Original Research Article

Controlling surveillance system, controlling PTZ cameras in Data Center area using mobile device

ABSTRACT:

A data center is a physical facility that organizations use to house their critical applications and data. Data center design includes routers, switches, firewalls, storage systems, servers, and application delivery controllers. Because these components store and manage business-critical data and applications, data center security is critical in data center. Therefore, an Android application has been developed that works on smart phones to follow and monitor the performance of the data center camera monitoring system, as it allows the data center manager to view the employees, devices and all data center facilities from his office through mobile phone, or when he is outside the workplace, and to view the report of faults and maintenance to ensure the effectiveness of the system Surveillance cameras in the data center. It also allows the engineer to control the cameras by panning and zooming in on the camera images in data center, Playback previous recordings of cameras and reviewing fault reports to find out the malfunctions of the monitoring system through the application from anywhere where the Internet service is available.

I. INTRODUCTION

In Information and Communication Technology (ICT) era, a data center has become one of the critical issues in the world, especially for a business player. As center where data and information are being processed, transmitted and stored, the data center must be able to provide optimal services to support the success of the corporate business. information becomes a key success for the organization in achieving their business target. Therefore, the protection of information on several security threats becomes a significant requirement to win business competition. Any security threats such as information theft, computer-assisted fraud, vandalism

and computer hacking [1]. CCTV provides multiple functions in the overall security plan. It provides the function of asset protection by monitoring location of assets and activity in their location. It is used to detect unwanted entry into a facility beginning at a perimeter location and following an unauthorized person throughout a facility [2]. Surveillance camera system for controlling cameras using position and orientation of the cameras and position information of a detected object. common goal of most CCTV systems has been the prevention of crime and disorder by tracking and monitoring. It is assumed that CCTV will aid detection through its surveillance capability. Claims are also made that CCTV provides public reassurance and therefore reduces fear of crime. CCTV is used as a site management tool, for example, to monitor traffic patterns or for crowd control at crowded places. The use of mobile phone has become an essential part of our lives [3]. High-end video surveillance systems may use of Pan/Tilt/Zoom (PTZ) cameras, which offer a high degree of flexibility. Since the number of subjects is usually larger than the number of video cameras, the problem to be addressed is how to assign subjects to these cameras. Numerous studies have dealt with the control problem of PTZ cameras [4]. This paper deals with the cameras control problem in automated video surveillance system, When the manager or system engineer is out of the workplace, we develop an application that seeks to optimize the controlling the pan, tilt, and zoom to control PTZ camera by engineer remotely, based on the characteristics of the surveillance area. The control of cameras is based on many factors, such as the direction of the subject's movement and its location, distance from the cameras, occlusion, overall recognition probability so far, and the expected time to leave the site, as well as the movements of cameras and their capabilities and limitations [5].

A common goal of most CCTV systems has been the prevention of crime and disorder by tracking and monitoring. A result of use of CCTV systems, there is need of intelligent video surveillance technologies for CCTV systems to automatically monitor the scenes for important events and behaviors. the efficiency and the robustness are the two particularly important issues for the deployment of intelligent video surveillance technologies, the CCTV systems there are many mobile applications which are being used for tracking purposes [3].

Recent research has attempted to utilize the flexibility of PTZ cameras. Distant Human Identification (DHID) system [6] illustrated a typical master-slave system configuration. A fixed wide-angle camera is used to observe a scene and send information to a server, which in turn

analyzes the scene and sends commands back to PTZ cameras. The PTZ cameras capture finer frames for targeted subjects.

Camera Video surveillance has received an extremely attention as extremely active application research area. The traditional video surveillance systems normally called Close-Circuit Television (CCTV). To this end, automated video surveillance systems utilize integration of real-time and more effective computer vision and intelligence techniques [7]. In the last few years, the video surveillance market has seen a major transformation into third generation video surveillance systems, moving to IP video from traditional analog video causing better processing power and improved compression algorithm [8]. The design of a video surveillance system requires decisions that need familiarity with the basic options and the basis behind the selection of any available choice in the market [9]. So, designing a system requires better remote access, further remarkable mix with different systems, enhanced picture quality and additionally that requires flexibility with others system [10, 11]. In recent years, violent crimes such as murder and rape have been repeatedly committed against those who are relatively vulnerable such as women, children and youth, and the problem of crime in modern cities is aggravating in its severity, resulting in the widening of the safety divide [12]. The crime prevention effect of CCTV has been recognized all over the world, and the installation of CCTV systems for crime prevention is expanding in developed countries including the U.K., the U.S., and France [13]. Manufacturers are developing cheap cost smart devices because of huge competition. There are different reasons for using the android mobile devices including open-source nature of Google platform [14]. where the entire operating system is open and accessible to developers and application writing is supported by the programming language Java, and can access easily to its software development kits (SDK), which all have led to an explosive revolution of Android applications. This paper investigates a system design and feasibility of solutions. it is necessary to develops an Android application to control surveillance cameras and review all the cameras records, allowing the engineer or the director of data center to know the situation of surveillance cameras by the phone intelligent without going to the server room or data center site.

