Design of Security System by Using 3G Based Video Streaming

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Abstract — In this paper the design and implementation of security system by using 3G based video streaming is proposed. The realization of both wired Ethernet and the wireless 3G accesses of internet are implemented. In this project one can monitor a particular place from any remote location by using the 3G network.

Keywords— embedded web server; S3C2440 ARM microprocessor; USB Device, Ethernet

I. INTRODUCTION

In the existing system is designed as a system which is used to monitor the movements inside the area in this system to monitor the conditions CC camera is used where the distance of monitoring the movement will be limited and to monitor we require a TV which will be placed inside a control room. To monitor the conditions person should be present inside the control room but it is impossible to monitor movement in TV for each and every second. Mobile video surveillance has been envisioned in the literature as either classical video streaming with an extension over wireless networks, with no processing at remote side but only remote control by a human operator, or as a special case of distributed wireless sensor networks in which one type of sensors corresponds to video sensors[1].Video surveillance system has gone through three stages including Simulation Monitoring System, Digital Monitoring System and Network Monitoring System which is the most popular, most widely used. Wireless Internet monitoring system which is based on GPRS (General Packet Radio Service) or CDMA (Code Division Multiple Access) is born when wireless communication service providers start to provide data communications services.

Whether it is CDMA or GPRS network, the supreme bandwidth is less than 100kbps. Usually transmitting the acquisition time interval of a few seconds of images, image continuity is poor and cannot transfer real-time coherent picture [2]. The 3G (3rd-generation) is able to provide diversified, high-quality multimedia services, to achieve Seamless global coverage, global roaming capability. In the quasi-static conditions, the rate of 2 Mbps can be achieved, even in high-speed train; the data rate is up to 144kbps, to support multimedia services such as audio or video. Based on mobile terminals for mobile video surveillance system will be a hot research as the mobile terminal equipment (such as PDAs, smart phones and car alarm systems, etc.) performance is continually improved.

II. THE MAIN FUNCTION OF THE SYSTEM

The applying S3C2440A of ARM920T processor system can provide a strong driving force for a variety of mobile multimedia software and an integrated support for MPEG-4 format hardware video codec, support for resolutions up to VGA (640x480) MPEG-4 format video codec, maximum

Frame rate 30f/s Mobile video surveillance systems use GPS receiver for automatic positioning. GPS receiver module of mobile terminals receives GPS satellite positioning data to calculate its own position. 3G modules send the location, status, alarm of mobile terminal and input information of sensor which is coded according to the protocol of the agreement to the 3G network through the SMS. 3G will receive the mobile location information transmitted to the monitoring center of the communication gateway, through the communications processed, forwarded to the control terminal, and the geographic.

III. THE HARDWARE DESCRIPTION OF MOBILE VIDEO SURVEILLANCE

![Fig 1: Hardware of the video surveillance system [3]](image-url)
A. Ethernet

Ethernet [4] is a family of computer networking technologies for local area networks (LANs) commercially introduced in 1980. Standardized in IEEE 802.3, Ethernet has largely replaced competing wired LAN technologies. Systems communicating over Ethernet divide a stream of data into individual packets called frames. Each frame contains source and destination addresses and error-checking data so that damaged data can be detected and retransmitted.

The standards define several wiring and signaling variants. The original 10BASE5 Ethernet used coaxial cable as a shared medium. Later the coaxial cables were replaced by twisted pair and fiber optic links in conjunction with hubs or switches. Data rates were periodically increased from the original 10 megabits per second, to 100 gigabits per second.

B. RS232 (serial port)

RS-232[5] (Recommended Standard - 232) is a telecommunications standard for binary serial communications between devices. It supplies the roadmap for the way devices speak to each other using serial ports. The devices are commonly referred to as a DTE (data terminal equipment) and DCE (data communications equipment); for example, a computer and modem, respectively.

RS232 is the most known serial port used in transmitting the data in communication and interface. Even though serial port is harder to program than the parallel port, this is the most effective method in which the data transmission requires less wires that yields to the less cost. The RS232 is the communication line which enables the data transmission by only using three wire links.

C. HARDWARE OF VIDEO CONTROL SERVER

In this project we are using the Samsung embedded processor S3C2440A and peripheral hardware circuits with embedded core board. Audio and video capture and MPEG-4, CAT coding are completed by the S3C2440A processor, and assume the AID conversion, compression, data encryption, wireless sending task. Video signal collected by Video camera send into the device by the video input interface and complete the decoding conversion. After decoding the digital video into the main processing chip, the MPEG-4 hardware encode for video compression coding. Microphone collected audio signals is sent through the audio input device and complete the PCM coding. Digital audio via I2S bus sent to ARM processor modules by the CAT coding compression. ARM920T running embedded Linux operating system, user applications can adjust the resolution of MPEG-4 Encoding, frame rate and bit rate, can also set the audio encoding rate of CAT module. Applications process the compressed encoded audio and video data to AES encryption, to form the control data transmission and storage, followed by one hand, the embedded Linux drivers to write the data to the SD card, on the other hand the data in accordance with the RTP packet network protocol package, through the 3G wireless module sends to the network. Users can use portable computers in the field through the USB interface configuration front-end collecting device.

