SECURITY SURVEILLANCE SYSTEM USING IP CAMERA

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ABSTRACT

The purpose of the project is to design an IP camera security surveillance system that can be controlled using a graphical user interface (GUI) command. This system can also be controlled through internet via TCP/IP protocol. An IP camera is used to record the video and also to capture image. The captured video then transferred into hard disk which can be used later for checking security issue. All of these processes are programmed using Microsoft Visual Basic 6.

Keywords
Area surveillance system**,** IP Camera**,** Computer Interfacing, Server/client, Microsoft Visual Basic 6

1.0 INTRODUCTION

Surveillance system 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 control. This system become one of the important needs nowadays and been raised to a high level of priority in nation-states around the world. This system can monitor any surrounding area by using the camera [1].

This system is built due to the greatest impact of the surveillance system in the state and security services. 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 [2]. The state and security services may buy or sell these information from the organization involved in the surveillance operation. So for better security, it's best to develop our own system

This project is about the surveillance systems using IP camera which plays the leading role in security system. Nowadays peoples are still using traditional CCTV system. The analog cameras must be connected to the fixed monitoring location by dedicated coaxial cabling, and the tape-based system requires personnel to manage. The actual image quality is usually unsatisfactory as the tapes wear out. The image quality is one of the most important features of the security camera. Using IP camera, images are stored on computer hard disks or storage servers. We do not have to change and replace the video tape when it runs out [3]. This project can be applied in real life, especially to ensure safety of certain area. As an example, it can be used in bank for better security system.

This paper is organized as follows. In the following section, the security system using IP camera is proposed. The experimental results showing the efficiency of the proposed system are presented in Section III. Section IV concludes the work and future development is suggested in Section V.

2.0 SURVEILLANCE SYSTEM USING IP CAMERA

The surveillance proposed here consists of IP camera and one computer as a server and another computer acts as a client as shown in Figure 1. This system has been divided into two parts and this work only focused on the following objectives:

1) To capture and record video images using IP camera and transfer it to other computer (client).
2) To save the database of the video recorded.
3) To study about the application of internet technology in making better security system.
4) To develop GUI framework using Microsoft Visual Basic that will record, save and manipulate the recorded video.



Figure 1: System Overall Concept

In order to meet the objectives, several steps are outlined and followed. These steps are shown in a flow chart in Figure 2.

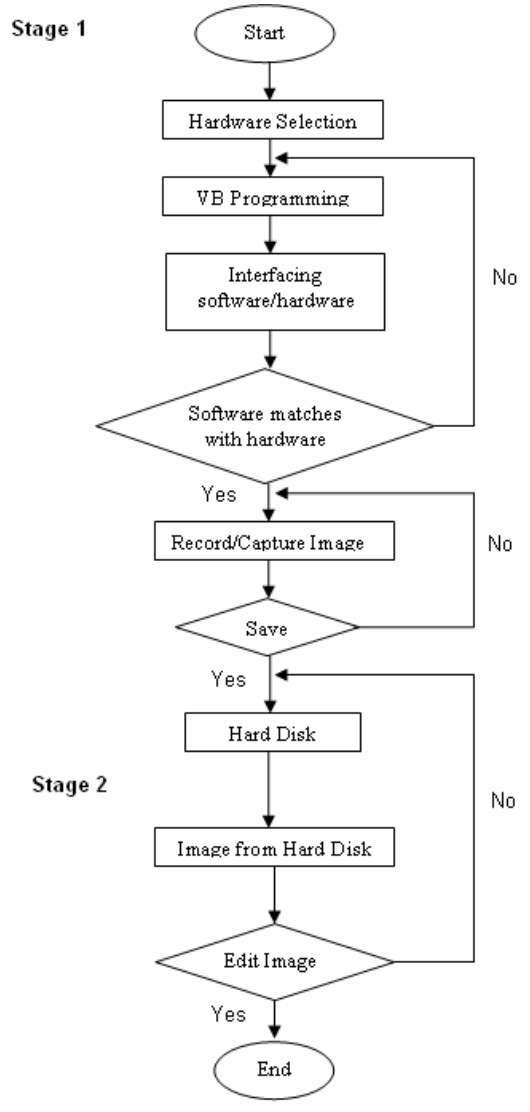


Figure 2: Program Flow Chart

The system comprises of hardware and software development. The hardware components used in this system are described in the following section.

