SECURITY CAMERA REAL TIME RECORDER FOR PERSONAL PROPERTY'S ROOM SURVEILLANCE

Thesis submitted to The Faculty of Information Technology in Partial Fulfillment of the Requirements for the Degree Master of Science (Information Technology)

Universiti Utara Malaysia

By

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2010

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Acknowledgement

Praise be to ALLAH for helping me to accomplish this humble study. Also, my thanks to ALLAH who has seen me through to this level in my academic achievement; I would like to seize this opportunity to extend my gratitude to Prof.Dr. Abdul Razak Yaakub for kindly supervising this study, her priceless instruction and valuable directions had great role in the accomplishment of this report.

Finally, special thank to those who supported me with their prayers particularly my father and mother. I would like also to thank all my instructors in the College of Arts and Sciences in the University Utara Malaysia (UUM) for their support.

Thank you.

ABSTRACT

One of the sections most interesting in the existing systems on the computer is Computer vision. There are many applications commercial for video surveillance for internal and external monitoring of both, and tracking systems for the security by use multiple cameras or one. And tracking of security should be capable to face effectively handle two main areas, a first stage for the detection of object movement and the second stage is track the object through numerous frames. The objective of this project is to develop not expensive tracking system security in the places indoor as room, and it will be able to determine automatically, and classification and tracking of an object by using one web cam. The research methodology for develop and evaluate the prototype was adapted from the waterfall module and it contains five stages: requirements, design, implementation, verification and maintenance. Usefulness, Ease of Use and Outcome and Future Use were used to indicate for good usability from Results of user evaluation on the SCRTRS.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

The metal resources supply has become tensional as the rapid development of society (Xiangjun et al., 2009). When the resources are not enough, some people will use illegal ways to get it. The personal property such as vehicles and computers are facing serious security problem because the theft cases are increasing in a rapid rate (Pagter & Pedersen, 2007).

There are many existing protection systems, which sometimes differ in their solutions to the problems of security and the anti-thefts, and therefore in this study, we are trying to find the best way to combat theft.

According to (Huaqun *et al.*, 2009) The best anti-theft system is one that let a thief give up the idea of stealing the property. This will be the case that the thief knows clear that he is likely to be caught because all the stealing process is recorded.

In this case, the camera is taken into consideration of the personnel to make real-time property surveillance (Pagter & Pedersen, 2007). Actually, video surveillance as compressed video has been widely used in many areas, such as the crime fighting, environment monitoring, traffic and city management, and urban sensing (Huaqun et al., 2009).

There are many advantages to use camera to make property surveillance:

- It's low cost.
- It just needs minimal operator assistance.
- Since record is real time uploaded to the internet, the thief cannot destroy the record (Huaqun et al., 2009).

With the increasing rates of theft in the previous years and development in the area of camera surveillance systems, so there should provide protection systems for conservation of the property And contribute to the fight against crime and to decrease from the crime rates, this study aims to provide security camera real-time recorder can ensure the personal properties by recording and real time uploading the record to the internet.

1.2 PROBLEM STATEMENT

With limited material in this world while the human's desire is unlimited, stealing take places. The stealing of personal property has become a crucial issue. Set the personal Vehicle. as one example, as reported by National Insurance Crime Bureau of United States, there was one car being stolen every twenty six seconds (Jung et al., 2008), And in the 2007 was crimes of property which obtained from the National Crime Victimization Survey (NCVS) 2.3 million in USA (Michael R), in France, theft cost 150 million in 1992 (Khangura et al., 1993), And the rate of property crimes about 90% of the rate of all crimes notified in Malaysia about it between 1980 – 2004 (CPPS). They are shown in Figure 1.1.

