RESEARCH ARTICLE

DESIGN VIRTUAL IP CAMERA.

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Manuscript Info	*Abstract*

Video Management System (VMS) is integral part of today's Surveillance and Security system based on IP cameras. It collects video data from Camera, perform necessary operations and then Stream and/or store the recorded data to client. This project is based on design of camera simulator for testing VMS. VMS is taking data from IP cameras. To test how it will behave while taking input from different IP camera which are having different specifications like resolution, codecs, frame rate. For testing VMS required numbers of cameras are equal to number of stream present in system, so have to purchase same number of cameras for testing purpose only. If prerecorded video streams can be provided to VMS of having different parameters purpose can be achieved. This project "Design of camera simulator for Video Management System" is based on this.

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Introduction:-

Video management System (VMS) and IP camera are the key components in Video Surveillance System. A video management system is a component of a security camera system that in general collects video from cameras and other sources provides an interface to both view the live video, and access recorded video. An IP camera is a networked digital video camera that transmits data over a Fast Ethernet link. IP cameras (also called "network cameras") are most often used for IP surveillance. IP camera is a type of digital video camera commonly employed for surveillance, and which can send and receive data via a computer network and the Internet.

Any VMS developer needs to test the VMS after developed the VMS. The test like memory consumption, CPU usage, number of video stream carrying capacity at a time, etc. For that need to provide video stream to the VMS and for that IP cameras require. So, the testing of any VMS, need same number of IP cameras as much as numbers of video streams are present in VMS, therefore need to purchase same number of IP camera just for the testing purpose. This is the current scenario for testing VMS.

So, Eliminate the requirement of physical IP camera, Virtual IP camera is introduced. Virtual IP camera provides the pre-recorded video stream to the VMS with the same features as physical IP camera can provide. For the transmitting of Video Stream virtual camera use Real Time Streaming Protocol.

RELATED WORK:-

In [1] authors use FFmpeg for decode the video. In decoding format, FFmpeg is separate the H.264 video data and AAC audio data from the container. There are many kinds of media container format for example FLV, AVI, MP4, MKV, etc. In [2] authors design versatile live multimedia streaming for IP network camera which can support not

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only streaming of existing various video formats like H.264, MPEG4, MJPEG and audio formats like AAC, PCM but also streaming of MPEG2-TS over RTP through RTSP streaming server. In [3] authors setup the streaming sever based on Live555 Open source library. In the transmission system of theatre video monitoring it uses the WinSock interface to set up streaming server which leads to defect that remote monitoring terminal of system must rely on window operating system. But the smart TV based on Android operating system. So, authors adopt the Live555 open source library based on RTSP and RTP/RTCP protocol to build the streaming media server. In [4] authors introduce a cost effective power efficient and low profile IP camera. The camera has built-in H.264/AVC encoder. The function of the IP camera for live video capturing and encoding is implemented using one piece of BF561 DSP processor chips and function for encoded data streaming is realized using low cost ARM processor chipset. In [5] authors give video surveillance concept based on video system with IP camera provides great efficiency and decrease the price of the system. The existing computer network is used for transfer of audio and video signal within the system of video surveillance with IP camera.

Proposed Methodology:-
System Block Diagram:-
Figure 1 shows the whole block diagram of the Virtual IP camera(simulator) and complements which use in simulation for select the desired video file from the video storage and sent it to the client.
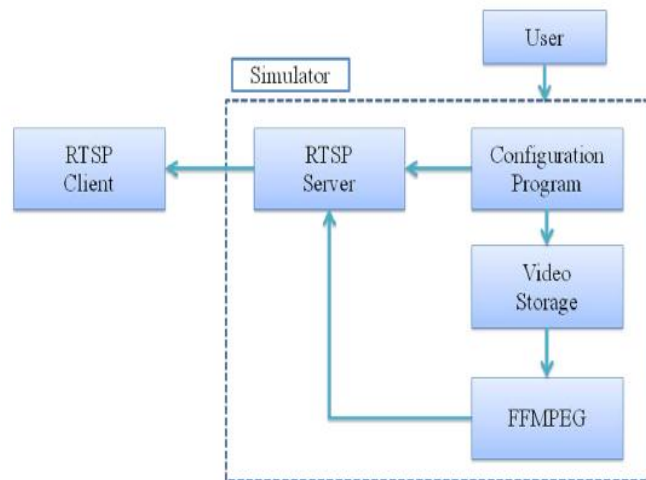
Fig.1:- Block diagram of proposed methodology