The development of the Internet network, the network-based CCTV is now widely used in the world. In particular, CCTV is used for crime prevention, and the scope of utilization is gradually expanding. The CCTV system transmits and receives image data via a wire/wireless

communication channel, as is composed of various components, such as the surveillance camera, image monitoring control server, authentication and access control server, smart mobile phone, desktop computers, screens and laptop. Communication between the surveillance camera and the image monitoring and control server is established via the wire/wireless network. The surveillance camera takes images and encrypts them before sending them to the image monitoring control server in a safe manner. Image information sending and receiving, and image information processing between surveillance cameras and image monitoring control servers are conducted over several steps. These steps include sending the encrypted image data, decryption of the received image data, facial area detection, creation of the image with privacy protection, and image saving. Secure image transmission should be guaranteed between CCTV cameras and image monitoring control servers.

2. EXISTING SYSTEM

Surveillance in dynamic scenes attempts to detect and track certain objects from image sequences, and more to understand object behaviors. The aim is to develop intelligent visual surveillance to replace the traditional video surveillance. The goal of visual surveillance is not only to place cameras in the place of human eyes, but also to accomplish surveillance task as automatically as possible such controlling PTZ cameras, retrieve previous camera record, cameras monitoring and displays fault and maintenance reports throw mobile device. Visual surveillance in dynamic scenes has a wide range of potential applications, such as a security guard for communities and important buildings, traffic surveillance in cities expressways, detection of military target objects, etc. We focus in this paper on applications involving the surveillance of people, vehicles in buildings, as they are typical of surveillance applications and include the full range of surveillance methods and controlling. Surveillance applications involving people or vehicles include the following.

A) Person-specific identification in certain scenes.

Personal identification at a distance by a smart surveillance system can help the guards to catch intruders and thieves. The systems automatically recognize whether or not the people in view are

intruders or thieves. If yes, alarms will be given immediately. Such systems with face recognition have already been used at public sites, but the reliability is too low for police requirements [15].

b) Anomaly detection and alarming.

In some circumstances, it is necessary to analyze the behaviors of people and vehicles and determine whether these behaviors are abnormal or normal. For example, visual

surveillance systems place in parking lots and supermarkets could analyze abnormal behaviors indicative of theft. Normally, there are many ways of giving an alarm. One way is to automatically make a recorded announcement whenever any abnormal behavior is detected. The another is to contact the police automatically [16][17][18].

3. PROPOSE SYSTEM

A crime is the issue with which almost every government has to deal. Personal identification by controlling PTZ cameras at a distance by a smart CCTV surveillance system can help the guards to catch intruders and thieves. and place visual surveillance systems at locations where the intruders usually seen, e.g., corridors, near servers' rooms, etc. The systems automatically recognize and judge whether or not the people in view are intruders. Visual surveillance is an active research topic in tracking systems. It has been using to detect, recognize and track certain objects from image sequences, and more generally to understand object behaviors. The aim is to use surveillance and smart phones to accomplish the entire surveillance task as automatically as possible, addition controlling cameras, monitoring cameras, retrieve previous records and getting fault and maintenance reports. These days, CCTV systems are using a variety of well-established methods for human detection.

A. Mobile Application controls surveillance cameras monitoring

Mobile application will control cameras and video playback captured from monitoring camera, and retrieve previous recorded from the storge server.

