

Smart Live Video Streaming Using Raspberry Pi

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ABSTRACT: In recent years, there has been an increase in video surveillance systems in public and private environments due to a heightened sense of security. The next generation of surveillance systems will be able to annotate video and locally coordinate the tracking of objects while multiplexing hundreds of video streams in real-time. Video surveillance has been evolving significantly over the years and is becoming a vital tool for many organizations for safety and security applications. Detection and tracking of moving objects are important tasks for computer vision, particularly for visual based surveillance systems. Video surveillance application, most times imply to pay attention to a wide area, so omnidirectional cameras or mobile cameras are generally used. In this system, we use the Raspberry pi chip as the microprocessor. Video data is captured from a USB camera or Raspberry pi camera, compressed into MPEG format, transferred the 3G network under the control of the ARM11 chip; then, the monitor client will receive the compressed data frame to restructure, and recompose video images. Wireless video monitor system provide a practical solution for remote wireless monitoring with low cost. The concept of video stream becomes invalid due to the mesh topology. The basic data unit in this kind of systems is video chunk. The multimedia server divides the media content into small media chunks of a small time interval, each of them with a unique sequence number that serves as a sequence identifier. Later, each chunk is disseminated to all peers through the mesh. Since chunks may take different paths in order to reach a peer, they may arrive to destination in a non-sequential order. To deal with this matter, received chunks are normally buffered into memory and sequentially rearranged before delivering them to its media player, ensuring continuous playback.

I. INTRODUCTION

Closed –Circuit Television is a System in which the signal are not distributed but monitored for security purpose. It is an indispensable device used for security purpose [1]. In supermarkets, factories, hospitals, colleges, school, companies have their own CCTV for 24 hours monitoring. Instead of using a traditional CCTV, now they can use the inexpensive security system with a tiny computer called as Raspberry Pi [2]. IP cameras can be used for send and receive data via internet using Internet protocol. A camera can be connected to the Raspberry pi for recording all happenings in area and can live stream in web browser or in mobile The smart phones for accessing the live streaming are equipped with significant processing, storage and sensing capabilities. There are many problem with this video surveillance such as inconvenient to carry, anomalies cannot be detected, picture is indistinct, and required more storage space for saving the surveillance[3].The motion detection can have the greater attract because of its important applications in areas such as traffic monitoring, video surveillance, sign language detection. To overcome this , they need a modern security system , a kind of image acquisition system based on ARM and Linux designed. It has a processing system USB camera, LCD monitor and build necessary peripherals for communication to complete the hardware platform. we apply the Motion detection for live streaming camera to analyse the incoming image and recognize the movement occur. The video can save and store the image for the review require for the administrators. They provide the internet access, through cellular connection and Wi-Fi and enable for the new application. Now a days a video application is popular. We need to meet the growing demand of the video application in cellular networks Safety monitoring and protection system plays a important role in people lives [4].There are more effective and reliable method for the security monitoring and protection system. There is a saying called "seeing is believing" much amount of information in image than language so can be easily understood. This motion detection algorithm is an automated approach in which it does not require the individual to start and stop the recording. So we decrease the storage and the cost of the equipment.

II. RELATED WORK

The next generation of surveillance will be able to annotate video and coordinate the tracking of objects with multiplexing hundreds of video streams [5]. Video surveillance has evolved over the years and is a vital tool for safety. It has been initially dominated by the camera with coaxial cables and they were connected using coax cables. There is a digital type of switching and IP-based data delivery. They can capture a wide area so, the camera here we are using omnidirectional camera or mobile camera can also be used. Raspberry Pi is used for core control, camera for capturing the video and a user phone or laptop connected to WiFi to receive the live streaming videos. Here we use a new feature known as the router for routing the video stream to network.

Table 1. Selection of Different Prototype Board

Name	RAM	O.S	Prog. language	USB Ports	Cost (\$)
Raspberry Pi	512m-1GB	Raspberian, Android, Fedor, free BSD	C, C++, Java, python	1-4	25-35
Arduino	16-32Kb	-	Arduino	1	34
Beagle- Bone black	512	Linux Angstrom	Arduino	1	45

Smart Security System has the capability of motion as well as the face detection. It uses basic background subtraction for motion, as it has the lowest processing speed requirement and is not used or implemented in the complex environment. Comparison with the different background subtraction based on Memory, Speed and Accuracy. Here we use the concept of the GMM algorithm for processing. GMM algorithm improves the foreground segmentation and reduces the processing speed.

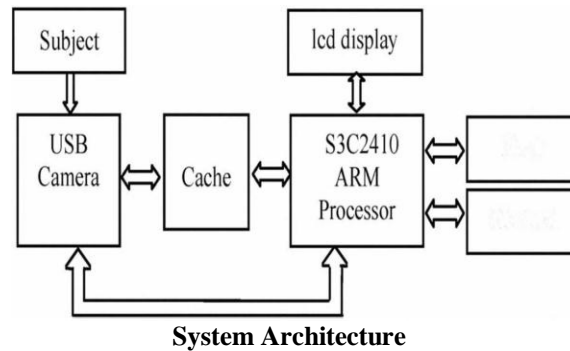
We implement this algorithm in some variable lighting conditions. The probabilistic foreground is used to identify the possible foreground. With the development of technology like IT, there is a rapid development in an embedded open Linux system, video conferencing, remote monitoring and mass data processing field can apply to embedded technology [6]. This technology has to overcome the weak points of traditional video surveillance such as poor stability and cost expensive. It has the advantage of hardware and software which can be cut or compact and low power consumption and used for the long distance transmission. Home security is fundamental these days of interruption and expanding step by step.

