Review on Real Time Video Streaming using Wi-Fi on Android Phone

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Abstract— Wireless technology is very much popular, number of users of wireless network it is continuously growing. Wireless communication system has many advantages, not only the mobility of the devices within the environment. But wireless video display on mobile platform like android is facing difficulties as collecting data from a wireless camera as well as transmitting it to server to store the video. Transmission of the data to server is necessary because of the limited memory space on smart phone. Video data of wireless camera have a huge size in few minutes of recording.

Key words: MAX232, Video Streaming, Serial Camera, Video Security, Serisl Wi-Fi MODULE, BUFFER 74HCT125, PIC18F4620

I. INTRODUCTION

An application which is associated with wireless and an IP address which transmits its data to the web server using http or some other protocol is rarely available in the recent days some time it is available in build with the help of arm processor. This is a system of android phone which will received data from wireless Wi-Fi camera module and display it to android phone. Benefit of wireless camera is that Wireless camera can easily set at any location of the office, home or open area. And user can easily mount it any where he wants as well as they can easily change position of the surveillance camera if it is wireless. Installation of camera on a mobile robot is also easy and it can be move anywhere as according to command. Wireless camera can be mount on RF controlled robot or DTMF (GSM) controlled robot.

Improvement in this section is that we can use it with android operating system using Wi-Fi and can directly see the video as well as we can transmit and save it to the server.

II. PROPOSED BLOCK DIAGRAM

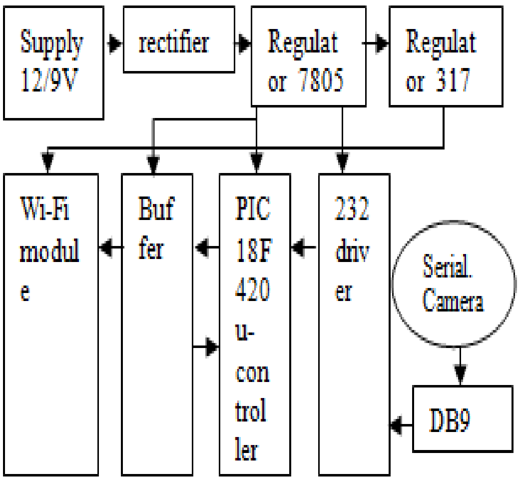

Fig. 1: Block Diagram

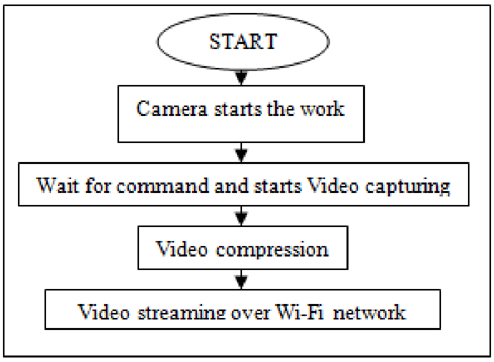

Fig. 2: Flow Chart of Transmission Software System

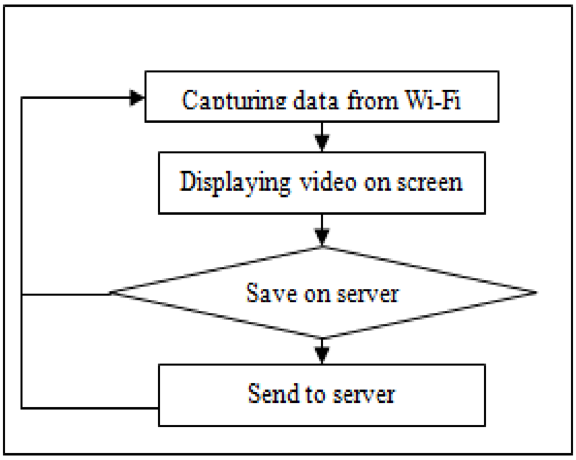

Fig. 3: Flow chart of receiving software system

III. HARDWARE DESCRIPTION

A. *Wi-Fi:*

The Wi-Fi APIs provide a means by which applications can communicate with the lower-level wireless stack that provides Wi-Fi network access. Almost all information from the device supplicant is available, including the connected network's link speed, IP address, negotiation state, and more, plus information about other networks that are available. Some other API features include the ability to scan, add, save, terminate and initiate Wi-Fi connections.

