SURVEILLANCE SYSTEM VIA INTERNET

SABIL FIKRI BIN SAHIMI

This report is submitted in fulfillment of the requirements for the award of Bachelor of Electronic Engineering (Computer Engineering) With Honors

Faculty of Electronic and Computer Engineering
Universiti Teknikal Malaysia Melaka

APRIL 2009
SURVEILLANCE SYSTEM VIA INTERNET

Saya Sabii Fikri bin Sahimi

(HURUF BESAR)
mengaku membenarkan Laporan Projek Sarjana Muda ini disimpan di Perpustakaan dengan syarat-
syarat kegunaan seperti berikut:
1. Laporan adalah hak milik Universiti Teknikal Malaysia Melaka.
2. Perpustakaan dibenarkan membuat salinan untuk tujuan pengajian sahaja.
3. Perpustakaan dibenarkan membuat salinan laporan ini sebagai bahan pertukaran antara institusi
   pengajian tinggi.
4. Sila tandakan (✓) :

   □ SULIT*
   □ TERHAD*
   ✓ TIDAK TERHAD

(Mengandungi maklumat yang berdarjah kesusilan atau
kepentingan Malaysia seperti yang termaktub di dalam AKTA
RAHSIA RASMI 1972)

(Mengandungi maklumat terhad yang telah ditentukan oleh
organisasi/badan di mana penyelidikan dijalankan)

(TANDATANGAN PENULIS)

(TANDATANGAN PENYELIA)

Alamat Tetap: C10 Jalan Tembisa,
Taman Melayu Jaya,
31900 Kampar Perak

Marsullidan bin Mat Ibrahim
Pensyarah
Fakulti Kejuruteraan Elektronik Dan Kejuruteraan Komputer
Universiti Teknikal Malaysia Melaka (UTeM)
Karung Birkunci No 1752
Tarikh: 08/05/2009

5 Mei 2009

Tarikh: 08/05/2009
"I hereby declare that this report is the result of my own work except for quotes as cited in the references."

Signature : [Signature]

Author : SABIL FIKRI BIN SAHIMI

Date : 5 MEI 2009
“I hereby declare that I have read this report and in my opinion this report is sufficient in terms of the scope and quality for the award of Bachelor of Electronic Engineering (Computer Engineering) With Honors.”

Signature

Supervisor’s Name : MR MASRULLIZAM BIN MAT IBRAHIM

Date : 05/05/2001
Dedicated for my beloved father and mother...
ACKNOWLEDGEMENTS

Firstly, I would like to dedicate my highest gratitude to Allah SWT for giving me the strength to complete this final project.

With this opportunity, I would like to take this opportunity to express my gratitude to my beloved parents for their continuous support to ensure that I continue growth and success during my educational process. My sincere appreciation also goes to my supervisor, Mr. Masrullizam Bin Mat Ibrahim for giving me prudent advice and guidance in shaping my direction to ensure that I could complete my final project. Thank you for the time and experiences shared as well as additional knowledge gained as I believe that I would not get this kind of opportunity elsewhere.

I am also indebted to my friends and I would like to thank all of them from 4 BENC S2 who had been such wonderful friends to me and also to everyone else who was involved in the completion of this project. I would like to thank them for all the support and encouragement to me which have given me the courage and wisdom to fulfill my final year project. Thank you.
ABSTRACT

The technology of surveillance systems have been developed and utilized in most security systems. A conventional surveillance system uses a direct connection from the camera to the media output. However, this system is only accessible within its limited compound and may not be accessed anywhere further off its area. Without proper access to the surveillance system, the user is not in control of the area and may not be able to fully optimize the usage of the surveillance system. In this project, the internet is used as the remote connection to the camera. This method uses internet web browsers as interface for users to use the system where users can access and view the camera from the website. The system is separated into two parts, the client side and the server side. The server side holds most of the hardware appliances and a few programming. Most of the essential components of the system are factory-manufactured devices that were installed directly to the system. The client side is more software oriented where most of the parts involves programming. The main component of the client side is the web interface which requires web programming. Web programming languages such as HTML, PHP and JavaScript is used for the web interface.
ABSTRAK

# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>CHAPTER</th>
<th>CONTENT</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>TITLE</td>
<td></td>
<td>i</td>
</tr>
<tr>
<td>STATUS CONFIRMATION FORM REPORT</td>
<td></td>
<td>ii</td>
</tr>
<tr>
<td>VERIFICATION OF REPORT</td>
<td></td>
<td>iii</td>
</tr>
<tr>
<td>VERIFICATION BY SUPERVISOR</td>
<td></td>
<td>iv</td>
</tr>
<tr>
<td>DEDICATION</td>
<td></td>
<td>v</td>
</tr>
<tr>
<td>ACKNOWLEDGEMENTS</td>
<td></td>
<td>vi</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td></td>
<td>vii</td>
</tr>
<tr>
<td>ABSTRAK</td>
<td></td>
<td>viii</td>
</tr>
<tr>
<td>TABLE OF CONTENTS</td>
<td></td>
<td>ix</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td></td>
<td>xiv</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td></td>
<td>xvi</td>
</tr>
<tr>
<td>LIST OF ABBREVIATION</td>
<td></td>
<td>xvii</td>
</tr>
</tbody>
</table>

## I

### INTRODUCTION

1.1 Overview 1
1.2 Project Objective 2
1.3 Problem Statement 2
1.4 Scope Of Work 3
1.5 Project Methodology 3
1.7 Thesis Outline 4
# LITERATURE REVIEW

2.1 Introduction  
2.2 Surveillance  
2.3 Closed-Circuit Television  
2.4 Server & Client  
2.5 Wide Area Network  
2.6 Server Types  
2.6.1 Web Server  
2.6.1.1 localhost  
2.6.1.2 Apache Web Server  
2.6.1.3 IIS  
2.6.2 FTP Server  
2.6.2.1 Internet Domain  
2.6.2.2 Web Hosting  
2.7 Server-Side Connection Protocols  
2.7.1 FTP (File Transfer Protocol)  
2.7.2 IP (Internet Protocol)  
2.7.2.1 Static IP  
2.7.2.2 Dynamic IP  
2.7.3 DNS  
2.7.3.1 Static DNS  
2.7.3.2 Dynamic DNS  
2.7.3.3 DynDNS  
2.8 Client-Side Connection Types  
2.8.1 Internet  
2.8.2 Web Browsers  
2.9 Client-Side Connection Protocol  
2.9.1 HTTP  
2.9.2 Proxy Server
2.10 Software
   2.10.1 FileZilla FTP Uploader 16
   2.10.2 Debut Video Capture Software 16
   2.10.3 WampServer 17
   2.10.4 Mozilla Firefox 17
   2.10.5 Microsoft Visual Studio 2005 18
       2.10.5.1 C# Programming Language 18
   2.10.6 Adobe Dreamweaver CS3 19
       2.10.6.1 HTML 19
       2.10.6.2 PHP 20
       2.10.6.3 JavaScript 20
2.11 Hardware 21
   2.11.1 DVR Card 21
   2.11.2 Surveillance Cameras 21
       2.11.2.1 CCD Camera 21
       2.11.2.2 CMOS Camera 22
       2.11.2.3 WebCam 22
   2.11.3 Computer Server 22
       2.11.3.1 PCI Slot 22

III METHODOLOGY

3.1 Introduction 23
3.2 Software Development 24
   3.2.1 Development Process Flowchart 24
   3.2.2 Development Process Flowchart 25
   Description
3.3 System Architecture 26
   3.3.1 System Specification 27
3.4 System Algorithm 28
3.4.1 System Algorithm Flowchart 28
3.4.2 System Algorithm Flowchart Description 29
3.4.3 System Algorithm Pseudo Code 30
3.4.4 Scheduling Diagram 31
3.5 System Configuration 33
   3.5.1 DebBy Video Capture Software 33
       Configuration
   3.5.2 ContentCheck.exe Configuration 35
   3.5.3 RecordedContents.exe Configuration 36
   3.5.4 Network & Internet Configuration 36

IV

RESULTS AND DISCUSSION

4.1 Introduction 38
4.2 Results Analysis 39
4.3 Results 40
   4.3.1 DebBy Video Capture Software 40
   4.3.2 ContentCheck.exe 41
       4.3.2.1 ContentCheck.exe Flowchart 42
       4.3.2.2 ContentCheck.exe Flowchart Explanation 43
   4.3.3 RecordedContents.exe 44
       4.3.3.1 RecordedContents.exe Flowchart 47
       Flowchart Explanation 48
   4.3.4 Website 49
       4.3.4.1 Introduction Page 50
       4.3.4.2 View Camera Page 51
       4.3.4.3 View Records Page 53
4.4 Future Development 54
4.5 Discussion 55

