Live Video Streaming using Raspberry Pi in IOT Devices

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***Abstract*— Nowadays, closed circuit television for security and peace purpose for people. The traditional system has the several disadvantages such as inconvenient to carry, anomalies cannot be detected, storage space needed is more, and cost remains high. This paper provide the design and implementation of the technology called Live video streaming using Raspberry Pi in IOT devices, with a single board computer which computes the Motion Detection Algorithm written in python as programming environment. The system uses the algorithm to significantly decrease the storage space and to save the cost. The algorithm is implemented on the Raspberry Pi, which provide the live streaming with motion detection. The live steaming can be viewed from any web browser or even from mobile in the real time.**

Keywords*— Raspberry Pi, Motion Detection, Live Streaming, Video Surveillances.

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 smartphones for accessing the live streaming are equipped with significant processing, storage and sensing capabilities..

There are many problem with this video survelliance such as inconvenient to carry, anamolies cannot be detected, picture is indistinct, and required more storage space for saving the survelliance[3].The motion detection can have th greater attract because of its important applications in areas such as traffic monitoring, video survellience, sign language detection. To overcome this , they need a modern security system , a kind of image acquisition system based on ARM and Linuxha 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 detecion 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.

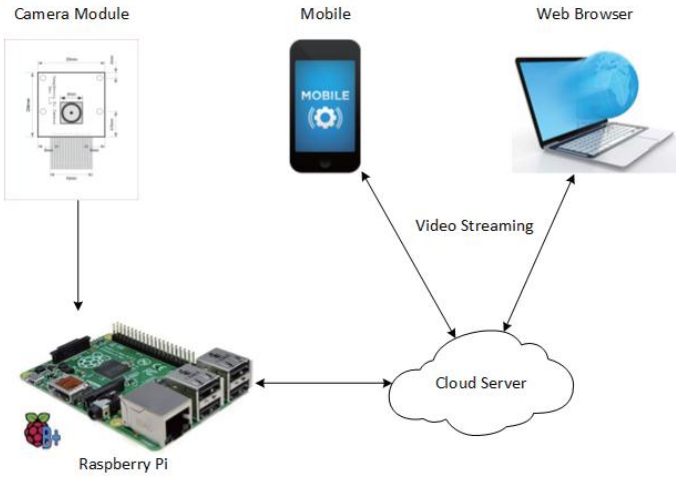

Fig1.System Framework

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 detecion algorithm is an automated approach in which it does not reaquire 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 survellance will able to annotate video and coordinate the tracking of object with multiplexing hundreds of video streaming[5].Video survelliance has evolved over year and vital tool for safety .It has been initially dominant by the camera with coaxial cable and they connected using coax cables. There is a digital type of switching and IP based data delivery.They can capture the wide area so, the camera here we are using omnidirecional camera or mobile camera can also be used.Raspberry Pi used for core control, camera for capturing the video and 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 ($)	
Raspber -ry Pi	512m 1GB	Raspberian, Android,Fed -ora, freeBSD	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 substraction for motion, as it has the lowest processing speed requirement and not used or implemented in the complex environment. Comparision with the different background substraction based on Memory, Speed and Accuary. Here we concept of the GMM algorithm for processing.GMM algorithm improves the foreground segmentation and reduce the processing speed.
We implement this algorithm in some variable lighting condition.The probobilistic foreground to identify the possible foreground.With the development of technology like IT, there is a rapid development in a embedded of open linux system , video coneferencing , remote monitoring and mass data processing field can apply to embedded technology[6]. This technology has to overcome week points of traditional video suveillance such as poor stability and cost expensive.It has 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 frame work.The GSM provide 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 be used for high definition video and still photographs.The Raspberry setup with a python script and which automatically delivery the video stream to cloud server.The user can see the video from the cloud directly on web browser or any android devices

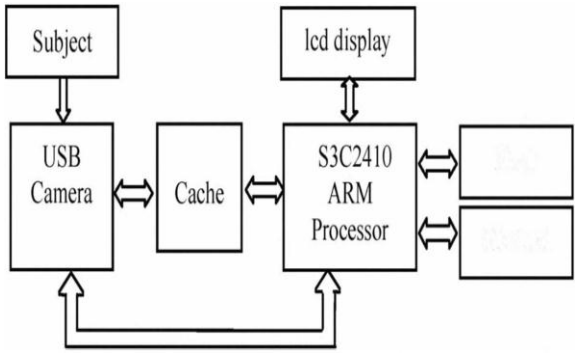

Fig 2 : System Architecture

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A. 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 700MHz ARM1176JZF-S core.
- 512MB RAM
- Video core 4 GPU supports up to 1920x1200 resolution.
- 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.

