific.

Kernel: The core part of an operating system we can call like kernel. Operating system will perform its functionalities like File management, Process management, Memory management, Network management and Interrupt management with the help of the kernel only. Kernel holds the device related drivers that are present on the motherboard. FRIENDLY ARM board supports for operating systems like SYMBION, ANDROID, EMBEDDED LINUX, and WIN CE. But in all these operating systems EMBEDDED LINUX will provide high security to drivers and files.

So in our current project we are making use of kernel of EMBEDDED LINUX with which device related drivers that are present on the mother board of FRIENDLY ARM board will automatically come when we load EMBEDDED LINUX related kernel.

Root File System: File system will tell how the files are arranged in the internal standard storage devices. In embedded Linux, kernel treats everything as a file even the input and output devices also. In embedded Linux, Root is the parent directory it contains other sub directories like dev, lib, home, bin, sbin, media, mint, temp, proc, etc, opt and etc. According to our application we will interface some external devices also. All the devices means internal devices that are present on the motherboard of MINI 6410 will get their corresponding drivers when we load

Embedded Linux related kernel. But these device drivers require micro controller related header files and some other header files which will be present in the lib directory which is present in the root directory. And also the devices related drivers will be present in the device directory which is again present in the root directory. So whenever we will load the Root File System then we will get different directories which will be helpful to the kernel. So compulsorily we need to load the Root File System. MINI 6410 specific Root File System is Root Qtopia.

The essential programs that are required in order to work with MINI 6410 like Boot loader, Embedded Linux related Kernel, Root File System will be loaded into the NOR flash which is present on the MINI 6410 board itself. The program that is related with the application will be loaded into NAND flash which is also present on the MINI 6410 board itself. By using boot strap switch that is present on the MINI 6410 will help the user to select either NOR or NAND flash. After that by using DNW tool we can load Boot loader, Embedded Linux neither related kernel and Root File System into NOR flash by using USB cable and the application related program into NAND flash. Once loading everything into MINI 6410 board it will work based on the application program that we have loaded into the NAND flash. Now the CMOS type camera will be interfaced to the MINI 6410 board itself. The camera will continuously record the video and continuously it will send them through Ethernet technology frame by frame. If any motion is detected it can be either related to any person or related to any object at that moment it will capture that image and stores into the internal memory of the micro controller. So it will reduce the power consumption when compared to the normal Motion detecting Systems.

In this way we can design a lower power working Motion Detection System by using MINI 6410 board and Embedded Linux.

2.4 Design model operation

This paper contains ARM11 board which is having in built memory where we store program. The ARM11 board uses a 1.8v power supply. The board is programmed through DB9 connector to the PC. We have serial communication ports which are used to interface directly to the RS232 cable interfaced directly to the PC. The program is burned inside the controller by using the tool DNW.

3 EXPERIMENTAL RESULTS

For implementing this project we are using Linux, Qt for embedded Linux and open CV library. The Linux open source operating system, or Linux OS, is a freely distributable, cross-platform operating system based on Unix that can be installed on PCs, laptops, net books, mobile and tablet devices, video game consoles, servers, supercomputers and more.

Qt for Embedded Linux is a C++ framework for GUI and application development for embedded devices. It runs on a variety of processors, usually with Embedded Linux. Qt for Embedded Linux provides the standard Qt API for

embedded devices with a lightweight window system.

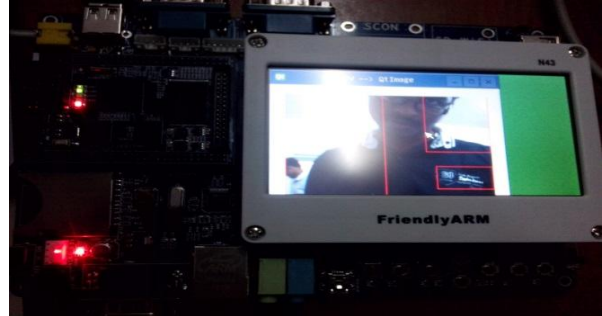


Figure: experimental set-up.

Open CV is an open source computer vision library originally developed by Intel. It is free for commercial and research use under a BSD (Berkeley Software Distribution) license. The library is cross-platform, and runs on Linux, Windows and Mac OS X. It focuses mainly towards real-time image processing, as such, if it finds Intel's Integrated Performance Primitives on the system, it will use these commercial optimized routines to accelerate itself.

4 CONCLUSION

This paper concludes the project title on “the video monitor wireless transmission system based on arm11” has been successfully designed and tested. It has been developed by integrating features of all the hardware components and software used. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit. Secondly, using highly advanced ARM11 board and with the help of growing technology the project has been successfully implemented.

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