Real Time Streaming Protocol (RTSP)
The Real Time Streaming Protocol (RTSP) is a network control protocol designed for controlling of multimedia streaming. The RTSP protocol is used for establishing and controlling media sessions between client and server. Client of media server is issue controlling commands, such as play, record, pause and teardown [3]. Through this controlling commands protocol provides real-time control to the media streaming.

Configuration Program:-
Configuration Program consist text file read/write operations, access the video files from the video storage folder, find desired video file from the video storage and pass on to the RTSP server.

Fast Forward Moving Picture Expert Group (FFMPEG):-
Fast Forward Moving Picture Expert group (FFMPEG) is a open source very powerful multimedia frame work that supports media container formats as well as video/audio coding standards and it provides a data structure to store the information extracted from multimedia data [1].

In the proposed system, FFMPEG is extracting the video file parameters such as video codec, bit-rate, frame rate, resolution from the video files. It also use to demux the video data and audio data from the media container like MP4, AVI, MKV.

Video Storage:-
Video Storage is folder which contains different video files of different format (H.264, MJPEG) corresponding to different parameters.

System Flow:-
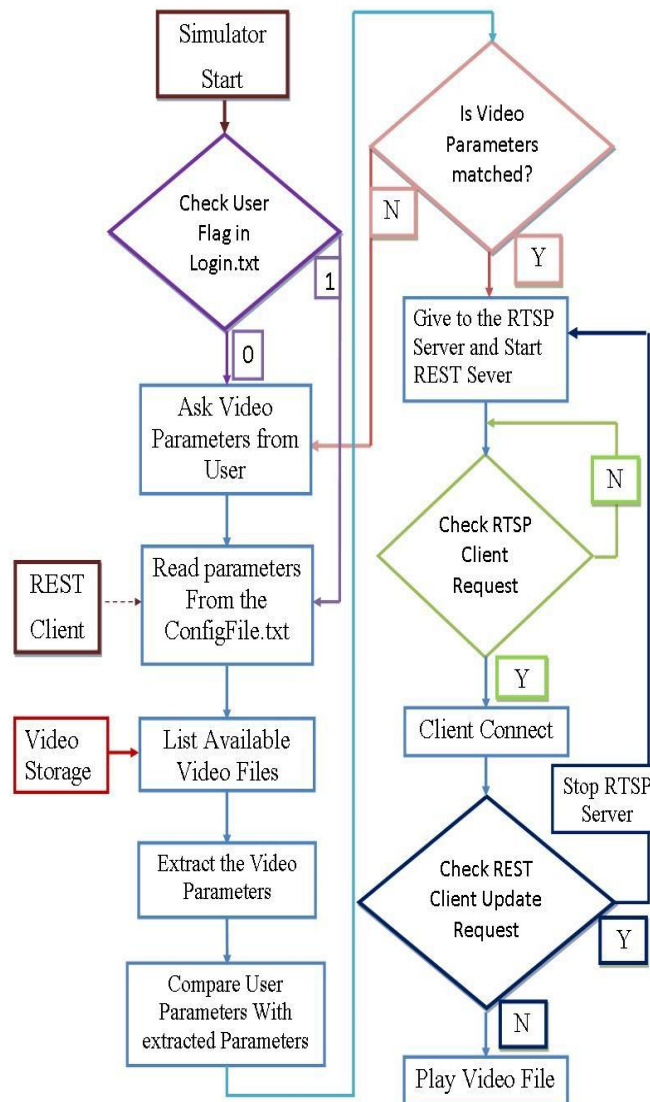
Fig.2:- Flow Chart of Simulator

Figure 2 show the flow of the simulator.