1) *Advantage:*
   - Maintenance free system
   - Wireless accessibility of camera
   - Wireless camera can be mount on RF controlled robot or DTMF (GSM) controlled robot.

2) *Limitations:*
   - Range of Wi-Fi
   - Strength of Wi-Fi signal varying

The hardware section includes controller, serial camera and Wi-Fi module. Microchip 18F4620 is chosen to complete the core control; logical serial camera is used to capture device and the users mobile connected through the Wi-Fi to receive video information

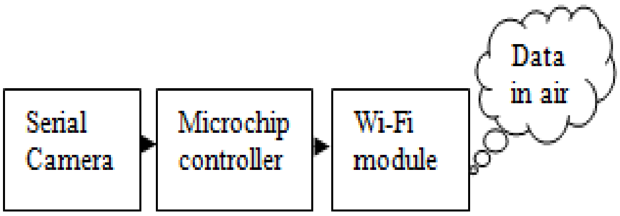

Fig. 4: Block Diagram of Hardware System Design

The system selected a microchip platform the build environment using MPLAB debug mode . and there are mainly 4 function modules, video capture module, video compression module and video streaming module. The flow chart system software shown in figure 5

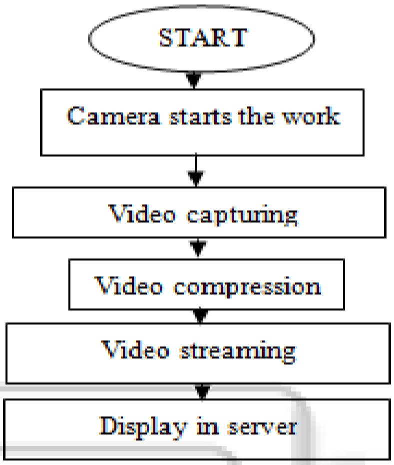

Fig. 5: Flow Chart of Software System [1]

B. *Android Phone:*

Now a day's an application of android phone is very much popular because of its ease of access graphical interface and easy to familiar with, and so the best part of this is, it easy available in market. And so the video available on android phone is a best option for user. Android is designed primarily for touch screen mobile devices such as smart phones and tablet computers, with specialized user interfaces.

C. *PIC18F4620 (Microcontroller):*

A controller of Microchip's PIC18F4620 was selected because it is low cost and has sufficient flash memory for coding upto 64k. with a 4k RAM. It is available in 40pin DIP package and has a hardware SPI bus.

D. *Quad-Buffer:*

74HCT125 is a quad buffer driver / line driver with 3-state output controlled by the output enable input (nOE). A HIGH(1) on nOE causes the outputs to assume a high impedance OFF-state(0). Inputs include clamp diodes. which enables the use of current limiting resistors to interface inputs to voltages in excess of VCC.

- Range of working temperature: -40° C to +85° C & : -40° C to +125° C
- Power supply voltage: 0.5V to +7 V

E. *Serial Driver:*

The MAX232 a serial driver integrated circuit is used to convert the logic level of TTL/CMOS logic levels to RS232 logic levels during serial communication of microcontrollers with serial devices like 'Serial Camera'.

IV. RELATED WORK

A. *MPEG-2 Compression Algorithm:*

MPEG-2 provides for flexibility in the type of compression. Encoders can vary considerably depending upon the application, so details of the encoding scheme must be transmitted along with the data, to enable the decoder to reconstruct the signal. The fig.6. shows the flow of MPEG-2 Compression algorithm. In the figure 4 First a reduction of the resolution is done, which is followed by a motion compensation in order to reduce temporal redundancy. The next steps are the Discrete Cosine Transformation (DCT) and a quantization as it is used for the JPEG compression; this reduces the spatial redundancy (referring to human visual perception). The final step is an entropy coding using the Run Length Encoding and the Huffman coding algorithm [1].

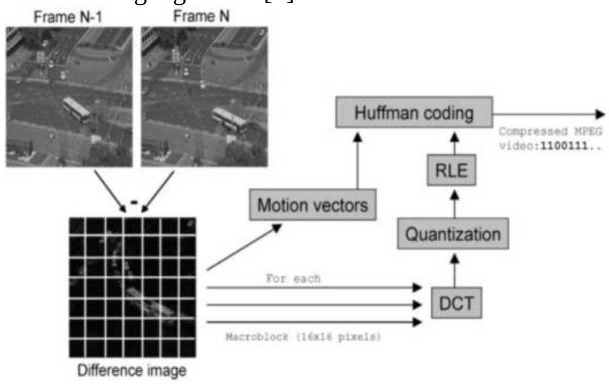

Fig. 6: Flow of MPEG-2 Compression Algorithm

B. *Adaptive Video Streaming Techniques:*

In the adaptive streaming, the video traffic rate is adjusted on the fly so that a user can experience the maximum possible video quality [2]. There are two types of adaptive streaming techniques depending on whether the adaptivity is controlled by client(receiver) or the server. After obtaining the predicted bandwidth or say goodput our android phone will start capturing and transmitting the video as per the instruction provided through the android phone.

