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Design and simulation of video monitoring structure over TCP/IP system using MATLAB

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ABSTRACT

Video monitoring systems are undergoing an evolution from conventional analog to digital clarification to provide better rate and security over internet protocols. In addition, analog surveillance becomes insufficient to face enormous demand of security of system contains more than hundreds of camera often deployed in hotels environments far away from room control. This paper presents the design and simulation of a video monitoring scheme in excess of a transmission control protocol/internet protocol (TCP/IP) system using MATLAB. Sophisticated cameras could record directly high-definition digital videos based on digital technology which simply communicate the control room relaying on ordinary internet protocol infrastructure networks. This technology provides a flexible network interface over a wide variety of heterogeneous technology networks. Though, the acceptance of IP designed for video monitoring pretense severe difficulties in terms of power processing, system dependability, required bandwidth, and security of networks. The advantage of IP based video monitoring system has been investigated over conventional analog systems and the challenges of the method are described. The open research issues are still requiring a final solution to permits complete abandon against conventional technology of analog methods. In conclusion, the method to tackle the purpose of video monitoring in actual operation is proposed and verified properly by means of model simulation.

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1. INTRODUCTION

Conventionally, the monitoring methods established in a large number of rooms by manpower while in existing time the surveillance systems could be set up by means of online networks [1]. The online monitoring of videos is less consumption of time and could reduce the manpower numbers with more elasticity to watch their property where they desire as long as they have internet networks [2]. The properties and life security are an aspect of life which could not piddle with [3]. The individuals and governments desired to recognize the situations of their highly appreciated things each moment of being although the actuality that these things positioning in diverse places diagonally the worldwide [4]. The observation is to observe the behavior and activities normally of human for the purpose of influencing, protecting, and directing [5]. The surveillance could provide the observation of groups or personality by government association while could also be related to illness monitoring which monitors the development of illness in the society as not in a straight line observed individually [6]. The monitoring word might apply to observe as of a

reserve in terms of electric devices such as internet protocol (IP) camera or electrically transmission the data such as internet traffic and mobile phone call [7]. Different kinds of monitoring techniques are available in the market such as telephone, biometric monitoring, computer monitoring, data mining human operative and social networks [8]. The response and effectiveness of operators are widely depending on his vigilance rather than the technology ability of the monitoring systems [9]. The human activity and events could exist overlook and the attentiveness stage of operators plunge have concentration rank drop considerably after 10 minutes of idleness in the sight [10]. The high-resolution digital IP monitoring cameras arrive to connect through the internet and remote security surveillance point and enabling new approach which draw attention to events identified in the scene of camera [11]-[13].

The installers of security systems face many challenges to integrate this type of online video surveillance which should be operate in difficult settings, recording and streaming of hundreds of cameras [14]-[16]. The security of video and physical fields is experiencing an enormous move as of analog to digital broadcast over IP networks [17]. The video in analog form coming from coaxial cable to dynamic voltage restorer (DVR) are digitized and compacted by programming algorithms [18]-[20]. Hence, the IP based approach needs to solve many issues to meet the human demands under high security and reliability. High bandwidth capacity requires transmitting and received hundreds of video streams concurrently as proposed by [21]. The requirements of processing power to encode and decode multiples streams have been suggested by [22]-[38].

The digital signal processing (DSP) techniques could be used to design many video monitoring systems from low end-to-end to high end-to-end from portable to plug in implementations. For high resolution, the video monitoring system over the internet protocol architecture and on-chip. Any digitalize videotape monitoring scheme could be separated into 3 module such as video imprison, network boundary, and vital monitoring room modules. The advantages and disadvantages of technical challenges and research open issues of IP based approach with respect to conventional methods has been investigated and developed in this paper. Figure 1 show the virtual diagram of video surveillance which has been successfully designed and employed in the realization stages. The module of video capturing is normally collected of groups of cameras and videocassette encoder part. The video captured from camera is processing and compresses as raw data by video coding. Then, the module of network interface processes the video coding stream and delivers to the IP section. The module of central room provides important surveillance each video and control the cameras response.

