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Signature : .....

Supervisor's Name : En Mohd Shahril Izuan Bin Mohd Zin

Date : 23 April 2007

LOW-COST PC-BASED VIDEO SURVEILLANCE SYSTEM

SAIFUL YAZAN BIN ABD KARIM

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MOHD SHAHRIL IZUAN B MOHD ZIN
Pensyarah
Fakulti Kej Elektronik dan Kej Komputer (FKEKK),
Universiti Teknikal Malaysia Melaka (UTeM),
Karung Berkunci 1200,
Ayer Keroh, 75450 Melaka

Tarikh: 22 APRIL 2007

"I admitted that this report is my own works except for the sentences or phrases that I have stated its sources"

Signature : 

Writer's name : Saiful Yazan Bin Abd Karim

Date : 29th March 2007

To my beloved parents

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ABSTRACT

This report covers the design, development and testing of a low-cost PC-Based video surveillance system. Typical commercial video surveillance systems are expensive and not affordable to all level of user. A typical commercial video surveillance system today also is based largely on analog signal technology. This project will use digital signal technology which is more efficient than analog signal. For this purpose, video surveillance software will be develop and designed. This paper also attempts to answer a number of questions about video surveillance: What are the applications of video surveillance? What are the system architectures for video surveillance? What are the key technologies? What are the some of the key technical challenges? And what are the implications of video surveillance, both to security and privacy? Video surveillance software is designed using Microsoft Visual Basic 6 program which controls the system using PC. This software is then integrated with a webcam. Besides capture video from a webcam, this program allows user to do surveillance on their PC. The interface of this program is designed to be a user-friendly concept easy to handle. A brief introduction of the concept of video surveillance system is followed by the discussion of design consideration and design verification.

ABSTRAK

Laporan ini merangkumi proses merekabentuk, membangunkan dan menguji sistem kawalan video kos rendah menggunakan komputer. Sstem kawalan video yang ada di pasaran tidak mampu digunakan oleh kebanyakan pengguna kerana harganya yang mahal dan kos penyelenggaraan yang tinggi. Kebanyakan sistem kawalan video di pasaran juga adalah berasaskan teknologi analog. Projek ini akan menggunakan teknologi digital yang lebih efisien berbanding teknologi analog, seiring dengan teknologi semasa. Untuk tujuan ini, satu perisian kawalan video dibangunkan dan direkabentuk. Laporan ini turut mengupas persoalan-persoalan berkaitan sistem kawalan video : Apakah aplikasi sebenar kawalan video? Apakah peraturan untuk sistem kawalan video? Apakah teknologi teras yang digunakan? Apakah cabaran utama yang perlu dihadapi? Dan apakah implikasi kawalan video dari aspek keselamatan dan hak peribadi? Perisian kawalan video yang direkabentuk menggunakan program pengaturcaraan Microsoft Visual Basic 6 akan digunakan untuk mengawal sistem ini dengan menggunakan komputer. Perisian ini kemudiannya akan berintegrasi dengan kamera web. Selain merakam video dari kamera video, program ini membenarkan pengguna untuk melakukan pemantauan keselamatan terhadap komputer pengguna. Antara-muka program ini direka untuk menjadi mesra pengguna dan mudah dikendalikan. Penerangan tentang konsep sistem kawalan video kemudiannya diikuti perbincangan kesesuian rekabentuk dan pengesahan rekabentuknya.

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ABBREVIATIONS AND ACRONYMS

VB	-	Visual Basic
PC	-	Personal Computer
GUI	-	Graphical User Interface
RAD	-	Rapid Application Development
ASP	-	Active Server Pages
COM	-	Component Object Model
EXE	-	Executables

CHAPTER I

INTRODUCTION

Basically, companies or organizations use a video surveillance system to monitor the safety and work progress in their places. We all know that using this type of surveillance system ensure their reliability and maintain their work performance. So, this project is to give the same impact to small building or private users.

1.1 Problem Statement

Companies and private users are concerned about the safety and human activities going on their place. Without proper monitoring, a lot of things can happen and proofs are needed in case of serious incident. The most practical way to solve this problem is by using a video surveillance system.

The main problem in real-life is video surveillance systems in the market are expensive and not affordable to all level of society. Besides that, some of them are complex and needs trained personal to equip the surveillance system.

1.2 Objectives

In this project, the main objective is to develop a simple and user friendly software with interface that has functions like viewing camera, capture or view recorded video, scheduling the record time and security mode. This simple interface will give users full control of the system and ensure reliability of this system.

Besides that, this project objective is to integrate the software with hardware to become a PC-Based video surveillance system which is affordable to everybody and easy to use. This project use PC-Based system because it is flexible and it saves cost a lot. This plug-and-play concept software will also save time.