B. Server Application for Monitoring and Controlling

by using this propose application, an engineer can control PTZ cameras (pan /tilt zooming), retrieve video record and getting reports from fault and maintenance. when he is in/ out side data center. CCTV cameras can focus on given parameters. The best use of this application might be in that case when an engineer outside data center. In that case, engineer will turn on the application which will control PTZ camera in all direction sets his wanted. These parameters will be sent which will issue commands for CCTV cameras for panning, tilting and focusing that particular location his controlled. which it helps to knew Identification, since the people detected in the video streams.
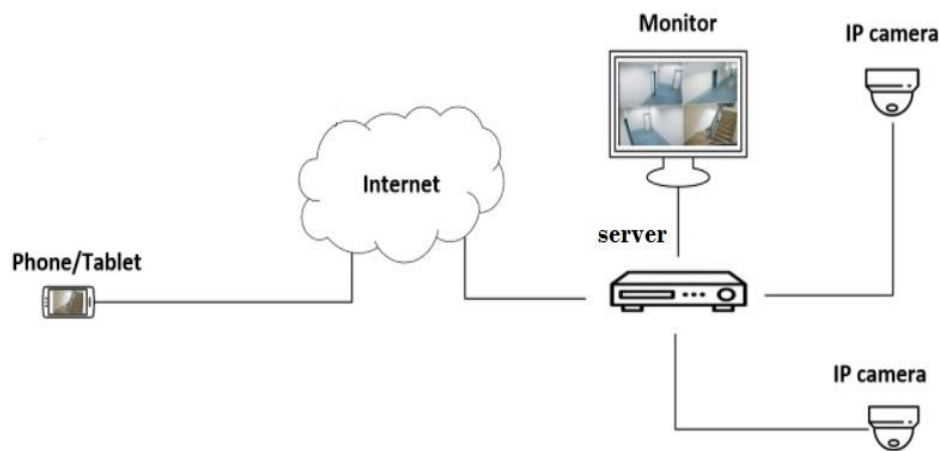
Figure 1. Propose System Architecture.

C. Mobile phone

J2ME is used to develop the controlling and viewing functions on a mobile phone. A viewer can use the keypad of a mobile phone to remotely control the movement of the mobile camera via NXT Service as well as to retrieve the surveillance videos captured by the remote camera via Cam Service. Access security and privacy are major concerns in a wireless environment. From the application viewpoint, in addition to a username/password check mechanism on our system,

the surveillance user can turn on the firewall function on the system to prevent any malicious network invader from accessing the system and enable an end-to-end Secure Sockets

Layer (SSL) mechanism to protect the data transmitted via Internet. (AES) mechanisms, which are supported by the modern Wi-Fi access points, can be used for encrypting the transmitted data when the mobile device connects to the Wi-Fi network, whereas the data can be protected by SIM-based encryption when the mobile device connects to the HSDPA network. Besides, the

WiMAX network also can support modern cryptographic algorithms such as AES with a 1024-bit key for data encryption [19].

D. Control data transmission

Some of the earliest remote control CCTV systems relied on a hard-wired link between the control console and the PTZ head. However, these systems required a lot of multicore cabling between the control room and each individual camera site and, in some cases, were prone to the effects of voltage drops along the cables.

A much more effective alternative to this method of control was to send digitally encoded PTZ commands along a twisted pair cable in the form of RS 422 or RS 485. The principle is illustrated in Figure (2). Each command is encrypted into a data format and sent along a two-wire link to a receiver. The receiver (site driver) contains a decoder chip which interprets the commands and operates the appropriate relay(s) via the relay driver chip [20].
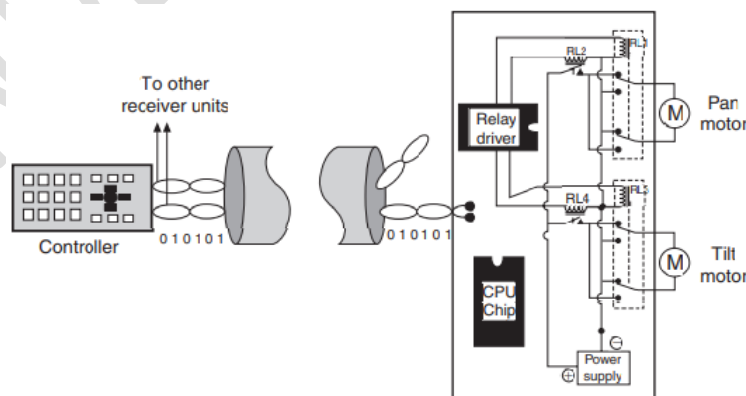

Figure 2. Control of motors using a separate data link such as RS 485 over a twisted pair.

