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Real Time Embedded Video Streaming Using Raspberry Pi

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ABSTRACT: Embedded Real-time video monitoring system is designed, in which the embedded chip and the programming techniques are used. The central monitor which adopts Raspberry pi is the core of the whole system. Real time video transmission is widely used in surveillance, conferencing, media broadcasting and applications that include remote assistance. Network video capture system using Raspberry pi is presented. This application system captures video, shares among networked systems and also alerts the controlling person with short message service alarm as required by the client. This system works in a real time environment and is supported by Raspberry pi. First, USB camera video data are collected by the embedded Linux system. All data are processed, compressed and transferred by the processing chip. Then, video data are sent to the mobile client by wireless network. This embedded monitoring system to overcome the weak points of the traditional video surveillance systems, such as complex structure, poor stability, and expensive cost. It can be widely used in many fields, and also used for long distance transmission. . This system provides low cost and high effective intelligent monitoring system like in elevators, home security systems etc. with low power consumption. Unlike other embedded systems this real time system provides client video monitor with the help of Raspberry pi.

KEYWORDS: Robbery Pi 3, Wireless Fidelity Connection, LAN, Raspbian OS, Web Server.

I. INTRODUCTION

The Video surveillance [1] systems play an increasingly important role to maintain social security. It has been widely used in many fields, such as finance, public security, banking, and home. Traditional video surveillance can generally achieve close distance monitoring, by using the PC as a monitor host, monitor host connected monitor camera with coaxial cable. With the development of IT technology, especially the rapid development in embedded CPU of the open Linux systems, video conferencing, remote monitoring, and mass data processing fields can apply the embedded technology. This embedded monitoring system to overcome the weak points of the traditional video surveillance systems, such as complex structure, poor stability, and expensive cost. Meanwhile, it possess some advantages, for example, hardware and software can be cut, compact construct, portable, low power consumption, more suitable for long-distance transmission. In this system, we use the high-performance S3C6410 chip as the microprocessor. Video data is captured from a USB camera, compressed into MPEG format. There are numerous issues in the video reconnaissance framework [3], for example, picture is ill defined, peculiarities can't be distinguished naturally and a considerable measure of storage rooms are expected to spare the observation data. In addition, lately, Motion Identification [4], [5] has pulled in an awesome enthusiasm from PC vision analysts because of its promising applications in numerous regions, for example, video observation, movement checking or sign dialect acknowledgment. To beat storage rooms issue, we apply the Motion Detection calculation for live camera spilling, this permits the framework to break down approaching pictures from cameras, and perceive when development happens. And after that, the video framework can gather and store the most significance things for the heads survey. Viable utilization of Motion Fig. 1: System Architecture Discovery elevates a mechanized way to deal with video framework response, and does not require a person to begin and stop recording sessions. So we can altogether diminish capacity utilization and spare venture costs. Whatever remains of this paper is composed as takes after. In Section II introduces

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the hardware framework. Area III introduces the flow of proposed methodology. The trials and software used are shown in Section IV. At long last, conclusions and references works are given in Section V.

II. HARDWARE SYSTEM DESIGN

Raspberry Pi equipment :

The photo of Raspberry Pi is appeared in Fig. 1. A typical web camera is utilized for live video catching. The associations are likewise appeared in the photo. This framework proposed here utilizations Raspberry Pi Model B associated with a Logitech C300 all inclusive serial transport (USB) webcam. Control supply required by the gadget is 3V DC which is being changed over first from 5V DC. Outside hard drive is required for information stockpiling. Here 16 GB Secure Digital High Limit rise above card is utilized. Web association is being given by means of CAT6 Ethernet link. The camera module is being appended to the stepper engine which is being controlled through the gadget. This is done to guarantee that camera catches pictures every which way. Raspberry Pi model is an ARM 9 processor with depiction and further details are appeared in the table beneath[6].

Raspberry Pi Software :

Amid introductory setup Raspberry Pi was arranged as a smaller than expected desktop with USB designed camera module and an outside screen or versatile for seeing the caught video. Program is utilized for review of live video stream. The outer card is stacked with Raspbian OS. The Dynamic host Convention is acquired for Raspberry Pi i.e IP tended to is brought. After acquiring this the framework can be arranged and controlled remotely. The live video can be seen by dialing-in the IP address into a web program. Cost of the entire framework is \$70. Cost of Raspberry Pi is less when contrasted with other options. We can ascertain the cost-per-super pixel and infer that picture determination on remote screen by raspberry pi is 60x720 (0.7 megapixels) and cost-per-megapixel picture is as roughly is \$125.

