Wireless Live Video Streaming using MJPEG Streamer on Rasberry PI

Sneha D Patel[1]Mayanka Khuman[2]
[1]PG Student [2]Assistant Professer, Head
[1,2]Kalol Institute of Technology & Research Centre, Kalol

Abstract— Raspberry Pi is a cheap and tiny single-board computer powered by ARM processor. While it was mainly developed for children to learn computer programming, it has also become a versatile device for DIY electronic enthusiasts or computer professionals who build many useful tools based on the tiny hardware In this project we build and run MJPG-Streamer on the Raspberry Pi It's been a while since I wrote the article on streaming video from the Raspberry Pi using MJPG-Streamer. Since I published that article I have received several comments and questions regarding issues building MJPG-Streamer, so in this short post I'm giving you revised build instructions. Then we interface Simple Webcam on Raspberry Pi. The Raspberry Pi's low power consumption makes it well suited to the role of always-on server. This post describes how to attach a simple webcam to a Raspberry Pi and have it take a snapshot every few minutes, and how to view the pictures on the web. If you want to be able to view the webcam from across the internet, I e .from locations other than your home network, it is necessary to forward a port on your internet router. That is beyond the scope of this article. However it is quite easy to do and many guides exist on the internet.

Key words: MJPEG (Motion Joint Photographic Expert Group), ARM (Advanced Risk Machine), RPI (Raspberry Pi)

I. INTRODUCTION

A. *Problem Description:*

Video has been an important media for communications and entertainment for many decades. Initially video was captured and transmitted in analog form. The advent of digital integrated circuits and computers led to the digitization of video, and digital video enable revolution in the compression and communication of video. Video compression became an important area of research in the late 1980's and 1990's and enabled a variety of applications including video storage on DVD's and Video-CD's, video broadcast over digital cable, satellite and terrestrial (over-the-air) digital television (DTV), and videoconferencing and videophone over circuit-switched networks. The growth and popularity of the Internet in the mid-1990's motivated video communication over best-effort packet networks. Video over best-effort packet networks is complicated by a number of factors including unknown and time-varying bandwidth, delay, and losses, as well as issues such as how to fairly share the network resources amongst many flow sand how to efficiently perform one-to-many communication for popular content. This article examines the challenges that make simultaneous delivery and playback, or streaming, of video difficult, and explores algorithms and systems that enable streaming of pre-encoded or live video over packet networks such as the Internet.

B. *Motivation:*

To reduce effects of poor video quality should be done flowingly and completely. The measurement takes an important role on pixel value , beam width, harmonic distortion and waveforms which are the basic parameters of video quality .The effects of poor video quality led my interest in this subject. This issue is actively present in the industrial and domestic sector .And this issue led a lot of financial loss also. The magnitude of damage caused by poor power quality in voke dme to learn more about this topic and urged me to do my contribution.

Many methods of video measurement are available like using various protocols to control the system ,data acquisition based on PC or Power Line Communication or TMS320CV5416 DSP Processor, another has applied ARM and DSP processor or has only applied DSP processor to monitoring power quality in real time. These methods are not efficient as we required. Thus the ultimate motivation arose with a desire of mitigate the effect of poor video quality that could lead strong power system.

II. OUTLINE OF METHODOLOGICAL APPROACH

A. *What Is Video Streaming System?*

Video streaming over wireless networks is compelling for many applications, and an increasing number of systems are being deployed. Video streaming of news and entertainment clips to mobile phones is now widely available. For surveillance applications, cameras can be flexibly and cheaply installed, if a wireless network provides connectivity. A wireless local area network (WLAN) might connect various audio visual entertainment devices in a home. Last, but no least, in search-and-rescue operations, real-time audio visual communication over wireless ad-hoc networks can save lives .While video streaming requires a steady flow of information and delivery of packets by a deadline, wireless radio networks have difficulties to provide such a service reliably .The problem is challenging due to contention from other network nodes, as well as intermittent interference from external radio sources such as microwave ovens or cordless phones. For mobile nodes, multi-path fading and shadowing might further increase the variability in link capacities and Transmission error rate. For such systems to deliver the best end-to-end performance, video coding, reliable transport and wireless resource allocation must be considered jointly, thus moving from the traditional layered system architecture to across-layer design.

B. *Proposed Methodology:*

Here we have developed live video streaming system with the ARM11 processor embedded into raspberry pi board. Through Web Server system we can connect any electronic device to web server and can get the real time data of devices through the web pages released by the server.

C. Description of System Design

The proposed system is divided into two parts viz. video system agent and centralized embedded server. The video streaming is equipped with microcontroller based system monitoring the current and voltage being used by equipment (load) all the time. The collected data is sent over GPRS in real time to the embedded server. The embedded server keeps all the data in database and uses it for further actions like notification for any abnormal operation, power failure etc.