1. In the beginning simulator checks the user flag in Login.txt file if flag is 0 simulator ask video parameters from user and store in Configfile.txt file or if flag is 1 the simulator read parameters from Configfile.txt file which is previously entered by the user.
2. In second step parameters read from Configfile.txt file.
3. Now, List out all video files from video storage folder where all video files are stored.
4. Extract the parameters of listed video file with help of FFMPEG multimedia library.
5. Now compare parameters entered by the user with parameters of storage video files, if parameters are matched among any of storage video file that file pass on to the RTSP server and start the REST server and if parameters are not matched with any video file from the storage simulator again ask the parameters from the user.

6. After video file given to the RTSP server, RTSP server continuously check that request is arrived or not from the RTSP client, if request is arrived then client to be connected and play the desired video file.
7. In backend of the simulator REST server continuously check the update or modification request came or not from the VMS where REST client is run, if yes the send the stop request to RTSP server to stop the playing video file and update parameters store in Configfile.txt file and flow will continue if no then video file is continue to play.

Experimental results:-
Parameters entered by the user are stored into Configfile.txt where configuration program read the video file parameters. Figure 3 show the video parameters entered by the user.
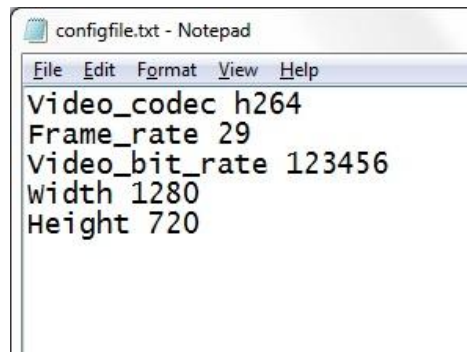

Fig.3:- Video Parameter

After read video parameters from the text file configuration program display list of all the video files with it's corresponding video parameters. That parameters are extracted by the FFMPEG and compare with the user entered parameters. Figure 4 show the list of video file and its corresponding parameters.
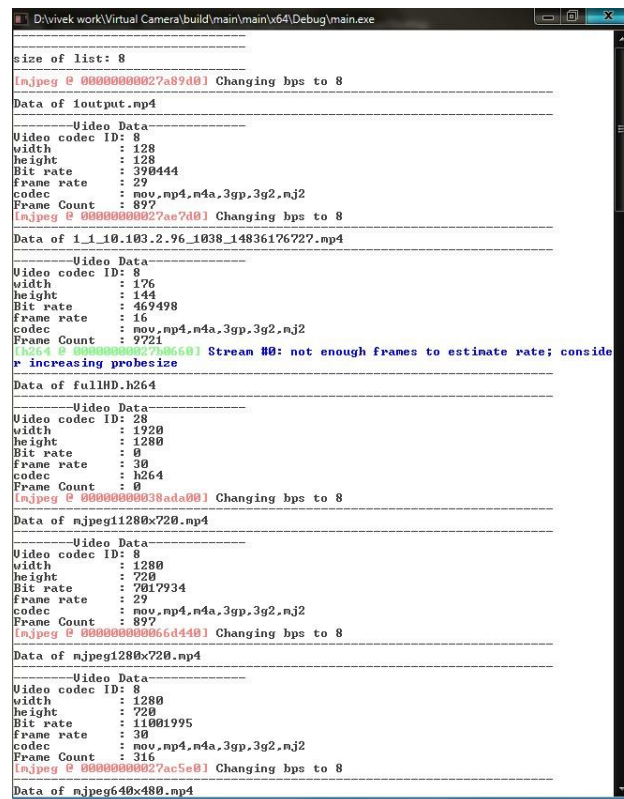

Fig. 4:- List of Video files with its parameters

Matched video file pass on to the RTSP server and RTSP server send the video data frame by frame to the client. Client and be the VLC media player, any Video management System. Figure 5 show the matched video file added to the RTSP server.