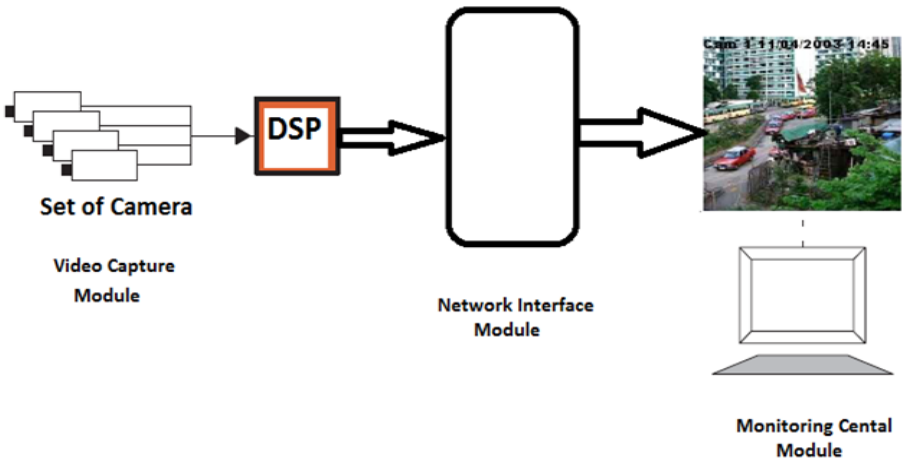

Figure 1. Virtual flow diagram of IP base approach system

2. VIDEO MONITORING MODEL

Over TCP-IP network, the video monitoring model has been designed and investigated in MATLAB. This system shows the behavioral of each part in the system under different conditions as illustrated in Figure 2. The SIMULINK block set provides instrument control to send and receive the information over TCP-IP and user datagram protocol (UDP). The UDP showing in Figure 3 is an alternative protocol of communication to transmission control protocol (TCP). This environment is used primarily to establish low latency and loss tolerating between all internet applications. In this model, the TCP-IP has been used to send and receive the data under test which is captured by cameras to perform video monitoring. In

addition, by using embedded coder type C6000, the video surveillance record data after DSP platform processing. The algorithms of motion detection have implemented and organized to TIC6000 signal processor.