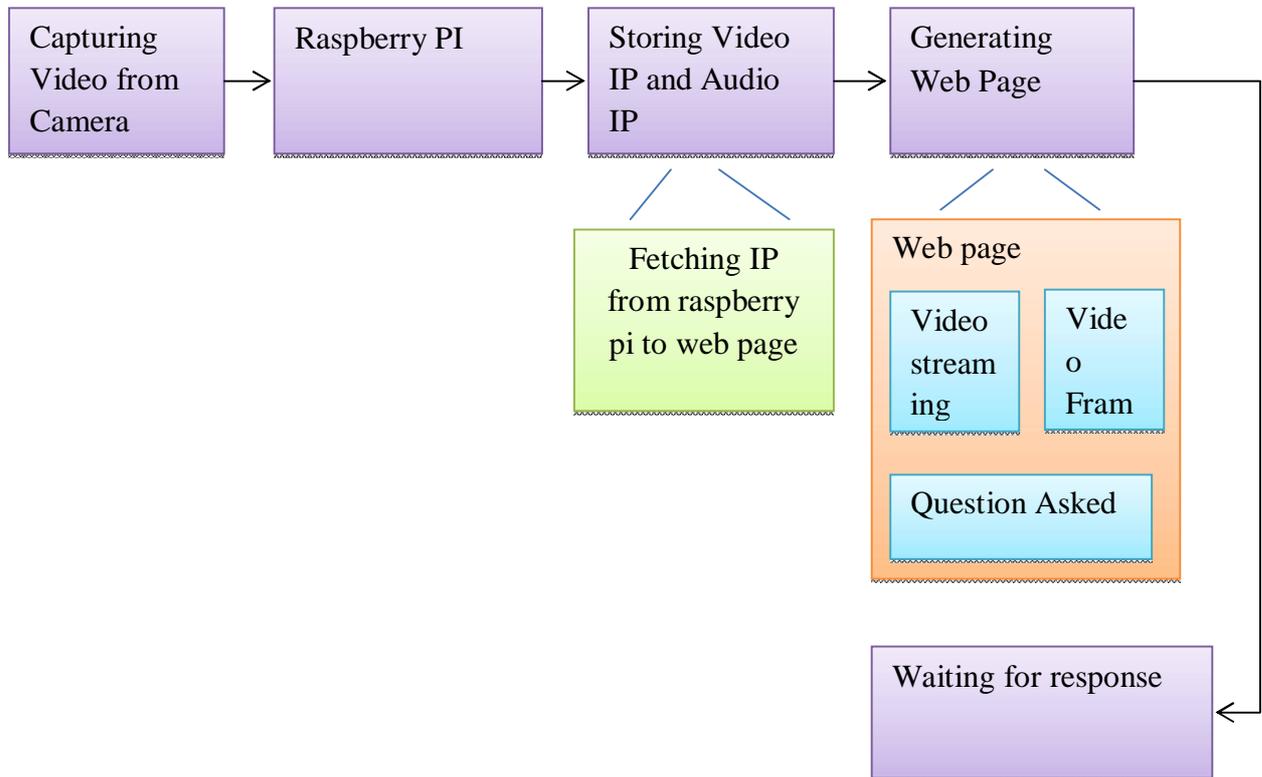


Figure1: Architecture of the video streaming architecture

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III. SOFTWARE MODULE

The framework chose Linux working framework as programming stage, utilize implanted Linux 2.6 bit. Also, there are for the most part three capacity modules, that is, Video catch module, Video Compression module, and Video treaming module. The stream diagram of programming framework is demonstrated as follows.

A. VIDEO CAPTURE MODULE:

Video Capture Based Video4Linux (alluded to as "V4L") is a Linux part on the video gadget driver, which is for video hardware, application programming interface capacities to give a framework. V4L USB camera utilizing the programming on the need to utilize Linux framework calls the following two, separately, `ioctl()` and `mmap()`. Application to get the camera picture information gathered in two ways, in particular `read()` (technique for direct perusing) and `mmap()` (memory mapping strategy). `mmap()` framework call permits forms mapping a similar document through memory sharing accomplished, the upsides of high effectiveness, in light of the fact that the procedure can specifically read and compose memory, duplicate any information without the need to accelerate the I/O get to, the framework is Using this technique[7].