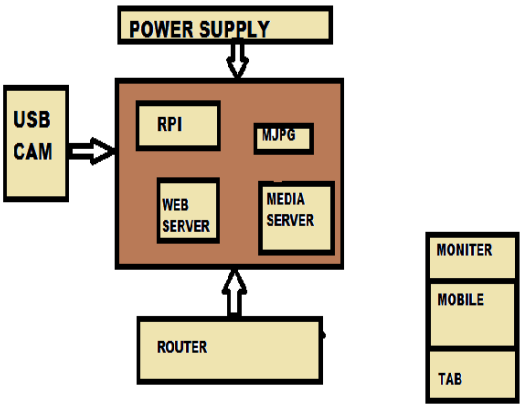

Fig. 1: Block Diagram of System

Fig. shows the block diagram of video streaming using system using web System. The load refers to the actual target system utilizing the power. The webcam contitunuous record the video The PMS agent is capable of sensing the various parameters, their conversion in shortest possible time and sends it over network. It ensures the real time monitoring and any abnormality in target system's function is reflected web server is a best medium for communication between two systems over large nuisance with accuracy and uninterrupted communication feature.[10] Other wireless communication protocols like Zigbee, RF communication etc. are bounded by distance limits. A router can provide unlimited connectivity, sufficient baud rate and reliable communication in a cost effective way. Also it has been adopted by several mobile remote control/access systems. A central server is based on an application which extracts the data from TCP/IP protocol, sent by the power monitoring agents. It can therefore provide facilities like access from cloud, email & SMS notification etc. if required. The entire communication system is based on TCP/IP protocol which is a standard adopted by almost all the systems. It provides a static link between monitoring system and central server based on IP addresses. For more number of agents, addressing may be done dynamically but not recommended over the static one.

III. MJPEG STREAMER

mjpg-streamer is an open source software that allows you to boring multimedia, Motion JPEG (M-JPEG or MJPEG) is a video compression format in which each video frame or interlaced field of a digital video sequence is compressed separately as a JPEG image. Originally developed for multimedia PC applications, M-JPEG is now used by video-capture devices such as digital cameras, IP cameras, and webcams; and by non-linear video editing systems. It continues to enjoy native support by the QuickTime Player, the PlayStation console, and browsers such as Safari, Google Chrome, and Firefox's webcams via video stream server built on embedded system.

IV. WORK PLAN

1) Raspbian LXDE setup on the Raspberry Pi board.
2) Basic study of web cam configuration
3) Router on Raspberry pi board
4) Implementation of monitoring on web server.
5) Implementation of system with control capability.
6) Development of hardware demo to show resut

A. Operating System Installation on Raspberry Pi Board.Raspbianlxde Setup on the Raspberry Pi Board:

- First I had installed Arch linux on raspberry pi becausearch linux is better for Arm & porting based boards. But after installation when I was working with my board I realized that system took more time to load and hanged a lot also I faced problem in IDE installation of Qt creator . Hence, we use Raspbian that is recommended on raspberry pi. Raspbian LXDE setup is done on the Raspberry Pi board.
- Following are the steps for downloading and installing Raspbian – LXDE on the Raspberry Pi board using the Win32DiskImager program. Download the distribution from the raspberry website or from a mirror or torrent. Make sure the distribution is for the Raspberry Pi, as others will not work. Usually these are zipped (compressed) files ending in .zip or .gz (something like "distribution-name.zip").Extract the image file from the downloaded.

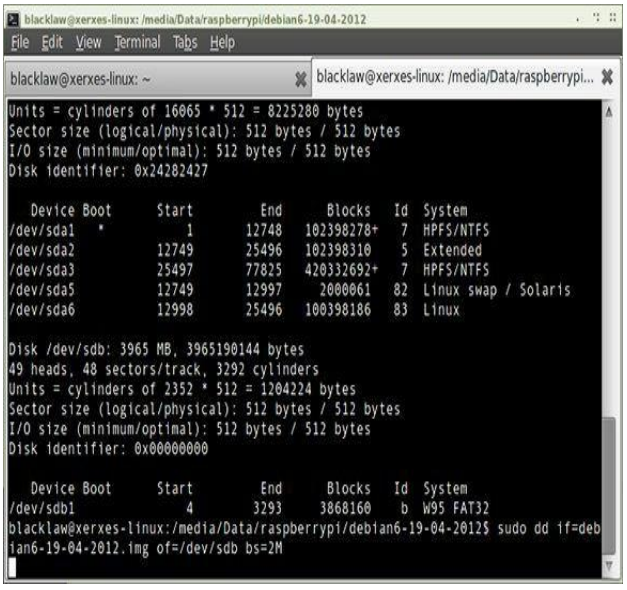

Fig. 2: OS porting

B. Setting Up Apache Web Server:

Apache is a popular web server application install on the Raspberry Pi to allow it to serve web pages .On its own, Apache can serve HTML files over HTTP, and with

additional modules can serve dynamic web pages using scripting languages such as PHP. INSTALL APACHE

First installs the apache2 package by typing the following command in to the Terminal: sudo apt-get installs apache2 -y By default, Apache puts a test HTML file in the web folder. This default web page is served when you browse to http://localhost/ on the Pi itself, or http://192.168.1.10 (whatever the Pi's IP address is) from another computer on the network. To find the Pi's IP address, type hostname -I at the command line (or read more about finding your IP address)..Zip file, so you now have "distribution-name.img".Insert the SD card into your SD card reader and check what drive letter it was assigned. You can easily see the drive letter (for example G:) by looking in the left column of Windows Explorer. You can use the SD Card slot (if you have one) or a cheap Adapter in a USB slot.the Win32DiskImager utility (it is also a zip file). You can run this from a USB drive.