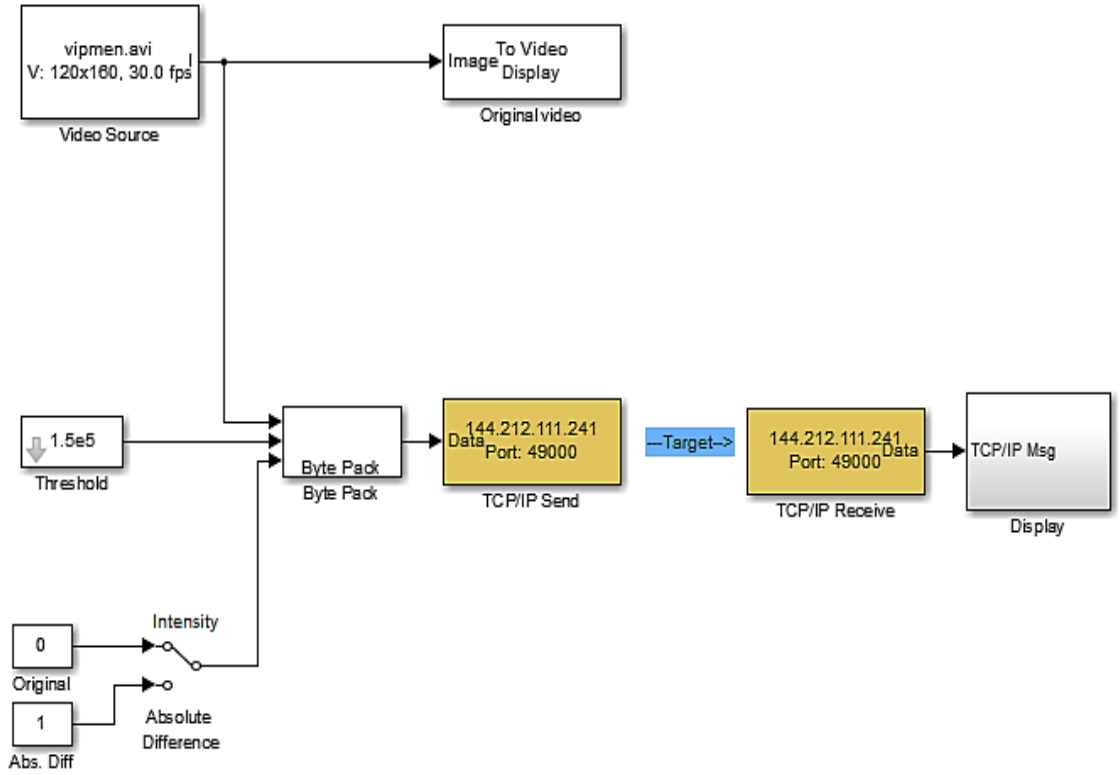

Figure 2. Monitoring model using SIMULINK in MATALB

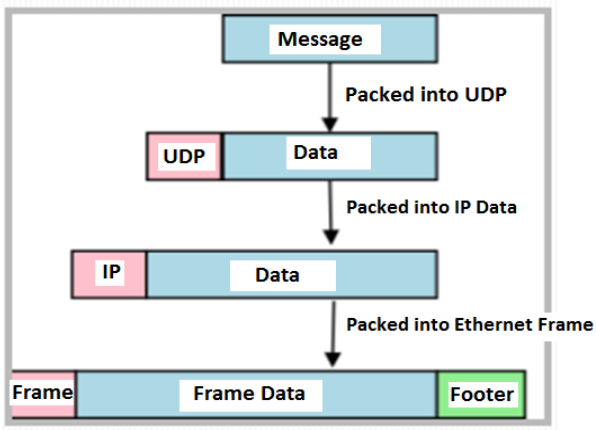

Figure 3. Java UDP programming

To run the model, the computer vision system and DSP system is integrated with embedded coder. The DSK-EVM board is required to design the DSK ethernet card for C6416 DSK target and Ethernet Cable. The algorithmic model show in Figure 4 is used to run the host side machine and communicate with the target by suing TCP-IP send and receive blocks at port number 49000. In the block mode, the TCP-IP block is configuring to send and receive the data under test. The surveillance model is executed on the target C64216 under algorithms of monitoring system as illustrated in Figure 5. This algorithm is implemented by use DSP system toolbox, SIMULINK blocks and embedded coder which is converted to C language coder. Figure 6 shows the motion display model.