2.1 Hardware Components

2.1.1 IP Camera

A Network IP Camera is a stand-alone device which allows a user to view live, full motion video from anywhere on a computer network, even over the Internet, using a standard web-browser. The entire system has now been digitized with the introduction of Network Cameras incorporating onboard processors and web server software. These Network Cameras can be connected directly to existing IP networks, images can be viewed and cameras managed from anywhere via a web browser, plus any hard disk on the network can be set up to record the video output [4] .

One example of network IP camera is Creative BriteCam IP Video Camera BC1800 which provides a platform for users to capture process and deliver video data over the internet as well as in their Local Area Network. Whether it's remote monitoring, live image broadcasting or security surveliance, Creative BriteCam will be able to provide high quality, digital images to make anyone's broadband experience truly a mulitmedia one [5]. However, since this project focuses on developing our own system with additional features, only BriteCam IP video camera is used without its server.



Figure 3: BriteCam IP Camera

2.2 Software Development

2.2.1 Microsoft Visual Basic 6.0

Microsoft Visual Basic is used to design a graphical user interface (GUI) command for this system. It is not a general purpose programming language or a procedural language. Microsoft calls Visual Basic an event driven programming language. Since the sequence of events to use is practically unlimited, so the programmer must code each event independently to interact with other events or music to make it easy to learn and used [6].

2.2.2 Graphical User Interface (GUI)

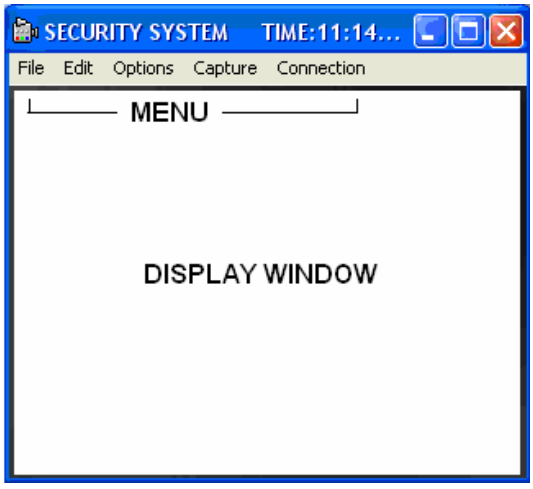
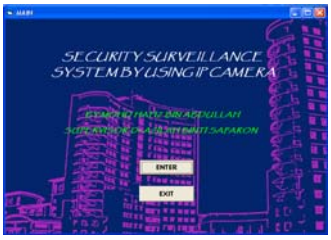


Figure 4: Main Window

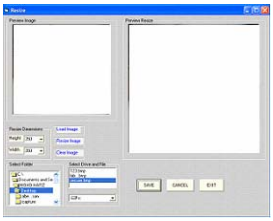
The GUI for this system is designed into two parts as shown in Figure 4 above. The first part is the menu. It contains five sub menus which will be used/chosen during surveillance period. The second part is to display window which will display recorded image from camera.



Front Page



Record/Captured



Resize



Lighten

2.2.3 Client/Server

Client-server is a computing architecture which separates a client from a server, and is almost always implemented over a computer network. Each client or server connected to a network can also be referred to as a node. Windows Socket (Winsock) has been used to create the network-capable application to transmit application data across the wire. By using Winsock in Visual Basic, the systems are able to implement the client and server architecture to control the units remotely. The two programs, the client and the server, must run concurrently in order to transmit and receive signal between them [7].