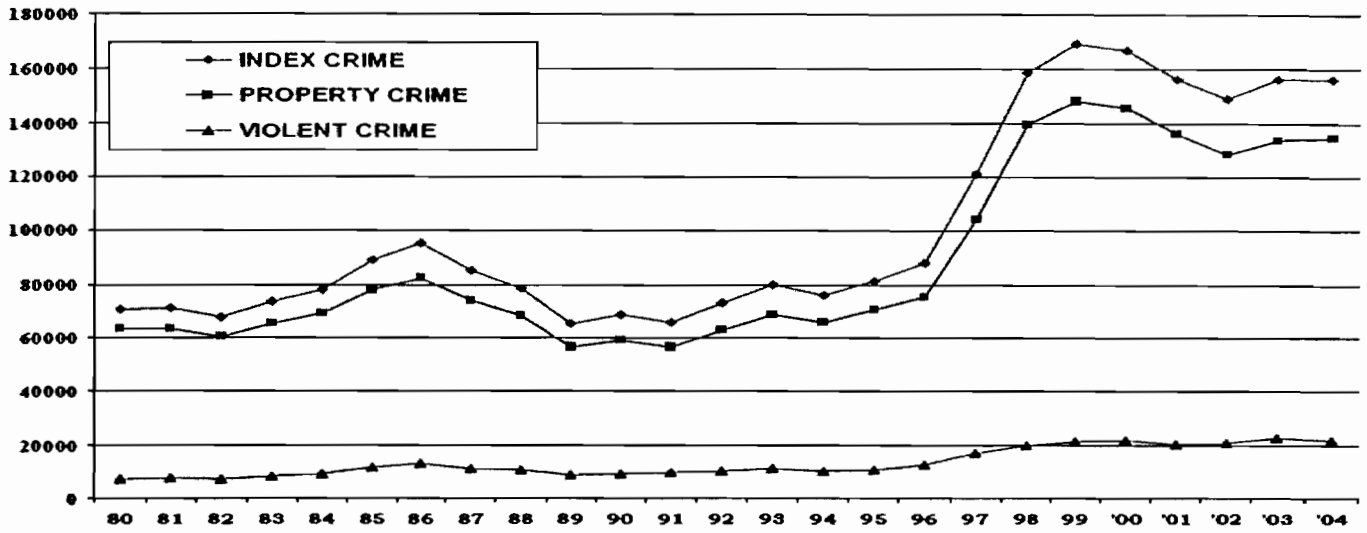

Figure 1.1: Crime Statistics in Malaysia 1980 – 2004 (Sidhu A.A) & (CPPS).

It was the 2008 budget for the fight against crime around 6 billion Malaysian ringgit for the Royal Malaysian police (CPPS). An increase of crime from 70, 823 in the year 1980 to 156.455 in 2004. This Amount to an increase of 120 %. Similarly violent crime has grown by 192% and property crime by 112 % during these two periods (Sidhu A.A).

Many kinds of theft occur because the presence of the desires and motives are unlimited. And the existence of various forms of Thieves.

The type and motivation of theft is various from country to country, from unorganized theft to well organized groups. The unorganized theft is carried out by single or small group of thieves and the organized groups of criminals often steal expensive properties and the third group is the youngsters. These thieves are in their teens (Khangura et al., 1993).

All of the three types of theft are very harmful to the whole society and to the human's future. In order to solve these theft cases, there is a large demand of Anti-theft system (Wan & Chen, 2009).

Currently, many Security surveillance systems, such as CCTV, have been used to reduce the theft cases. However, these systems have some limitations such as high cost (Hui et al., 2008). So, there is a gap of the Security system for the personal property.

Therefore, this study is to develop not expensive tracking system security in the places indoor as room, and it will be able to determine automatically, and classification and tracking of an object by using at least two cameras. A Security camera real time recorder for personal property's room surveillance is required to be as a solution of the research issues.

1.3 RESEARCH OBJECTIVES

This study aims to provide a Security camera real time recorder for personal property's room surveillance.

The specific objectives of the study are:

- To determine the requirements of a Security Camera real-time recorder for personal property's room surveillance.
- To develop a Security Camera real-time recorder for personal property's room surveillance prototype.
- To evaluate the Security Camera real-time recorder for personal property's room surveillance in term of users' usability.

1.4 RESEARCH QUESTIONS

The following researches questions are hoped to be solved are:

- What are the requirements of Security Camera real-time recorder for personal property's room surveillance?
- How to develop Security Camera real-time recorder for personal property's room surveillance?
- What are the criteria to be used for usability evaluation of Security Camera real-time recorder for personal property's room surveillance?

1.5 SCOPE AND LIMITATIONS OF THIS STUDY

The scope of this study used camera to record the condition of personal properties, so the software can only be used to command the camera.

Limitations of this study are explained as follows:

i. The web cam it will be use in this study and two cameras are maximum use for cameras.

ii. The maximum distance between computer and web cam is 5 meters.

iii. Track and detect objects based on object movement by (Differencing, edge1, edge2 and Draw Rectangle) and save compressed video.

iv. Email alert can function simply to use for those who have an internet connection.

v. Send Email the maximum attachment to upload file in internet is 25MB.

vi. This proposed application just can apply by computer and laptop only.