V

CONCLUSION AND RECOMMENDATION

5.1 Conclusion 57
5.2 Recommendation 58

REFERENCE 59
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>NO</th>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1.1</td>
<td>No Connectivity problems with conventional surveillance systems</td>
<td>2</td>
</tr>
<tr>
<td>Figure 2.1</td>
<td>Schematic representation of a proxy server [4]</td>
<td>16</td>
</tr>
<tr>
<td>Figure 2.2</td>
<td>Official Mozilla Firefox Web Browser Icon [2]</td>
<td>18</td>
</tr>
<tr>
<td>Figure 2.3</td>
<td>Adobe Dreamweaver CS4 Splash Screen [7]</td>
<td>20</td>
</tr>
<tr>
<td>Figure 2.4</td>
<td>DVR Card with 4 Channels Input At 25fps [3]</td>
<td>22</td>
</tr>
<tr>
<td>Figure 3.1</td>
<td>Program Development Flow Chart</td>
<td>25</td>
</tr>
<tr>
<td>Figure 3.2</td>
<td>System Architecture Block Diagram</td>
<td>27</td>
</tr>
<tr>
<td>Figure 3.3</td>
<td>Server-Client program &amp; data output synchronization</td>
<td>29</td>
</tr>
<tr>
<td>Figure 3.4</td>
<td>Scheduling algorithm for data request &amp; transmit between client &amp; server</td>
<td>32</td>
</tr>
<tr>
<td>Figure 3.5</td>
<td>Debut Options Window Dialog Box</td>
<td>34</td>
</tr>
<tr>
<td>Figure 3.6</td>
<td>Video Output Compression Settings.</td>
<td>35</td>
</tr>
<tr>
<td>Figure 3.7</td>
<td>Video Capture Recording Time Settings</td>
<td>35</td>
</tr>
<tr>
<td>Figure 3.8</td>
<td>Output Folder Location</td>
<td>36</td>
</tr>
<tr>
<td>Figure 3.9</td>
<td>Windows Firewall Configuration</td>
<td>38</td>
</tr>
<tr>
<td>Figure 3.10</td>
<td>Program Exceptions Browse Dialog Box</td>
<td>38</td>
</tr>
<tr>
<td>Figure 4.1</td>
<td>System process flow block diagram</td>
<td>40</td>
</tr>
<tr>
<td>Figure 4.2</td>
<td>Camera Output Viewed From Debut Video Capture Software</td>
<td>41</td>
</tr>
<tr>
<td>Figure 4.3</td>
<td>ContentCheck.exe Executable File.</td>
<td>42</td>
</tr>
<tr>
<td>Figure 4.4</td>
<td>Log Files Generated By ContentCheck.exe</td>
<td>42</td>
</tr>
<tr>
<td>Figure 4.5</td>
<td>ContentCheck.exe Program Flowchart</td>
<td>43</td>
</tr>
<tr>
<td>Figure 4.6</td>
<td>Program icon for RecordedContents.exe</td>
<td>45</td>
</tr>
<tr>
<td>Figure 4.7</td>
<td>Main User Interface For RecordedContents.exe</td>
<td>45</td>
</tr>
<tr>
<td>Figure 4.8</td>
<td>Menu selection for View Upload Log option.</td>
<td>47</td>
</tr>
<tr>
<td>Figure 4.9</td>
<td>Menu selection for Clear Log File option.</td>
<td>47</td>
</tr>
<tr>
<td>Figure 4.10</td>
<td>Program Upload Algorithm Flowchart</td>
<td>48</td>
</tr>
<tr>
<td>Figure 4.11</td>
<td>Remote Surveillance Via Internet Logo</td>
<td>50</td>
</tr>
<tr>
<td>Figure 4.12</td>
<td>Remote Surveillance System Introduction Page</td>
<td>51</td>
</tr>
<tr>
<td>Figure 4.13</td>
<td>View Camera Page With Image Output</td>
<td>52</td>
</tr>
<tr>
<td>Figure 4.14</td>
<td>Camera output when image is not available</td>
<td>53</td>
</tr>
<tr>
<td>Figure 4.15</td>
<td>Remote Surveillance System Introduction Page</td>
<td>54</td>
</tr>
<tr>
<td>Figure 4.16</td>
<td>Server-Client Data Transmission Block Diagram</td>
<td>57</td>
</tr>
</tbody>
</table>
# LIST OF TABLES