Figure 4: Microsoft Winsock Control 6.0

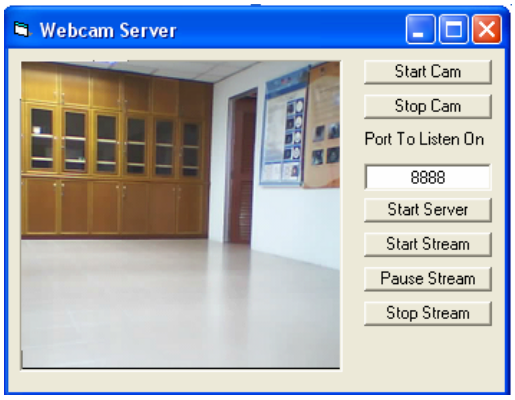


Figure 5: Server

The server, connected to the port, acts as a central unit where all clients must communicate when requesting to transmit and receive data. In this application, however there is only one client program transmitting and receiving data. The server receives character from client and sends to network camera so that image can be displayed at the client computer.

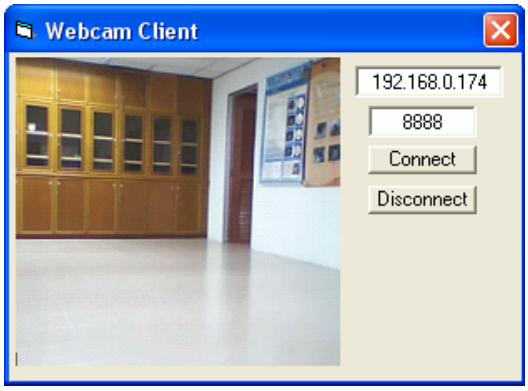


Figure 6: Client

To communicate with the server, the client must use the provided IP address of the server i.e. (192.168.0.174) for this work. The server can accept the request, process it, and return the requested information to the client. Both server and client need to use similar port.

3.0 RESULT AND DISCUSSION

The aim of this project is to make a better security surveillance system for many purposes. The IP camera can record the video image and also capture image frame by frame based. This information, whether recorded video and captured image can be transferred to a centralized computer.

The following paragraph described how the video is recorded and saved and also how the image is captured.

3.1 Record Video

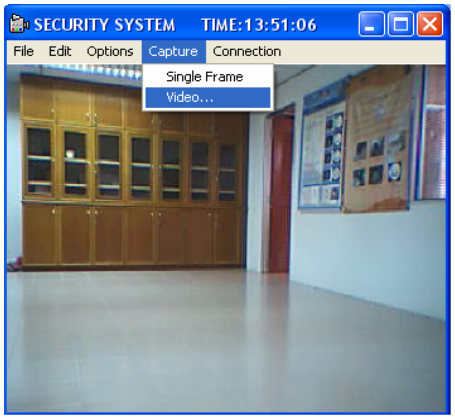


Figure 7: Record Video

To record the video, *capture* in the menu is selected and then *video* is chosen from the submenu. The sequence rate such as frame rate per second (FPS) and also the length of the video that we want to record can be set manually. The video can be saved automatically into local drive C in .AVI format. This video can be replayed for security checking later.

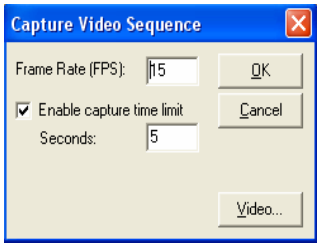


Figure 8: Sequence setting

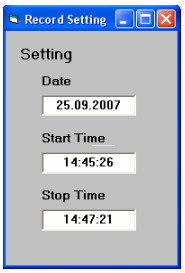


Figure 9: Record setting

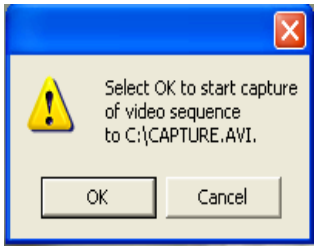


Figure 10: Save recorded video

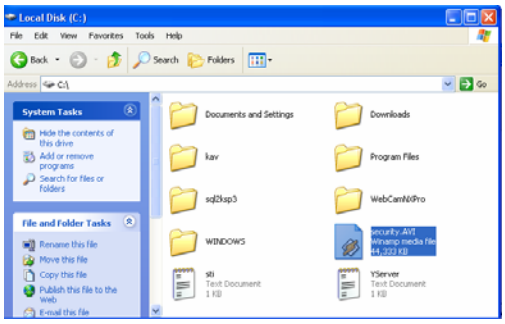


Figure 11: Saved video at Local Drive C

3.2 Capture Image

Capture image is also one of the functions of this system. In order to be in this mode, *single frame* is selected from the submenu *capture*. Once menu single frame is selected, the image is captured and can be saved as .bmp format. A browser will be displayed and user can select the path to save the image.