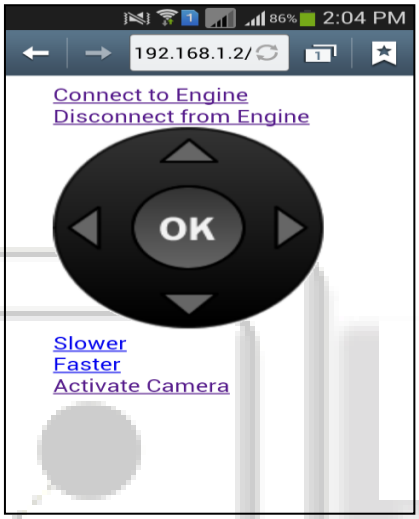

Fig. 3: Ip Adress of the System

C. Hardware Configuration

1) Here we connect one usb cam ,power supply ,ethernet cable,sd card ,monitor to raspberry pi board
2) When our devices like mobile phone, laptop or tablet with same router and we enter the ip address of rpi we can see the video stream capturing by the usb camera

Fig. 4: Hardware Configuration

V. Basic Problems in Video Streaming

There are a number of basic problems that afflict video streaming. In the following discussion, we focus on the case of video streaming over the Internet since it is an important, concrete example that helps to illustrate these problems. Video streaming over the Internet is difficult because the Internet only offers best effort service. That is, it provides no guarantees on bandwidth, delay jitter, or loss rate. Specifically, these characteristics are unknown and dynamic. Therefore, a key goal of video streaming is to design a system to reliably deliver high-quality video over the Internet when dealing with unknown and dynamic

1) Bandwidth
2) Delay jitter
3) Loss rate

The bandwidth available between two points in the Internet is generally unknown and time-varying. If the sender transmits faster than the available bandwidth then congestion occurs, packets are lost, and there is a severe drop in video quality. If the sender transmits slower than the available bandwidth then the receiver produces sub-optimal video quality. The goal to overcome the bandwidth problem is to estimate the available bandwidth and than match the transmitted video bit rate to the available bandwidth. Additional considerations that make the bandwidth problem very challenging include accurately estimating the available bandwidth, matching the pre encoded video to the estimated channel bandwidth, transmitting at a rate that is fair to other concurrent flows in the Internet, and solving this problem in a multicast situation where a single sender streams data to multiple receivers where each may have a different available bandwidth. The end-to-end delay that a packet experiences may fluctuate from packet to packet. This variation in end-to-end delay is referred to as the delay jitter. Delay jitter is a problem because the receiver must receive/decode/display frames at a constant rate, and any late frames resulting from the delay jitter can produce problems in the reconstructed video, e.g. jerks in the video. This problem is typically addressed by including a playout buffer at the receiver. While the playout buffer can compensate for the delay jitter, it also introduces additional delay. The third fundamental problem is losses. A number of different types of losses may occur, depending on the particular network under consideration. For example, wired packet networks such as the Internet are afflicted by packet loss, where an entire packet is erased (lost). On the other hand, wireless channels are typically afflicted by bit errors or burst errors. Losses can have a very destructive effect on the reconstructed video quality. To combat the effect of losses, a video streaming system is designed with error control. Approaches for error control can be roughly grouped into four Video Streaming: Concepts, Algorithms, and Systems classes: (1) forward error correction (FEC), (2) retransmissions, (3) error concealment, and (4) error-resilient video coding .The three fundamental problems of unknown and dynamic bandwidth.

VI. Conclusion

Video streaming can be described as any event related to the electrical network that ultimately results in a financial loss. Possible consequences of poor Power Quality include unexpected power supply failures, equipment failure or

malfunctioning, equipment overheating leading to their lifetime reduction, damage to sensitive equipment, electronic communication interference, and increase of system losses. so it is necessary to reduce poor video quality effects. This work focuses on solving the issues of existing system and provides efficient and effective monitoring and analysis mechanism. With webcam and reliable GPRS communication medium, the system provides a good medium to monitor and keep track of power used by remote equipment. The system may adopt more high speed link with advanced communication protocols including 3G to improve speed and bandwidth. Through Web Server System we can connect any electronic device to web server and can get the real time data of devices through the web pages released by the server.

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