B. VIDEO COMPRESSION:

The expanding interest to fuse video information into media communications benefits, the professional workplace, media outlets, and even at home has made advanced video innovation a need. An issue, in any case, is that still picture and advanced video information rates are huge, commonly in the scope of 150Mbits/sec. Information rates of this extent would expend a great deal of the transmission capacity, stockpiling and figuring assets in the run of the mill PC. Therefore, Video Compression gauges have been created to take out picture excess, permitting video data to be transmitted and put away in a smaller and productive way.

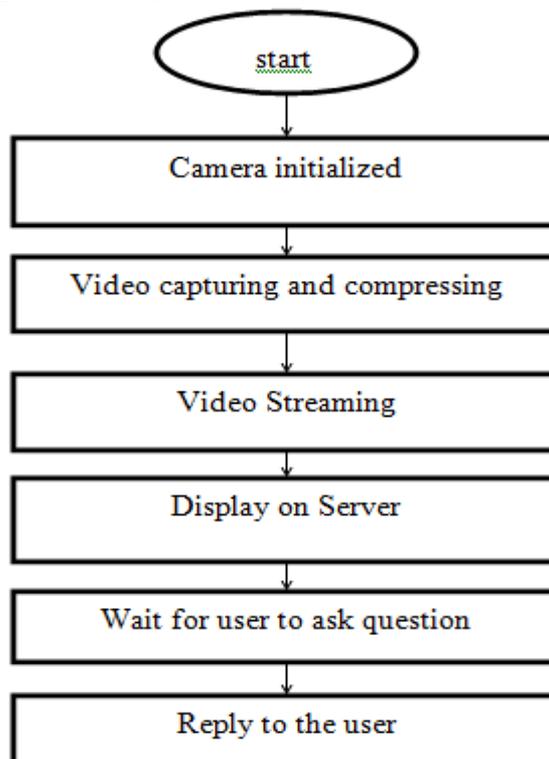


Figure 02 : Flow chart of video streaming using raspberry pi

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C. MPEG (MOTION PICTURE EXPERTS GROUP):

MPEG-2 is a standard for "the non specific coding of moving pictures and related sound data". It portrays a mix of misfortune video pressure and misfortune sound information pressure strategies, which allow capacity and transmission of motion pictures utilizing as of now accessible stockpiling media and transmission data transmission. MPEG-2 is generally utilized as the organization of advanced TV flags that are communicate by earthly (over-their), link, and direct communicate satellite TV frameworks[7]. It additionally indicates the arrangement of motion pictures and different projects that are conveyed on DVD and comparable circles. Television slots, TV beneficiaries, DVD players, and other gear are frequently intended to this standard. MPEG-2 was the second of a few benchmarks created by the Moving Pictures Expert Group (MPEG) and is a universal standard (ISO/IEC 13818). Parts 1 and 2 of MPEG-2 were created as a team with ITU-T, and they have a particular catalo number in the ITU-T Recommendation Series.

B. MPEG-2 COMPRESSION:

Algorithm [8] MPEG-2 accommodates adaptability in the kind of pressure. Encoders can change impressively contingent on the application, so points of interest of the encoding plan must be transmitted alongside the information, to empower the decoder to recreate the flag. Initial a diminishment of the determination is done, which is trailed by movement remuneration keeping in mind the end goal to decrease transient excess. The following strides are the Discrete Cosine Transformation (DCT) and a quantization as it is utilized for the JPEG pressure; this lessens the spatial excess (alluding to human visual discernment). The last stride is an entropy coding utilizing the Run Length Encoding and the Huffman coding calculation.

C. VIDEO STREAMING:

Once RGB web camera is associated through ace USB interface to raspberry pi board to make settings in the terminal window, amid the settings we run the application related shell script in terminal which will execute application in board coming about video spilling on web program utilizing http convention, entering a static IP address by client in any remote gadget which is in nearby system can see the remote area. Here the web program depends on MJPG streamer for gushing caught video from camera set in remote area. The MJPG streamer is cross assembled and stacked into the Raspberry pi board to go about as a web spilling server. The server intermittently acquire recordings from camera through the private system, such recordings are transmitted from camera to the server.