Such as burglary, crude gas and fire are necessary for home security framework. The GSM provides the improved security at any point of sensor happens.

III. SYSTEM ARCHITECTURE

In this architecture we use the camera module, Raspberry Pi device and connection among the devices to access video streaming. The camera module has been connected to the Raspberry Pi board and is used for high definition video and still photographs. The Raspberry Pi is setup with a python script and which automatically delivers the video stream to cloud server. The user can see the video from the cloud directly on web browser or any android devices.

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Over view of Raspberry Pi

The proposed system uses Raspberry Pi Model B+ single board computer and some key features:

- ✓ Broadcom BCM2835 SOC processor with 700 MHz ARM1176JZF-S cores.
- ✓ 512MB RAM
- ✓ Video core 4 GPU supports up to 1920x1200 resolutions.
- ✓ 5Mpix Camera module capable of full HD video @30fps
- ✓ .Micro SD card slot, 10/100Mbps Ethernet port, 4 x USB 2.0 ports, HDMI, audio/video jack, GPIO header,



- ✓ Micro USB power port, DSI and CSI ports.
- ✓ Dual step-down (buck) power supply for 3.3V and 1.8V
- ✓ Raspberry Pi device

B. Connecting the Camera



Connection of Camera module on Raspberry Pi board

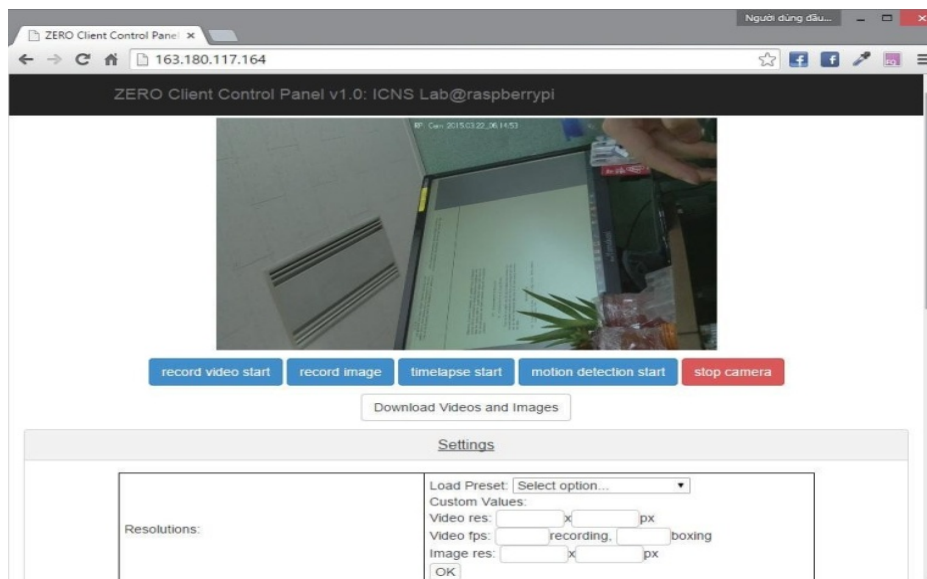
IV. IMPLEMENTATION

The Motion Detection algorithm works on principle of the frame differencing , Comparing that change of pixels value from one frame to another and also for object change in image.

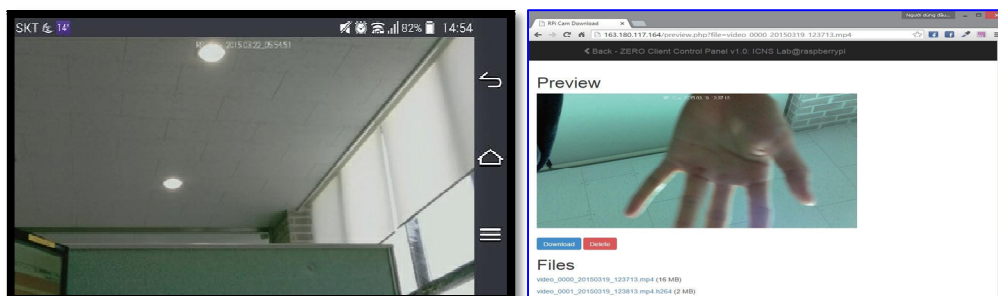
The Problem with this detection algorithm is it neither detect the slow moving object, because of sensitivity in the threshold, if it is too low and it detect like shadow and the image change in the sunlight. This algorithm is not able to handle rotating objects.

V. EXPERIMENTS & RESULTS

The below presents the screenshots of the system. Here the control panel with control option to save the file which is used for capture of picture some change in video resolution. When some movement occur it analyse the incoming image and store important items, and here we can view the JPEG images and video will be played smoothly even we can watch on mobile with good reliable performance. While remotely can view in the 640x360 MJPEG image, the Raspberry Pi reports 67% CPU without overlocking.



Monitoring Web Interface



VI. CONCLUSION & FUTURE WORK

An approach for the video surveillance monitoring system with the Motion Detection algorithm to decrease the cost as well as the storage using a raspberry pi as single board computer was propose in paper. But it is far from the final version and need to improve a lot .In Future we can improve with the threshold value which can be used in the Motion

Detection Algorithm. The performance can be enhanced to certain condition .If we have the some good threshold value and algorithm can detect the object which are moving and include slow or tiny object.

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