<table>
<thead>
<tr>
<th>NO</th>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 1.1</td>
<td>Examples for URL &amp; Domain Name.</td>
<td>11</td>
</tr>
<tr>
<td>Table 2.1</td>
<td>C# Code Example</td>
<td>19</td>
</tr>
<tr>
<td>Table 2.2</td>
<td>PHP Code Example</td>
<td>21</td>
</tr>
<tr>
<td>Table 2.3</td>
<td>JavaScript Code Example.</td>
<td>21</td>
</tr>
<tr>
<td>Table 3.1</td>
<td>Components used in the system</td>
<td>28</td>
</tr>
<tr>
<td>Table 3.2</td>
<td>Configuration Steps for ContentCheck.exe</td>
<td>36</td>
</tr>
<tr>
<td>Table 3.3</td>
<td>Configuration Steps for RecordedContents.exe</td>
<td>37</td>
</tr>
<tr>
<td>Table 4.1</td>
<td>RecordedContents.exe Buttons</td>
<td>46</td>
</tr>
<tr>
<td>Table 4.2</td>
<td>Website Pages Description</td>
<td>51</td>
</tr>
<tr>
<td>Table 4.3</td>
<td>View Records Buttons Description.</td>
<td>54</td>
</tr>
</tbody>
</table>
LIST OF ABBREVIATIONS

CCTV  Closed Circuit Television
IP    Internet Protocol
FTP   File Transfer Protocol
DNS   Dynamic Name Server
HTTP  Hypertext Transfer Protocol
PHP   Personal Home Page to Hypertext Preprocessor.
DVR   Digital Video Recorder
kbps  Kilobytes Per Second
CS3   Creative Suite 3
WAN   Wide Area Network
IIS   Internet Information Services
ASP   Active Server Pages
URL   Uniform Resource Locater
DHCP  Dynamic Host Configuration Protocol
WWW   World Wide Web
HTML  Hypertext Markup Language
CHAPTER 1

INTRODUCTION

1.1 OVERVIEW

Security is one of the important elements in our daily lives. It provides the confidence for us to be in control of ourselves and to our belongings. The technology of a CCTV Surveillance System has been around for quite some. Installing a CCTV at one’s premises ensures them to be in control with the on-goings in an area. However, there are limitations to the viewing capability where it can only be accessed only within its closed compound. This project is about developing a Surveillance system which uses the web browser technology to monitor the CCTV system remotely through the internet.

CCTV Surveillance is the technology by which a house, office, or room are installed with a camera and can be monitored from an observation area without having to be exactly at the designated place in order to know who or what is on the place. The data of the CCTV camera is transferred through a wired connection to the receiver. The output is displayed through a software which converts the optical data of the CCTV to the display screen.
1.2. PROJECT OBJECTIVE

The objectives for this project is determined in a few points, the main objective is to create a surveillance system that benefits the wide-ranged connectivity of the internet. Secondly is to design a system with easy accessibility by integrating the CCTV surveillance capabilities with Internet browsers (Internet Explorer, Mozilla). Finally is to establish a CCTV Surveillance System Via Internet with the least possible cost by implementing the system to regular personal computers.

1.3. PROBLEM STATEMENT

One of the main concerns of this project is to solve problems with CCTV monitoring accessibility. The objective is to create a CCTV system that could be accessed from a remote location. A regular CCTV system can only be viewed from a local site and is not accessible from a different location. Usually the problem occurs whenever the user is out of the camera’s compound but they still need to monitor the area. Figure 2.1 shows about the connection problem. The problem could be solved by creating a surveillance system via internet. The intention of this project is to create a CCTV system that could be accessed remotely using a broadband internet connection. Most of the systems available in the market today are very expensive. Therefore, this project intends to implement a much cheaper system using the same concept.

![Figure 1.1 No Connectivity problems with conventional surveillance systems](image)
1.4. SCOPE OF WORK

This project is started by information gathering about all the requirements needed to accomplish these matters. Basically, the searching begins by exploring information via internet, related books, journals and thesis. Resource from the library and supervisor's guidance will be used as and some essential information will use in this project. After all the information gathered, the project methodology will be sketch. The project development will be proceeding based on the methodology. Overall, this project is divided into three parts which consists of Hardware Assembly, Web Application and also in creating a suitable webpage that will be used as the web interface. It is also needed to identify the appropriate scripting language to be used for the web development. It also involves about the software-hardware integration.