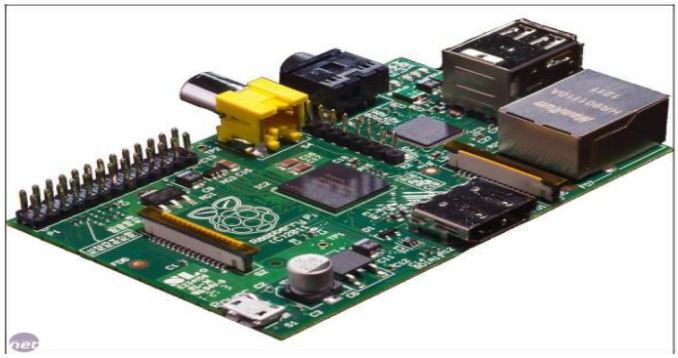


Figure 3: Raspberry Pi device

Initially , Raspberry Pi is new hardware device and provides the all functionality like the personal computer or laptops. It has 6 times more processing time then any other models.The Raspberry pi device is connected with USB and configured with camera module which connected to external monitor for

accessing the captured video.This Raspberry Pi, device runs on Raspbian OS and programmed using GNU octave and python, and is open source.The Dynamic host protocol is obtained used for Raspberry Pi and fetch the IP address.When we accessed then we can configured and controlled remotely.

B. Connecting the Camera

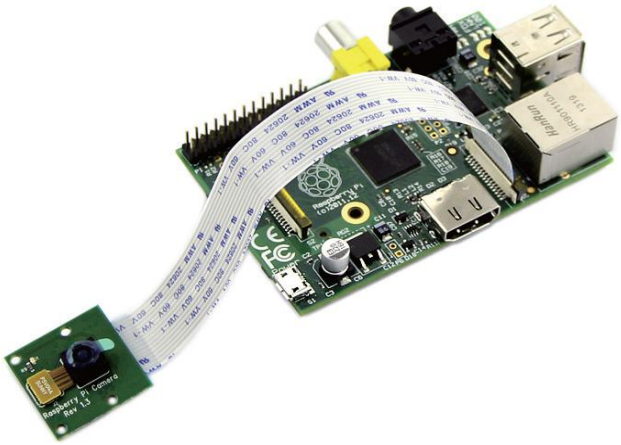


Figure 4: Connection of Camera module on Raspberry Pi board

A 5MP camera which is capable of the 1080p video and still images and be connected to Raspberry Pi device
directly with interface known as CSI(camera serial interface) and install the latest version of Raspbian operating system, then we go with camera.It has a focus 5mp sensor and capable of 2592x1944.
The whole device cost is $75 and this include the Raspberry Pi, USB camera and WiFi adapter.Thet cost is less when we compared.

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.

Algorithm : Motion Detection algorithm

1: procedure MOTION DETECTION
2: calculate the average of a selected color in frame 1
3: wait X seconds
4: calculate the average of a selected color in frame 2
5: if abs(avgFrame1 − avgFrame2) > threshold then
6: motion detected

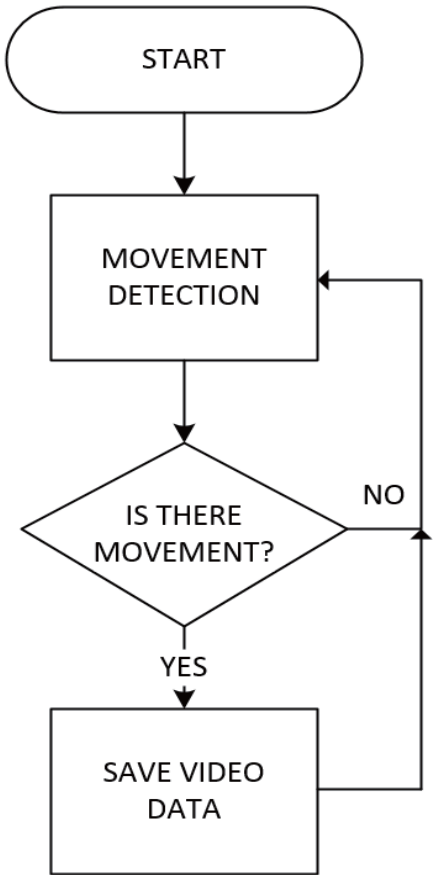


Figure 5 : Basic Flowchart of Algorithm

A. Face Detection

This depends on the algorithm,If motion detected then one frame will be input frame for face detection .It convert the image to gray scale improve the contract of image .The converted image perform through Haar classifier.