Fig. 6:- Video File play on VLC

Figure 6 show the client VLC media player connected with the RTSP server and VLC media player play the desired video file.
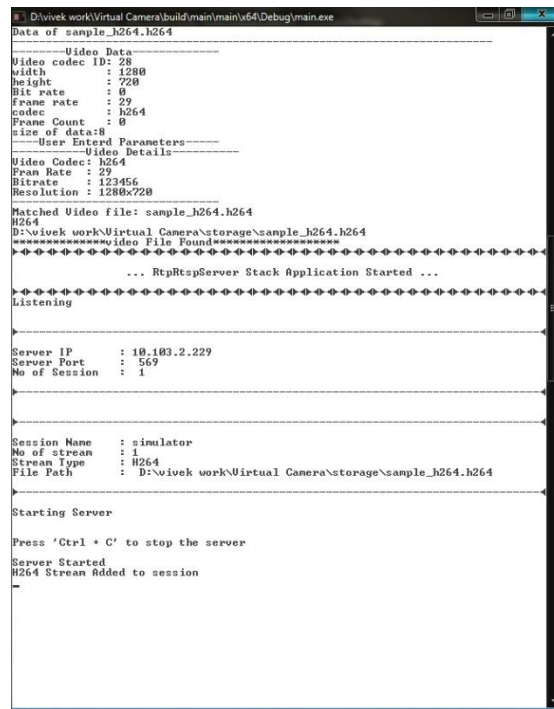
Fig. 5:- Matched file send to the RTSP

CONCLUSION AND FUTURE WORK:-
In proposed system, the designing of virtual IP camera (Simulator) is implemented for testing purpose of VMS. It eliminates the requirement of physical camera where video stream is provided to the VMS without need of any camera.

In future, Different more video container format can be supported.

Acknowledgment:-

References:-

1. Lei Xiaohua, Jiang Xiuhua, Wang Caihong, "Design and Implementation of a Real-time Video Stream Analysis System Based on FFMPEG", Fourth World Congress on Software Engineering 2013, IEEE, pp.212-214.
2. Pham Van Phuoc, Sun-Tae Chung, HoSeok Kang, Seongwon Cho, Keeseong Lee, Tae in Seol, "Design and Implementation of Versatile Live Multimedia Streaming for IP Network Camera", International Conference on Advanced Technologies for Communications(2013), (ATC'13),pp.525-528.
3. Hui Ren, Liu Gao , Zhen Li, "Research on Transmission System of Video Monitoring for theatre Based on Live555", 3rd International Conference on Material, Mechanical and Manufacturing Engineering (IC3ME 2015),pp.831-834.
4. Ming-Jiang Yang, Jo Yew Tham, Dajun Wu, Kwong Huang Goh, "Cost Effective IP Camera for Video Surveillance", 4th IEEE Conference on Industrial Electronics and Applications(2009),pp.2432-2433.
5. Gradimirka Popovic, Nebojsa Arsic, Branimir Jaksic1, Boris Gara2, Mile Petrovic, "Overview, Characteristics and Advantages of IP Camera Video Surveillance Systems Compared to Systems with other Kinds of Camera", International Journal of Engineering Science and Innovative Technology (IJESIT- 2013) ,Volume 2,pp.357-360.
6. Baoxiu Li, Wenhui Zhang, Zhenhui Liu, Minjie Kang, "Development and Implement of the IP Camera Based on DM6437", International Conference on Mechatronic Science, Electric Engineering and Computer(2011),pp.1963- 1964.
7. Muneeb Ahmed Qureshi1, M.Madan Gopal2 & Mohammed Sadiq3, "Design And Implementation Of Audio/Video Codec Based On Android Platform", International Journal of Computer & Communication Technology ISSN (PRINT): 0975 - 7449, Volume-4, Issue-2, 2013, pp.12-14.
8. http://www.axis.com/in/en/learning/web-articles/technica l-guide-to-network-video/system-features.
9. https://www.ffmpeg.org/about.html