The pan and tilt unit comprises two motors and a number of gears to convert the motor speed into torque. The motors may be 24 VD.C., 24 VA.C. Whilst A.C. motors are generally more efficient and often produce greater torque than their equivalent-size D.C. counterparts, speed control of an A.C. motor is somewhat more complex than for D.C motors. motors are ideal where it is anticipated that high winds are likely to exert a heavy load on the camera assembly, and a high torque drive mechanism is required to overcome this. However, where dynamic joystick control is to be incorporated in the system or controlled by phone device, D.C. P/T units will allow multi-speed (where the speed alters in incremental steps) or variable-speed operation [20].

4. RESULTS AND EXPECTED OUTPUTS

Android application outputs lead to achieve goals are following:

1-The engineer controls the cameras that have a movement motor (PTZ camera) and moves them to ensure that they work normally and adjust them to places of high importance without going to the site through the application.

2- The engineer can add a number of cameras without being restricted to one manufacturer (such as ZTE cameras, Sony and Hikvision) to be added to the cameras that the manager sees through the application and he can delete cameras and replace them with other cameras without going to the site through the application.

3- Identifying the presence of a person or persons inside a prohibited area (server room) by placing a motion detector in the prohibited area, linking it with the camera operating device, adjust camera settings   designated for that area, and sending a warning message in the control cameras room.

4- The engineer can review the previous recordings and know the recording size of each camera to know the places where there is a lot of movement, through the application, to make a comparison between cameras with high and medium levels to help suggest adding large storage capacities in the future.

This Paper screen shots showing the expected results of camera controlling, video streaming and retrieve previous video record from server.
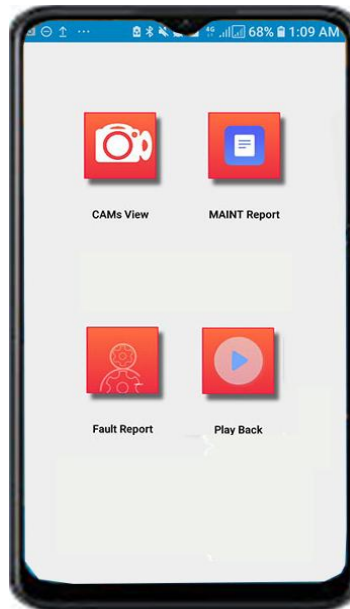
Figure 3. Screenshot of Mobile Application using by engineer

Figure 3 showing android mobile application screenshot for controlling surveillance system. This application controlling PTZ camera, retrieve previous video record, Fault and maintenance reports from server.
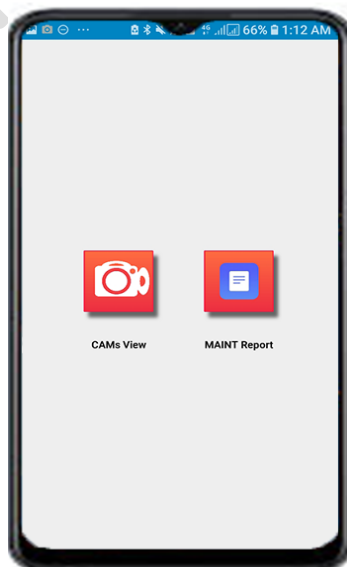
Figure 4. Screenshot of Mobile Application using by Manager.

Figure 4 showing android mobile application screenshot for display cameras and show maintenance report.
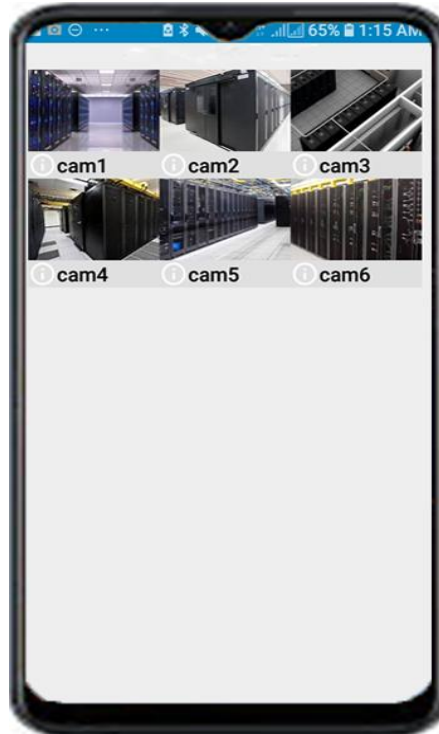

Figure 5. controlling cameras and viewing.