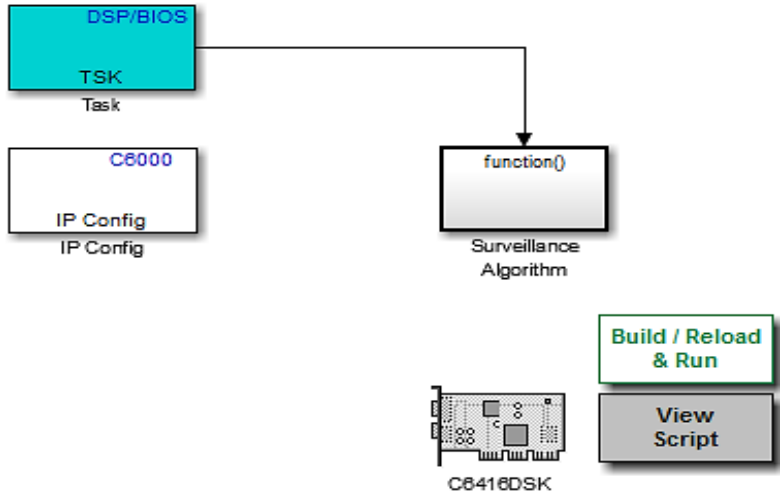

Figure 4. Target side example model

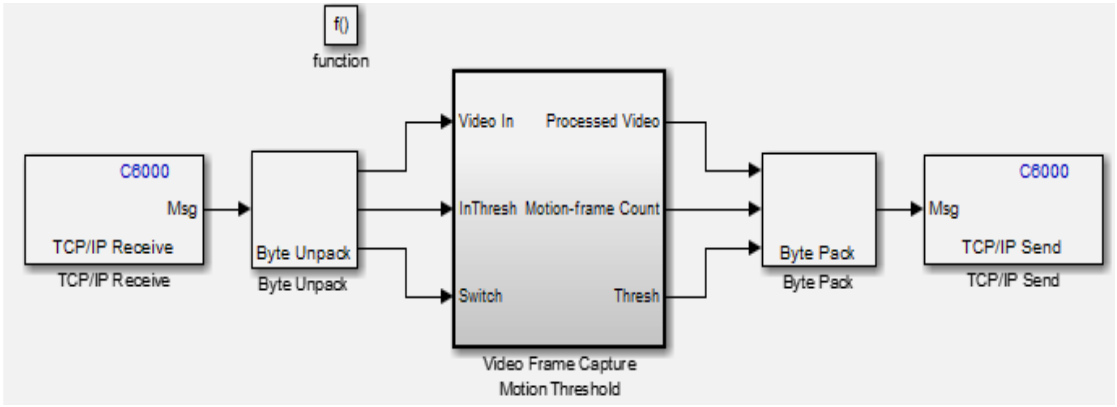

Figure 5. Surveillance algorithms model

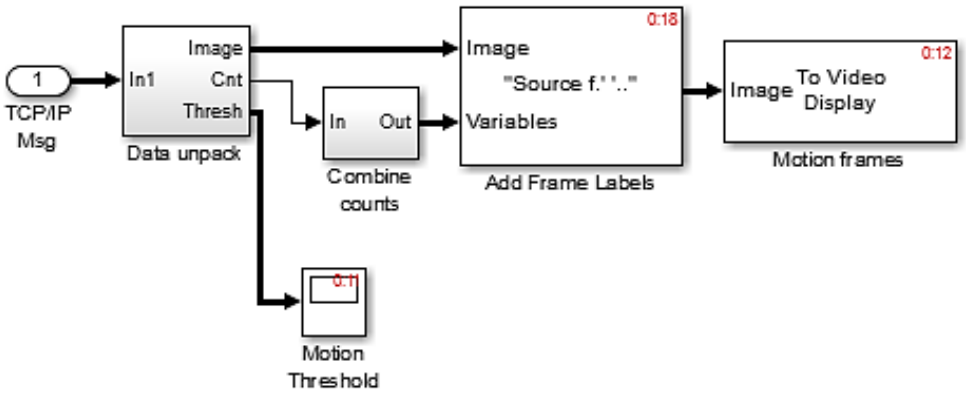

Figure 6. Motion display model

3. RESULTS ANALYSIS

When the code was generated and running on the target, the host side model at the same time sends the frame of video to the target through TCP-IP protocol. The video frames sent by host side model is received by the target and computes the sum of absolute values of different sub-armorial decompression (SAD) between successive video frames which is then return a motion estimation. In case of the estimated motion value exceeds the threshold level, the increments of target are counter and sends the corresponding

frames back to the host by TCP-IP blocks. By adjusting the motion threshold, different video could be illustrated. By running the model, the building reload is used to load and run the DSP coder. While the code is generated, it will bring up the host side model to watch the video monitoring algorithms depend on the detection of motion.

4. CONCLUSION

This paper introduces the design and running the video monitoring system under TCP-IP protocol. The capturing of real time viewing stream video from IP depend on digital cameras on the host computer is investigated and discussed by three different techniques namely web browser, software from vendor and SIMULINK blocks. While future direction has started on the technology of capture streaming video, the MATLAB image acquisition and DSP tool is used to design the simulate the online recognition and detection of many targets images in real time for high security monitoring systems.

The concerns of rising security could accelerate the demand of video surveillances and the camera numbers setup in urban locations, airport, industrial facilities and private building will maintains growing. Hence, as the increasing of camera numbers, the technical tasks in managing this amount of data will push the researchers have attention to develop many solutions in this growth. Though, these developments regularly in difference with everyone such as inventive density algorithms could reduce the bandwidth necessary for every video streams. These solutions will increase the power of processing that required for video compression and decompression. From other side, the user will keep looking for high resolution to provide more detailed frames about their properties. This work presents an easy method to propose and measurement an IP base video monitoring scheme. This technique is comprehensive and practical to measurement the networks in attendance of mobile link.

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