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Next Generation SMART Supervisor using ARM 11

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Abstract **– In this paper the live video monitoring system with Arm 11 is studied. Live video streaming refers to sending video signals real time over the Internet. Today, live video streaming technologies are widely used in broadcasting news, connecting friends and relatives in online chat rooms, conducting businesses online face to face, selling products and services, teaching online courses, monitoring properties, showing movies online, and so on. We develop the system using ARM11 Raspberry Pi Micro Controller board for live video streaming application. The system will consist of ARM11 board, Webcam, stepper motor driver, SD card/Pen drive interface, sensors, relays.**

Keywords **– Live Video Streaming, ARM 11, Smart Phone, Web Camera.**

I. INTRODUCTION

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. Remote monitor has become an important maintenance method that is based on the network.

There are two units Raspberry Pi Unit and Process unit with wireless link between them. Process unit will send sensor reading to Raspberry Pi Unit which will be uploaded to the server. The webcam will be connected to ARM11 controller. The video will be sent on internet. Also sensor readings will be sent using Internet. The camera can be rotated from server .For this stepper motor will be used. The software at server contain different control buttons like show video, rotate camera, change set point of process unit. Video Capture Based Video4Linux is a Linux kernel on the video device driver, which is for video equipment, application programming interface functions to provide a system[2]. Media streaming applications have distinctive Quality of Service requirements, such as delay sensitiveness and loss tolerance. Specifically, each packetized media unit has a presentation deadline at the client, which is determined by the interactivity requirements and buffer limitations. The deadline constraint imposes restrictions on the transmission delay of video packets[1].

Processor: Processor based on ARM11 architecture is selected in the system; its expansion board provides the IO resources associated with our design.

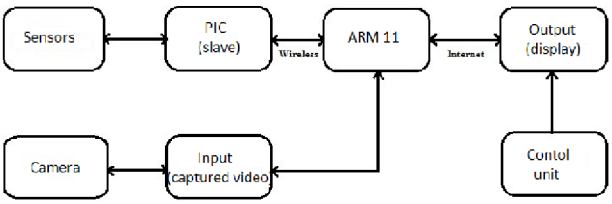


Fig.1. Systems Block Diagram

Camera: CMOS camera is selected in the built system. Particularly in poor light, the speed of CMOS camera is slower, but its price very low, and CMOS has power consumption only when the circuit is connected, it is generally used low-end cameras, digital cameras and toys. There is a 20P plug with 2mm pitch in ARM used as extension to connect the camera [6].

The general principles of Internet-based control systems have been modelled. Interactive Internet-based systems provide a way to monitor and adjust using standard web browsers and a PC. The target systems can be monitored and controlled

Independent from the location and the platform since standard web browsers can be used on the client side. A typical data-acquisition system is made up of three components connected to each other via the Internet.

II. HARDWARE DESIGN

This system consists of 2 units Slave Unit, Master Unit and program download kit. The sensor is connected to slave unit. Sensor readings are transmitted to master via CAN protocol. These readings are then transmitted to server via internet using rabbit processor. At server user can see parameters at front end designed using VB and also he will be able to control it. At server user also provided with program download facilities. User can change program in the master unit using the internet[4]. It will establish an Internet link to the server and also control reset and other necessary circuit required for programming, and download the program in Master unit.

(1) Video capture module: Camera captures video frames and sends them to video processing module.

(2) Video transmission module: Send video information containing the moving target to the user's mobile phone to complete the remote video surveillance.

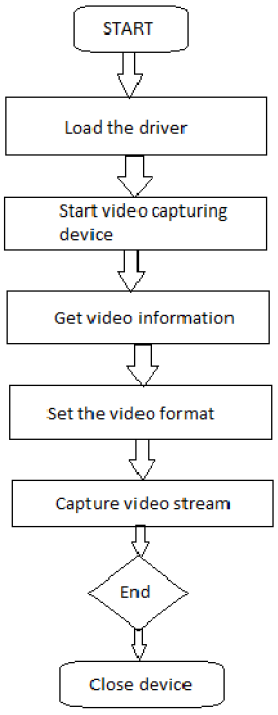


Fig.2. The flow chart of video capture module

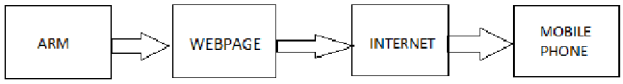


Fig.3. The diagram for transmission of video information

Wireless communication and mobile technologies are already well established in modern surveillance systems. Mobile-based client applications are commonly used to provide the basic access to camera video streams and other system resources. we observe the growing popularity of mobile and wireless access solutions. The performance of the access application was dependent on the particular installed hardware. Therefore surveillance systems have moved from traditional analogue into digital and IP-based technologies. Theaccess applications have been made hardware independent.