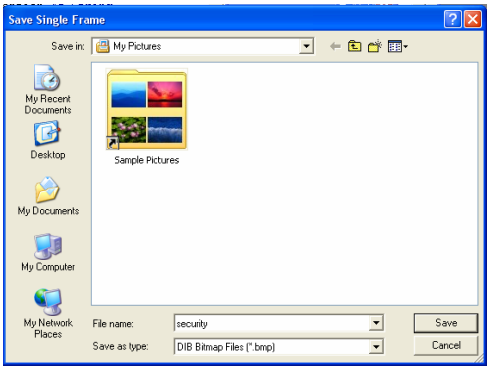


Figure 12: Save single frame

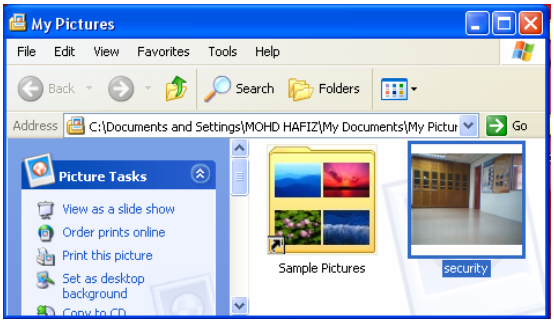


Figure 13: Saved single frame path

3.3 Edit Image

This project also provides editor mode to improve the captured image. This is to facilitate any party to make any analysis especially for security issue. The editor can do resizing and lighting up the image.

3.3.1 Resize

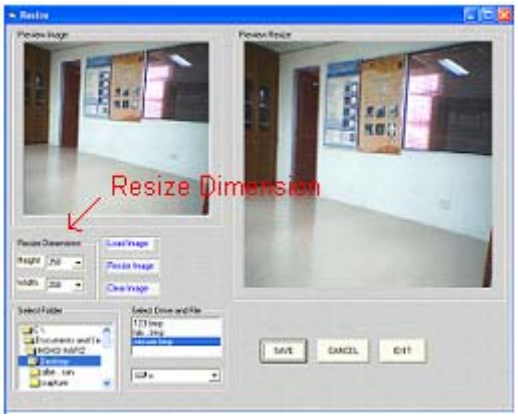


Figure 14: Resize form

To resize the image, any .bmp format image is loaded from the storage. The new dimension of image can be set by selecting the height and width of resize dimension frame.

3.3.2 Lighten

The same method is used to lighten the image which the image has to be downloaded into editor mode.



Figure 15: Before lighten

To make an image lighter, the lighten image slider is used to select how much light that the image needs.



Figure 16: After lighten

The limitations in implementing this system in UiTM are networking problem and real time implementation. UiTM's network has its own firewall and some ports need to be open in order the system can be accessed from internet. So in order to test this system, it is only implemented at Local Area Network but it is still based on the IP.

The captured video cannot be implemented in real time applications because of the size of the video and the limitations of bandwidth and also bit rate given by the channel.

4.0 CONCLUSION

This project has been tested successfully which most of the objectives have been fulfilled. The area scenes are successfully monitored through visual basic window by using a graphical user interface (GUI) from a PC. All recorded video and captured images can be saved into the hard disk. It allows security personnel to check on the video and image at any time and able to control the camera remotely. Further more, additional function such as lighten the view is also available in this system. This will also help security system to have clear and better image.

5.0 FUTURE DEVELOPMENT

This camera surveillance system still can be modified and expanded to be more intelligent. For future development, there are several recommendations brought up into consideration.

Firstly, the recorded video has to be compressed before sending to the client. This is to resolve the problem with real time implementations.

Secondly, the system can be controlled through the software via mobile communication. A person can monitor their home from their mobile telephone.

Lastly, the communication between the computer and the system board can be improved by using wireless communication such as infrared or Bluetooth.

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