Figure 5 showing android mobile application screenshot for controlling surveillance system.

 This application controlling PTZ camera and displaying cameras from the storage server.

5. CONCLUSION

Sending information or data through data networks to servers is common but coupling these two

surveillance and data transmission processes are a very challenging work. CCTV surveillance systems are mostly implemented and managed by governments and big enterprise; this propose system can be used at wide scale to controlling surveillance system from outside. In the future,

we will enhance the propose system tracking algorithm, that will consider the multiple sensing data of mobile user with network connected CCTV environment.

Reference:

1- Achmadi D, Suryanto Y, Ramli K. On developing information security management system (isms) framework for iso 27001-based data center. In 2018 International Workshop on Big Data and Information Security (IWBIS). IEEE, 2018, 149-157.

2- Kruegle H. CCTV surveillance: analog and digital video practices and technology, Second Edition, 2007.

3- Rayte S, Bhamare R, Barhate K, Sonawane M. Crime monitoring and controlling system by mobile device. International Journal on Recent and Innovation Trends in Computing and Communication. 2015; 3(1):123-6

4- Al-Hadrusi MS, Sarhan NJ. Efficient control of PTZ cameras in automated video surveillance systems. In2012 IEEE International Symposium on Multimedia. IEEE, 2012, 356-359.

5- Al-Hadrusi MS, Sarhan NJ, Davani SG. A clustering approach for controlling PTZ cameras in automated video surveillance. In2016 IEEE International Symposium on Multimedia (ISM). IEEE, 2016, 333-336.

6- Zhou X, Collins RT, Kanade T, Metes P. A master-slave system to acquire biometric imagery of humans at distance. InFirst ACM SIGMM international workshop on Video surveillance 2003, 113-120.

7- Ghumare AR, Patil ND, Holkar CD, Badgujar VD. Peer to Peer Communication between Android Device and PC and Video Surveillance using Android Device. International Journal on Recent and Innovation Trends in Computing and Communication, 3(1):175-80.

8- Moon HM, Pan SB. Implementation of the privacy protection in video surveillance system. In2009 Third IEEE International Conference on Secure Software Integration and Reliability Improvement. IEEE 2009:291-292.

9- Lingkang GU, Mingzheng Z. Intelligent surveillance system used one new method of image recognition. In2011 International Conference on E-Business and E-Government (ICEE). IEEE, 2011. 1-4.

10- Wang X. Intelligent multi-camera video surveillance: A review. Pattern recognition letters. 2013; 34(1): 3-19.

11- Venetianer PL, Deng H. Performance evaluation of an intelligent video surveillance system–A case study. Computer Vision and Image Understanding. 2010 ;114(11):1292-302.

12- Lee J, Kim G. A study on Construction of Smart Safe City for Crime prevention. Seoul: Korea Research Institute for Human Settlements. 2013.

13- Kim, K. and Shin, D. B. "The strategies on safe city making through hotspot analyses on crime." KSCE Journal of Civil Engineering 2014,18 (5), 1511-1517.

14- Toyama M, Kurumatani S, Heo J, Terada K, Chen EY. Android as a server platform. In2011 IEEE Consumer Communications and Networking Conference (CCNC). IEEE. 2011, 1181-1185.

15- Huang Y, Essa I. Tracking multiple objects through occlusions. In2005 IEEE Computer Society Conference on Computer Vision and Pattern Recognition (CVPR'05). IEEE. 2005, 2, 1051-1058.

16- Yong-Ik Yoon Jee-Ae Chun, "International Conference on Information Networking (ICOIN), 2014, 374 – 378.

17- Han, Zhenjun, Qixiang Ye, and Jianbin Jiao. "Combined feature evaluation for adaptive visual object tracking." Computer Vision and Image Understanding, 2011 115(1), 69-80.

18- A. Cavallaro, O. Steiger, and T. Ebrahimi, "Tracking video objects in cluttered background," IEEE Transactions on Circuits and Systems for Video Technology. , 2005,15(4), 575-584.

19- Leu JS, Lin WH, Tzeng HJ. Design and implementation of a mobile home surveillance system. Journal of the chinese institute of engineers. 2010,33(5): 669-80.

20- Cieszynski J. Closed circuit television. Third edition, Elsevier; 2006.