a) Master Unit

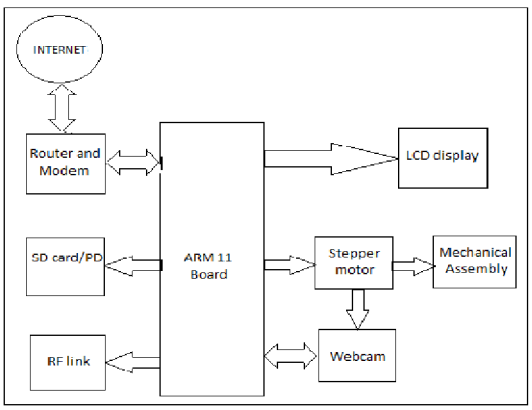


Fig.4. Master unit

Master unit will receive data from process unit through wireless zigbee transmission. Also it will send data to server unit by raspberry pai module. User can change program in the master unit using the internet. This module handles video information from video capture module, that is to say, detecting whether there is an intruder appearing in the monitoring scene. In order to improve accuracy and stability of the system, on the basis of background subtraction, an improved moving detection algorithm is proposed[3]. The main idea is: in background subtraction, the background image is fixed, so in the case of long-term monitoring, the changes of ambient light will reduce the accuracy of moving detection. To overcome this drawback, the adaptive background updating method is introduced, which can real-time update the background to reduce the impact of the ambient light.

b) Slave Unit

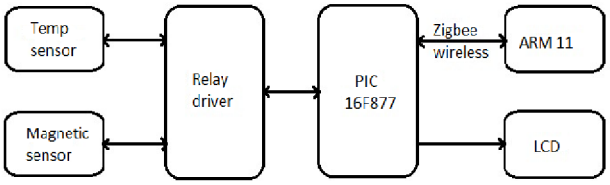


Fig.5. Slave unit

The analog output of the parameter sensors are converted into a digital signal by the In Build ADC of the ARM11 microcontroller. Two units Raspberry Pi Unit and Process unit with wireless link between them. Process unit will send sensor reading to Raspberry Pi Unit which will be uploaded to the server. The webcam will be connected to ARM11 controller[6]. The video will be sent on internet. Also sensor readings will be sent using Internet. The camera can be rotated from server. The set point and the current value of parameter both will be simultaneously displayed on the LCD and the same data will be sent to master unit[7] .The predefined set point of camera can be changed from a monitoring scene.

ZIGBEE - The CC2520 is second generation ZigBee RF transceiver. This chip enables industrial grade applications by offering state-of-the-art selectivity/co-existence, excellent link budget, operation up to 125°C and low voltage operation**.** CC2520 is controlled by PIC microcontroller connected to the SPI and some GPIOs. The microcontroller will send instructions to CC2520 and it is the responsibility of the instruction decoder to execute the instructions or pass them on to other modules.

III. SOFTWARE REQUIREMENT

1. Embedded C for Micro Controller.
2. HTML for webpage.
3. Embedded C for PIC.

IV. HARDWARE REQUIREMENT

1. Rasberry pai
2. Max 232
3. 16X2 LCD
4. Power Supply
5. An application unit using ARM Controller
6. Internet Connection with router and modem etc.
7. Zigbee.

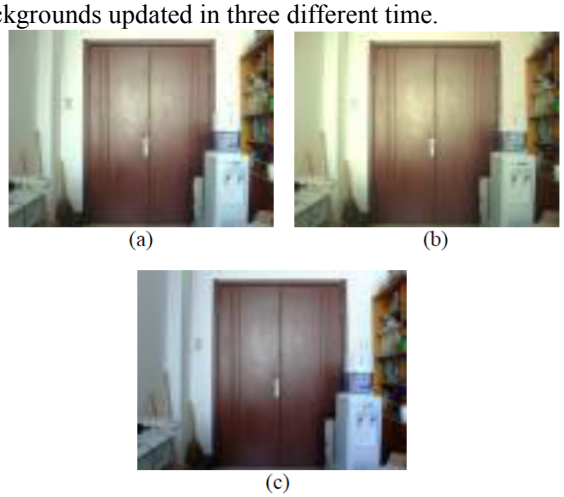
V. SENSORS

LM35- The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in degree Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling .The LM35 is rated to operate over a -55 degree to +150degreeC temperature range.