C. *Video Delivery:*

Video delivery over network is difficult because of the strength varying according to the range and so in the process to create a wifi based system. Peer-assisted video delivery has been proposed and leveraged for landline-based VoD, live streaming, IPTV, and even user-generated content (UGC) video systems . Huang et al. analyzed the user behavior in the MSN VoD system and showed that peer assistance can largely reduce server bandwidth costs without degrading the video rendering quality. In, the challenges and design of the PPLive P2P VoD system were described, and the results of a large scale measurement of user behavior and system performance were further discussed. P2P has also been applied in live streaming systems to large audiences . Based on an analysis of TV viewing behavior, Cha et al. studied the potential of peer-assisted video distribution in IPTV systems, where peers provide advanced rewind functionalities. Cheng et al. studied the issues related to peer-assisted video distribution of short videos in UGC video sharing platforms, and proposed to use a multiple-video cache scheme with the assistance of related video links. Users' access behavior and corresponding video popularity patterns are the basis for the design of a new delivery system. Li et al. analyzed the user behavior in a large-scale mobile Internet TV system and identified the mandatory support of the wireless infrastructure to improve the video viewing experience. In, Li et al. analyzed the impact of access method (3G or WiFi) and mobile devices on user behavior patterns. Liu et al. proposed Blue streaming to save power consumption in P2P streaming to mobile devices. MOVi, proposed in, is a P2P-based mobile VoD application. These studies are complementary to our work in this article [4].

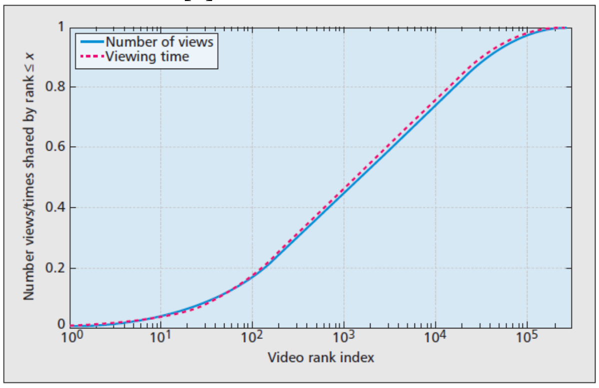

Fig. 7: Video Popularity Distribution [4]

D. *Individual-Oriented Quality Adaptation:*

The individual-oriented quality technique is used to adjust the quality of experience for individual users according to the user's device capacity and network strength. So, each individual user may have different quality of experience.

1) *Client-Initiated Quality Technique:*

In client-initiated quality technique, the requests for the service of quality adaptation or the feedbacks are sent from the client to adjust the quality levels of the scalable media content so as to handle with the dynamic change of the network conditions. Such methods are effective in supporting different presentation qualities requested by heterogeneous users and providing QoS-adaptive services under dynamic network conditions. For scalable streaming services, frequent adding or dropping the enhancement layers will result in "quality jitter" which affects the users quality of experience. Smooth adaptation methods were proposed in [9] to schedule the transmission of the enhancement layers according to the receiver buffer size and the end-to-end bandwidth conditions. In, a light-weight adaptation method was proposed to calculate the adaptation parameters objectively using Peak Signal-to-Noise Ratio (PSNR) information. Feedback information from the client helps the quality adaptor to determine the appropriate frames of the media content to transmit. In, collaborative quality adaptation was proposed to prefetch streams among peers in a P2P-based mobile network[5].