1.3 Scope of Project

Scopes of project is to design and develop software for video surveillance and provide user interface and integrate it with hardware to become a system. To develop the software, we used Microsoft Visual Basic 6 (VB6) application. This application will be use to develop the system's interface and able to execute the programmed functions.

1.4 Methodologies

This project is started with a project planning. This plan is done during part one of this project. Then, a program flowchart is designed to suite the

objectives of this project. This flowchart will guide the software development according to the functions planned. The considerations taken in designing the interface are crucial because the main objective wants a simple and user-friendly interface.

1.5 Report Structure

This report consists of five chapters which are project introduction, literature review, project methodology, results and conclusion. In project introduction, it reviews on the objectives of this project, the problem statement and the scope of project. While in literature review chapter, it reviews on the surveillance system and Visual Basic background and applications. Then in the methodology chapter, it describes on how the project is planned and how to design the software for this project. The results of this project are displayed and discussed in the results section while conclusion chapter will conclude this project whether if the objectives are achieved and some suggestions to improve this project.

CHAPTER II

LITERATURE REVIEW

2.1 Surveillance

Surveillance is the monitoring of behavior. **Systems Surveillance** is the process of monitoring the behavior of people, objects or processes within systems for conformity to expected or desired norms in trusted systems for security or social control. Figure 2.1 below shows the typical surveillance camera used today.

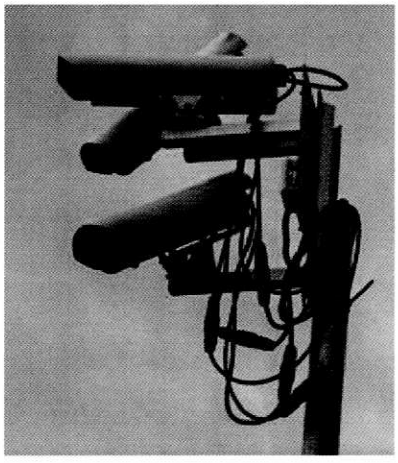

Figure 2.1 Surveillance camera

Although the word surveillance literally means (in French) "watching over"[1] the term is often used for all forms of observation or monitoring, not just visual observation. Nevertheless, the all-seeing **eye-in-the-sky** is still a general icon of surveillance.

The word *surveillance* is commonly used to describe observation from a distance by means of electronic equipment or other technological means, for example:

(a) Eavesdropping
(b) Telephone tapping
(c) Directional microphones
(d) Communications interception
(e) Covert listening devices or 'bugs'
(f) Minox subminiature cameras
(g) Closed-circuit television
(h) GPS tracking
(i) Bait car
(j) Electronic tagging
(k) CCTV Images
(l) Military reconnaissance
(m) Reconnaissance aircraft, e.g. Lockheed U-2
(n) Reconnaissance satellites
(o) "Trusted" computing devices
(p) Internet and computer surveillance

However, surveillance also includes simple, relatively no- or low-technology methods such as direct observation, observation with binoculars, postal interception, or similar methods.

2.1.1 Surveillance, Counter Surveillance, Inverse Surveillance, Sousveillance

Surveillance is the art of watching over the activities of persons or groups from a position of higher authority. Surveillance may be covert (without their knowledge) or overt (perhaps with frequent reminders such as "we are watching over you"). Surveillance has been an intrinsic part of human history. Sun Tzu's *The Art of War*, written 2,500 years ago, discusses how spies should be used against a person's enemies. But modern electronic and computer technology have given surveillance a whole new field of operation. Surveillance can be automated using computers, and people leave extensive records that describe their activities.

Counter surveillance is the practice of avoiding surveillance or making surveillance difficult. Before computer networks, counter surveillance involved avoiding agents and communicating secretly. With recent developments; the Internet, increasing prevelance of electronic security systems, and computer databases, counter surveillance has grown in scope and complexity. Now counter surveillance involves everything from knowing how to delete a file on a computer to avoiding becoming the target of direct advertising agencies.

Inverse surveillance is the practice of reversalism on surveillance, e.g., citizens photographing police, shoppers photographing shopkeepers, and passengers photographing cab drivers who usually have surveillance cameras in their cabs. A well-known example is George Haliday's recording of the Rodney King beating. Inverse surveillance attempts to subvert the Panoptic gaze of surveillance, and often attempts to subvert the secrecy of surveillance through making the inverse surveillance recordings widely available (in contrast to the usually secret or restricted surveillance tapes).

Sousveillance (a term coined by Steve Mann, a professor at the University of Toronto [2]) is inverse surveillance that includes the recording of an activity by a participant in the activity. Recent sousveillance workshops such as Microsoft's

Continuous Archival and Recording of Personal Experience are evidence of a growing sousveillance industry including Microsoft (wearable cameras), Nokia, Hewlett Packard ("Casual Capture") and many others.