B. Remote Monitoring

To live streaming in the remote places and they need to install a motion software,and a camera for capturing image ,If in the place internet access is by ADSL line and configuration for the router with IP address connected to Raspberry Pi.

IV 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.

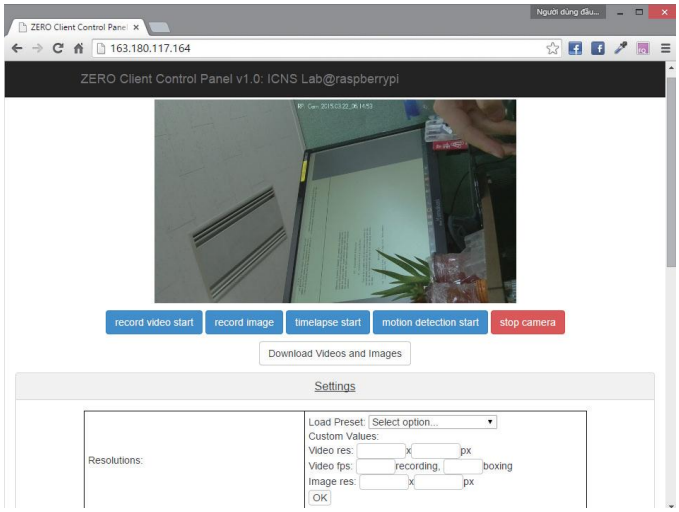


Figure 6: Monitoring Web Interface

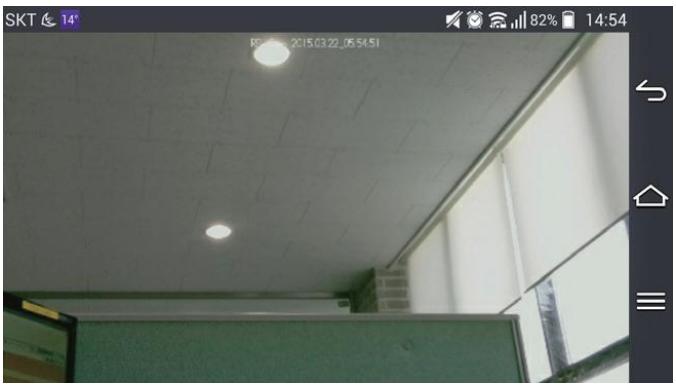
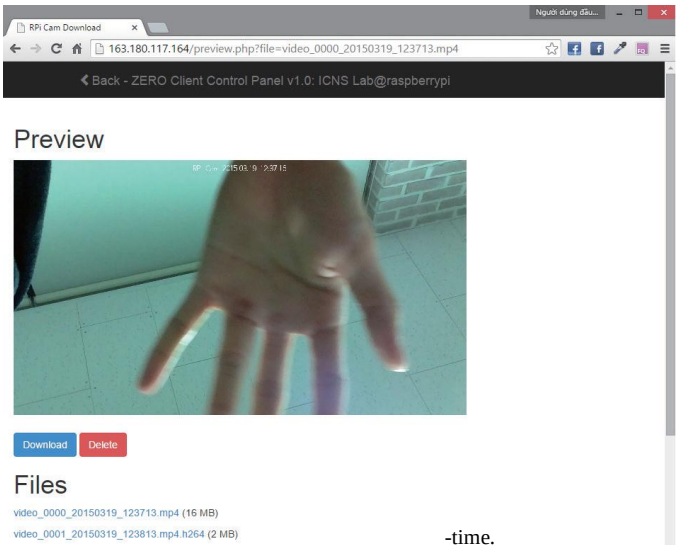


Figure 7: Interfaces on Mobile Devices.



-time.

Figure 8: Video Stream in real

VI . CONCLUSION & FUTURE WORK

An approach for the video surveliance 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.

ACKNOWLEDGEMENT

The authors would like to thank Prof .Dr. G. G SivaSankari Professor, and Head of Department Computer Science Engineering AMC Engineering College for her encouragement and support.

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