2) *Server-Initiated Quality Technique:*

In server-initiated quality technique, service quality are adjusted to take optimized data according to the overall performance. Streaming server decides whether to serve an individual user and how to adjust the server transmission rates according to the network conditions. In, DACME (Distributed Admission Control for MANET (Mobile Ad Hoc Networks)'s - Scalable Video) agent at the video source node will probe the network conditions and determine the number of the transmission layers so as to fully utilize the network bandwidth and balance the load of the system. Sometimes, negotiation of service quality happens before the commencement of the service, in which a bilateral service contract has been established between a service provider and each individual client. A multi-level adaptation algorithm was proposed in to degrade the quality levels selectively so as to optimize the overall resource utilization under resource constraints. The server-initiated quality adaptation is effective in balancing the demand of the users and the constraints of system resources. In, a unified broadcasting method is proposed for the server to schedule the enhancement layers in its broadcast and unicast channels so as to optimize the overall bandwidth consumption of supporting heterogeneous users. When network bandwidth fluctuates, client can get the video contents from various channels to ensure its quality of experiences. In, the authors proposed an adaptive method to schedule the streaming packages according to available network bandwidth to minimize the accumulative degradation of multiple video streams [5].

E. *Mobile Networks:*

For situations like public transport scenario where the user are moving dynamically, Network Mobility (NEMO), a further development of Mobile IPv6, has been proposed. A mobile network consists of a number of users whose devices are locally attached to a single device that handles the mobility requirements of all of its attached client nodes. This single device, a Mobile Router (MR) provides mobility support to its client nodes by the creation of a bidirectional communications tunnel between itself and a Home Agent (HA) device running in its home network. Data communications destined for a client node are directed to the Home Agent where they are encapsulated for transmission to the Mobile Router which then removes the encapsulation header from the data and forwards it to the appropriate client. By extension, NEMO permits multiple Care of Addresses (CoA) for a mobile router that is equipped with multiple network interfaces, each attached to a different access network and offering an independent path to the home agent.[6].

F. *Scalable Video Coding:*

Scalable Video Coding (SVC) allows the encoding of a Sequel video as a number of sub-streams consisting of an Advanced Video Coding compliant base layer which provides a minimal quality of video stream and a number of enhancement layers, each of which enhance the quality of the received stream. In SVC there are three scalability dimensions (picture resolution, frame rate and signal to noise ratio) which can be used for terminal adaption. Basically, the standard allows a transmitter to transmit only those layers that a device is capable of processing, reducing the number of packets sent over the network. In times of network congestion or insufficient network capacity, the video stream can be adapted by dropping the upper enhancement layer packets while ensuring delivery of base layer and lower enhancement layer packets providing a minimum acceptable quality of received video. Video streams are commonly delivered in real time using best-effort delivery mechanisms such as RTP running over UDP.

The IETF has produced standards for the packetisation and delivery of video streams using RTP [6].

The EDPF, LBA and our OPSSA algorithm are implemented on a realistic, hardware-based multihomed mobile networks testbed as illustrated in Fig. 8. The testbed provides two independent paths from the video streaming server to the mobile network node. Each path has a 100Mbps wired component extending from the streaming server via the Home Agent and a WAN emulation core router to a modified

Linksys WRT54GL 802.11g wireless router which forms the wireless link to the MR. The mobile network node is locally attached to the MR [6].

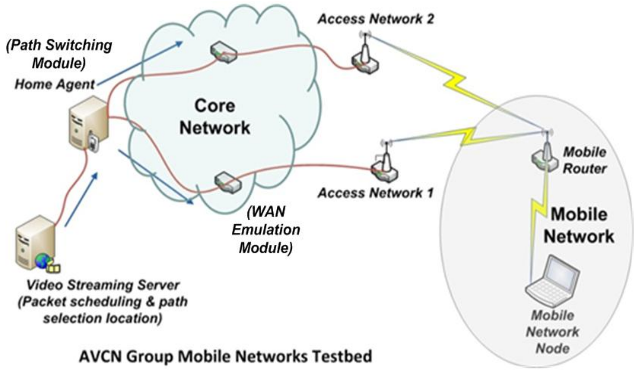

Fig. 8: Testbed Topology [6]

V. Content Preparation

Since the client must be able to pass the command whether he or she has to display it only on the mobile phone or they want to send and save it to the server [3]. If they want to save it to the server an additional protocol will start which will send the video to the server so that the client can watch the video on his/her mobile using internet from any location.

VI. Conclusion

From this review or study of different Video Streaming based paper in which I find out the different communication interface and found Wi-Fi interface camera for a dedicated application I try to design and develop an application for android operating system which will collect the data from wifi interface of camera and will display on the screen of the mobile as well as it will send and save the data to the server for future use.

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