VIDEO ON SERVER We can get to live stream from camera from any program with the assistance of URL.eample <http://192.168.137.50:8080> Here 8080 is port where we arrangement our stream in movement. Conf record. We can see our own arrangement setting "stream port" in motion.conf for port. We have found that Google chrome 30 is not ready to play the stream straightforwardly because of bug in the chromium extend. We can get a huge picture with the stream URL of the camera. Furthermore we were not ready to observe live stream in web traveller since it doesn't bolster movement jpeg. Some other program like Firefox, safari furthermore vlc media player could demonstrate live stream. In the wake of filling appropriate URL we can see video spilling with little deferral[9].

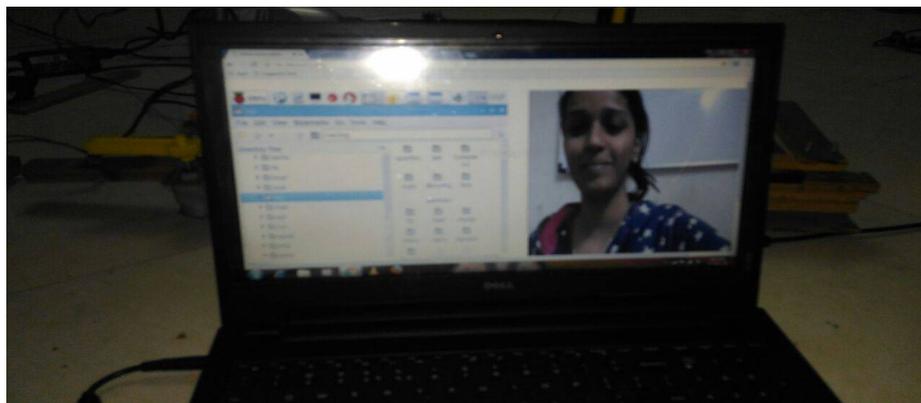


Figure 03 Output of the System.

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Figure 04 Overview of Raspberry Pi 3.

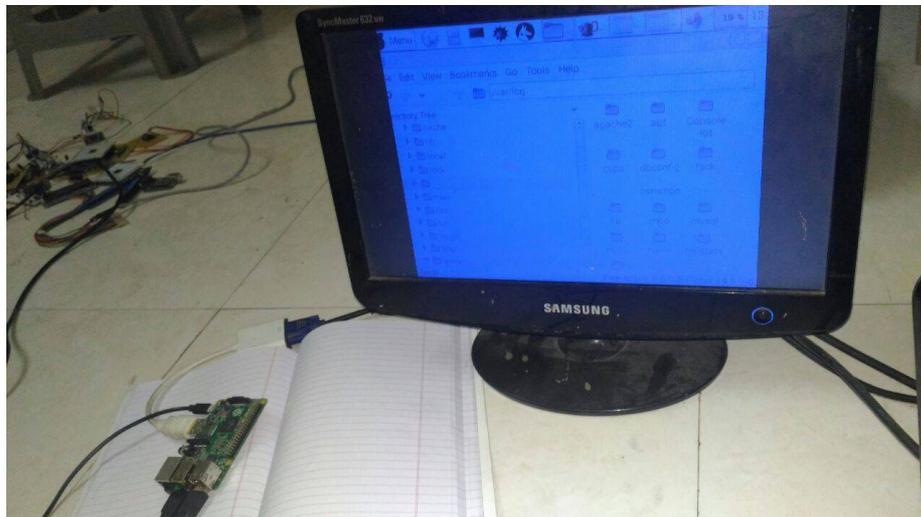


Figure 05 Output of the System with GUI.

IV. SOFTWARE

1. The code for capturing the video, obtaining the respective IP is done in python.
2. HTML, PhP is used for generating the web page.

V. CONCLUSION

In this paper, an embedded real-time video monitoring system is designed; the embedded web streaming server is based on the Linux Operating System. It succeeds in network video monitoring. The system has low-cost, good openness and portability and is easy to maintain and upgrade. Here the web browser is based on MJPG streamer for streaming captured video from camera placed in remote location. The MJPG streamer is cross-compiled and loaded in to the Raspberry pi board to act as a web streaming server. The server periodically obtain videos from camera through the private network, such videos are transmitted from camera to the server. We conclude that real time video monitoring

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using arm we get better performance and we can transmit video using wire and also possible for wireless hence long distance transmission is possible.

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