Clinical Surveillance is the monitoring of events (including, for example, the occurrences of infectious diseases or chronic diseases) with a significant impact on public health. Increasingly, clinical surveillance is being used to inform public policy in allocating health care resources and meeting patient needs. As health care becomes increasingly dependent on information systems and the use of clinical surveillance becomes more widespread, privacy concerns may arise. Patient centeredness is a form of **clinical sousveillance** in which information is managed with equiveillance and transparency.

Equiveillance is the balance between surveillance and sousveillance. It has been suggested that equiveillance might better preserve the contextual integrity of veillance data.

2.1.2 Impact of Surveillance

The greatest impact of computer-enabled surveillance is the large number of organisations involved in surveillance operations:

(a) The state and security services still have the most powerful surveillance systems, because they are enabled under the law. But today levels of state surveillance have increased, and using computers they are now able to draw together many different information sources to produce profiles of persons or groups in society.

(b) Many large corporations now use various form of 'passive' surveillance. This is primarily a means of monitoring the activities of staff and for controlling public relations. But some large corporations actively use

various forms of surveillance to monitor the activities of activists and campaign groups who may impact their operations.

(c) Many companies trade in information lawfully, buying and selling it from other companies or local government agencies who collect it. This data is usually bought by companies who wish to use it for marketing or advertising purposes.

(d) Personal information is obtained by many small groups and individuals. Some of this is for harmless purposes, but increasingly sensitive personal information is being obtained for criminal purposes, such as credit card and other types of fraud.

Modern surveillance cannot be totally avoided. However, non-state groups may employ surveillance techniques against an organisation, and some precautions can reduce their success. Some states are also legally limited in how extensively they can conduct general surveillance of people they have no particular reason to suspect.

2.1.3 Telephones and Mobile Telephones

The official and unofficial tapping of telephone lines is widespread. The contracts or licenses by which the state controls telephone companies means that they must provide access for tapping lines to the security services and the police.

For mobile phones the major threat is the collection of communications data. This data not only includes information about the time and duration of the call, but also the geographical location where the call was made from and to whom. This data can be determined generally because the geographic communications cell that the call was made in is stored with the details of the call. But it is also possible to get greater resolution of a persons location by combining information from a number of cells surrounding the persons location.

Mobile phones are, in surveillance terms, a major liability. This liability will only increase as the new third-generation (3G) phones are introduced. This is because the base stations will be located closer together.

2.1.4 Postal Services

As more people use faxes and email the significance of the postal system is decreasing (this may not be the case in all countries, certainly the case with international communications, but probably not local). But interception of post is still very important to the security services.

There is no easy way to know your post is being read. The machines used to sort and stamp letters often rip up items anyway, so damage is no certain indicator that your post is being read. The simplest counter-measure to stop your post being opened is to put sticky tape along each edge and the seams of the envelope, and then sign the tape with an indelible marker. That prevents all but the most expert tampering.

People used to send floppy disks via the post. Today these files can go easily by email. But CDs and DVDs of data are still regularly sent by post. To ensure that this data is not open to reading by anyone, even if it's just wrongly delivered, you should encrypt the data.

2.1.5 Surveillance Devices - 'bugs'

Surveillance devices or 'bugs' are not really a communications medium, but they are a device that requires a communications channel. The idea of a 'bug' usually involves a radio transmitter, but there are many other options for carrying a signal; you can send radio frequencies through the main wiring of a building and pick them up outside, you can pick up the transmissions from a cordless phones,

and you can pick up the data from poorly configured wireless computer networks or tune in to the radio emissions of a computer monitor.

Bugs come in all shapes and sizes. The original purpose of bugs was to relay sound. Today the miniaturisation of electronics has progressed so far that even TV pictures can be broadcast via bugs that incorporate miniature video cameras (something made popular recently during TV coverage sports events, etc.). The cost of these devices has dramatically fallen.

2.1.6 Photography

Photography is becoming more valuable as a means of surveillance. In recent years there has been a significant expansion in the level of stills and video photography carried out at public demonstrations in many countries. At the same time there have been advances in closed circuit television (CCTV) technology and computer image processing that enable digital images taken from cameras to be matched with images stored in a database.

Photographs have long been collected as a form of evidence. But as protest and civil disobedience become an ever greater liability to governments and corporations, images are gathered not only as evidence for prosecution, but also as a source of intelligence information. The collection of photographs and video also has another important function - it scares people.

2.1.7 Closed Circuit TV[3]

Closed circuit TV (CCTV) - where the picture is viewed or recorded, but not broadcast - initially developed as a means of security for banks. Today it has developed to the point where it is simple and inexpensive enough to be used in home security systems, and for everyday surveillance.