Parameters which are written in Flash chips under the control of ARM. Some parameters become effective immediately after being set up. Some parameters take effect after re-start the front-end device, depending on the circumstances. In addition, real-time video data collected through the USB interface, can also be sent directly to portable computers.

D. MPEG4 DEVELOPMENTS

Similar to the procedure applied to the development of MPEG1 & 2, the definition of the tools that will integrate the MPEG4 standard will be done through the, so called, core experiments process based on a coding model. In MPEG4, this coding model is known as the verification model (VM). The VM is a completely defined encoding and decoding environment such that an experiment performed by multiple independent parties will produce essentially identical results [5]. New tools can be integrated in the VM, substituting other tools, when the corresponding core experiment has shown significant advantages in this integration.

The representation architecture adopted for the first MPEG4 video VM is based on the concept of VOP, such as it has been described in this paper (in fact, the author was one of the proposers of this architecture) [9]. The encoder architecture is presented in figure 4. The scene is
‘understood’ as a composition of VOPs with arbitrary shape. The method to produce the VOPs is not considered in the MPEG4 VM. This means the VM is able to code video scenes with more than one VOP, if the scene is, by some means, previously structured in VOPs.

The VOPs may have different spatial and temporal resolutions and each VOP has assigned a composition order. The composer uses a recursive blending of the VOPs, such as it was defined in the document specifying the MPEG4 tests [8]. The α-channel information may be binary or represented

IV. SOFTWARE DESIGN AND DEVELOPMENT OF THE VIDEO CONTROL SERVER

The video control server uses embedded Linux system as its operation system. The main software architecture of video control server is shown in Fig. 5. The video control server software consists of two functional components: the internal server control program and the external connection management program. The external connection management program consists of an embedded web server, the CGI program, the external network access interface program including the 3G and Ethernet network access control program. The Internal server control program consists of an internal network control application program, a video nodes control program and a SQLITE embedded database. TCP/IP protocol based on 802.11 protocol stack & driver module is applied in video nodes control program. The SQLITE embedded database based on the virtual file system adopts JFFS file system for its file storage system. The external connection management program and the internal network control program are two processes which communicate with each other. We use BSD (Berkeley Software Distribution) Socket to not only realize the communication between processes within the video control server but also communications among processes on the video server and end-users. [16]

Therefore, we have chosen the universal Socket interface to define the interface between the internal server control program and the external connection management program. Figure 5.

The CGI program is the core of the external connection management program. Its function includes sending control commands through or receiving data from the external network interface program including the 3G network access program and the Ethernet access control program, enabling the interaction with the internal network control application program. Embedded web server works as a process which runs after the internal network control application process when the system is electrified and it will last in the running period of video control server program. Both the interaction between web server and the CGI program and the interaction between the internal network control application programs are implemented with BSD Sockets.

The internal network control application program is the central component of the internal server control program. Data from each of video data nodes is collected by the video nodes control program, which is sent to the CGI and web server program for publishing and certain frames of the video streams can be stored into the SQLITE database for long-term storage. [5] The video stream data can also be managed by the internal network control program and sent to the webpage for playback without storing into the embedded database.

When the video control server is electrified, video data nodes, the internal network interface and the video server program of video control server will be initialized. Then, the web server process is started, waiting for connections from end-users. When a user accesses the web server from the Internet, the embedded web server will allow users to access over long-distances. After authentication, users can log into the server by a standards compliant web site, check the working status of all video data nodes within the network. The Web server can not only display pre-developed static Web pages but also interact with the internal network control program and present dynamic commands to users.
V. EXPERIMENTAL RESULTS

Embedded website can capturing a place at which we want monitor and according to our requirements it us shows us the videos and images and location of that place continuously. Some results of this research are shown below.

VI. CONCLUSION

From this research one can conclude that one can secure our place from any remote location by using the 3G network no need of maintain the control rooms for monitoring some particular place. This research also concludes that 3G network can work well under the circumstances of limited bandwidth. This system is a high reference value in many industries, banking sectors and many market expansions. In this research we have studied the characteristics of 3G network working principle final design of system frame work and the key technologies. We can get maximum video resolution by using the 3G network.

VII. REFERENCES