Magnatic Sensor - The sensors are standard magnetic door sensors used in security applications. These ports are supplied with a +5 v dc supply voltage which sense whether the door sensors are open or closed. When one of the C123C contacts are shorted (closed) the reported value approaches zero, typically values of 2 or 3 are seen. When the contact opens, the value jumps to 99.

ARM11 processor core is build and expanding peripheral devices using embedded Linux as the operating system. Today monitoring systems are either webcam based or simple motion detection based. Here we have interfaced both webcam and PIR sensor.

In the system, the background of the monitoring scene is updated real-time, being able to adapt to changes in ambient light when long-term monitoring, they are backgrounds updated in three different time.



(a) (b)

(c)

Fig.6. Backgrounds updated in three different time: (a) is the background updated in about 9 am; (b) is the background updated in about 12; (c) is the background updated in about

In the system, each video frame is saved with the fixed size, and in the video processing module, by comparing the number of pixels in the continuous region of the difference image.

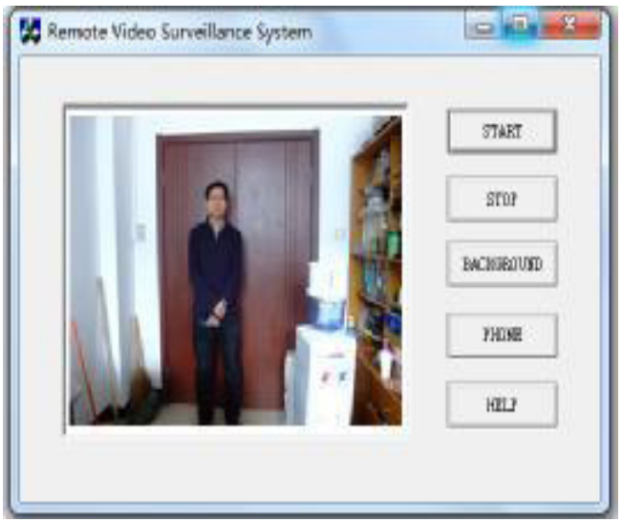


Fig.7. The interface map of our system starting

The webcam will be connected to ARM11 controller. The video will be sent on internet. Also sensor readings will be sent using Internet. The camera can be rotated from server. For this stepper motor will be used. The software at server contain different control buttons like show video, rotate camera, change set point of process unit.

VI. RESULTS

We created the webpage for sending the captured video signal to the destination or receivers end .User have to log in that page with specific ID and password. He can receives the signal on his android based smart phone .We are getting 1 to 4 sec delay for transmitting and receiving the video signal. This delay depend on the GSM server that we are using .With the help of stepper motor we can rotate the camera by 90 degree in 2-3 seconds.

VII. CONCLUSION

An embedded real-time monitoring system based on ARM was built, it succeeds in network video monitoring and upgraded towards home automation or security automation system. The system has low-cost, good efficiency and portability and is easy to maintain and upgrade. It has advantages at low power consumption. The Video compression module has good real-time processing performance and the saved video frames have high quality.

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REFERENCES

[1] Chen Rongfang, Wang Haibin, Hu Zhenhua, Zheng Pin. Remote Monitor System of Power Network Based on Embedded Internet Technology. Microcomputer Information. vol. 24, no. 7-2, pp. 78-80, 2008 S3C6410 Microcontroller User's Manual Revision1 http://www.samsungsemi.com..

[2] Hang Zhou, David Suter,"A compact architecture for wireless video surveillance over CDMA network [A]," In: Proceedings of IEEE International Conference on Video and Signal Based Surveillance,2006 [C] Sydney, Australia, 2006, II,pp.102-107.

[3] Xie Hong-hua,Lu Yi-qin,Lv Jin,"The designing of High-quality real-time video surveillance system based on 3G wireless networ[J],"Computer Applications,2007,24(lO),pp.313-317.

[4] X. Cai, F. Ali, and E. Stipidis, "Mpeg4 over local area mobile surveillance system," lEE Colloq. (Dig.), vo!. 3-10062, pp. 81-83, 2003.

[5] Zhang Wan-fang,Su Hong-gen, "Stream media files of the Real-time Transport Protocol MPEG- 4 based on RTPIUDP/IP[J]," Computer Engineering and Designing, 2004, 2S(8),pp.1409-1410.

[6] Dong Xie. “ARM-based embedded remote monitoring and control system design Gateway”, Modern electronic technology, 2006.

[7] Jiqiang Xia,Jun Yuan,Qingfeng Man. “ARM-based processor of the CAN-Ethernet communication module”, Measurement and Control Technology, 2004, pp. 30-33.