1.5. PROJECT METHODOLOGY

The initial step in developing this project would be the literature review which is to identify the components used in this project. The second part is to do a few researches regarding the technical information that can be used in choosing the available methods that can be used to establish a connection between the server and client. The third part would be the client / server assembly where the image capture device (CCTV camera) is configured to the server and connected to the internet. The client uses the internet connection to obtain the output result.

The most important part is the programming part, in this part is need to spend a lot of time to create programming source code using C# and develop a program to perform the algorithm for the server to transmit the data to the internet. The client would also uses a server-side scripting to obtain the data from the server.

The final process is to testing the application that have been developed where it is tested by getting the output of the camera image through the web browser by using the internet connection.
1.6. **THESIS OUTLINE**

This thesis represents by five chapters. The following is the outline for this project in order to understand the whole report.

The first chapters of the thesis will explain briefly about the project background, objective of the project which needs to be achieved, problem statement of the project, scope of works regarding the project and methodology of the project.

Chapter 2 describes about literature review involved gather information of the project in order to complete the whole project. This study is focused especially on software Visual Studio 2005, Dreamweaver CS3 and also the client/server architecture.

Chapter 3 explains about the project methodology where how the project is implemented. The approach for meeting the goals and objectives and project life cycle phase is described in this chapter, along with the tasks needed to complete it.

Chapter 4 describes the project finding which includes the developed programs and GUI. This chapter also discusses and analyze about the project and algorithm of the data transmit process and also programming code. Furthermore, the output from web browsers which indicates the remote viewing is also included.

Chapter 5 will be the conclusion and suggestion to the project in future undertakings.
CHAPTER II

LITERATURE REVIEW

2.1 INTRODUCTION

In order to develop this project, some reviews and researches are made from articles, journals, reference books and also forums. All sources are used to compare and to familiarize with various ways to develop the project.

According to the research performed, all the related information considered as important are included in this report. Information regarding present surveillance technologies, CCTV cameras, software development and also online implementation are combined and used as reference for this project.
2.2. 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. Surveillance in many modern cities and buildings often uses closed-circuit television cameras. Although surveillance can be a useful tool for law enforcement and security companies, many people have concerns about the lost of privacy. The word surveillance is commonly used to describe observation from a distance by means of electronic equipment or other technological means. [1]

2.3. CLOSED-CIRCUIT TELEVISION

Closed-circuit television (CCTV) is the use of video cameras to transmit a signal to a specific place, limited set of monitors. It differs from broadcast television in that the signal is not openly transmitted, though it may employ point to point wireless links. CCTV is often used for surveillance in areas that may need monitoring such as banks, casinos, airports, military installations and convenience stores. The increasing use of CCTV in public places has caused a debate over public surveillance versus privacy. People can also buy consumer CCTV Systems for personal, private or commercial use. A more advanced form of CCTV, utilizing Digital Video Recorders (DVRs), provides recording for possibly many years, with a variety of quality and performance options and extra features (such as motion-detection and email alerts). In industrial plants, CCTV equipment may be used to observe parts of a process from a central control room; when, for example, the environment is not comfortable for humans. CCTV systems may operate continuously or only as required to monitor a particular event. [10]
2.4. SERVER & CLIENT

The client-server software architecture model distinguishes client systems from server systems, which communicate over a computer network. A client-server application is a distributed system comprising both client and server software. A client software process may initiate a communication session, while the server waits for requests from any client.

The most basic type of client-server architecture employs only two types of hosts: clients and servers. This type of architecture is sometimes referred to as two-tier. It allows devices to share files and resources. The two tier architecture means that the client acts as one tier and application in combination with server acts as another tier. These days, clients are most often web browsers, although that has not always been the case. Servers typically include web servers, database servers and mail servers. Specific types of clients include web browsers, email clients, and online chat clients. Specific types of servers include web servers, ftp servers, application servers, database servers, mail servers, file servers, print servers, and terminal servers. [11]

2.5. WIDE AREA NETWORK (WAN)

Wide Area Network (WAN) is a computer network that covers a broad area. The largest and most well-known example of a WAN is the Internet. WAN is used to connect LANs and other types of networks together, so that users and computers in one location can communicate with users and computers in other locations. WAN is used to establish a connection between the client and server through web servers and client programs.