1.6 RESEARCH SIGNIFICANCE

This research is aimed to develop Security Camera real-time recorder for personal property's room surveillance; it is expected to protect the safety of the personal properties in closed place in an effective way. With the widely adoption of the software, it's hoped that theft cases will be reduced in a significant way.

1.7 SUMMARY

This study proposes a real-time recorder system to record and upload the real-time condition of personal properties by a camera. The waterfall methodology is chosen to carry out this study. It is hoped that the personal properties can be well protected by the usage of this system.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter discusses the background of this research and a brief description of the settings study presented in the previous chapter. This section shows the discussion about technology internet and ideas of the previous work and image processing.

2.2 DIGITAL CAMERA

Twenty years ago, nobody can imagine that digital camera will be so popularized in this world. The immediacy and versatility of the digital camera is own to its well-designed elements (Johnson, 2005).

The use of the cameras in control systems against theft became common thing, therefore, this study aim to use of cameras as a key element for the completion of an effective monitoring system and appropriate anti-theft. So, must know what are the quality and specifications available and cameras that will be used in this study.

There are many elements in a digital camera which are playing a vital role in taking pictures (Flynn & Reardon, 2006):

Resolution: it is decided by the size you want the pictures to be printed. The guide to choose the megapixel range is shown in Table 2.1.

Table 2.1: The guideline to decide the needed megapixel range (Johnson, 2005)

megapixel	Print size (inch prints)
1	3*5
2	4*6

3	8*10 from a crop of the original image
6 or more	13*19 and 8*10 from a crop of the original image

When you want to take more pictures and your memory card is full, you can set it to capture lower-resolution images, to hold more pictures (Johnson, 2005).

Optics: the optics is used to reflect the object which is taken picture of, so it must be made of glass instead of plastic, the lens should contain many glass components to help keep everything in sharp focus (Johnson, 2005).

There are many types of optics, each one has its own emphasizes in the kind of pictures to take. The wide angle lens is suitable to take pictures of landscapes, indoor shots, and general purpose photography (Sammon, 2010); the lens with a longer reach is suitable to take pictures of the wildlife. Before taking pictures, the optics must be selected to match them (Johnson, 2005).

Zoom: a zoom lens is used to change the focal length of the camera: how much the camera magnifies the image, zoom in or zoom out for best composition. The general zoom of the digital camera are 2*, 3*, 5* or even above. In general, the greater the zoom, the better (Johnson, 2005).

Memory: memory is used to decide how many pictures you can take. The more memory, the more pictures can be taken, and the higher price of the memory cards (Johnson, 2005).

What a digital camera can do is more than taking pictures. With the revolution of information technology, pictures or compressed video can be send to the computer

and have further management such as upload to the internet to share with others.

According to (Jionson, 2004) the digital photos can be shared in a low cost at anytime anywhere via the internet. The online photo sharing has get a rapid development over the past few years and become a huge industry. Pictures taken by digital cameras can be shown in a home DVD player or directly on the TV screen. But they need to be burnt into DVD first. Which is not as convenient as sending it to the internet automatically.

This study aims to provide security camera real-time recorder can ensure the personal properties by recording and real time uploading the record to the internet.

2.3 ANTI-THEFT SYSTEM

The stealing cases are increasing dramatically around the world especially in the latest 20 years. The type of theft is different in different areas, but the losses caused by theft are significant in all countries.

Some statistics from some country as following:

- In France, 312,000 vehicles are stolen in 1992, lead to the cost of 150 million; In Germany, 120,000 vehicles were stolen only in 1992 and In America, more than 1.5 million theft cases are taking places in 1992. Besides that, there is a trend that the theft has come from the big target such as jewelry shops to the personal property (Khangura et al., 1993).
- In Malaysia the rate of property crimes about 90% of the rate of all crimes notified in Malaysia about it between 1980 - 2004 (CPPS). It was the 2008 budget for the fight against crime around 6 billion Malaysian ringgit for the Royal Malaysian police (CPPS). An increase of crime from 70, 823 in the

year 1980 to 156.455 in 2004. This Amount to an increase of 120 %. Similarly violent crime has grown by 192% and property crime by 112 % during these two periods (Sidhu A.A).

Hence, the provision of protection systems has become something urgent for contributing to reducing the growing rates of theft. According to (Wan & Chen, 2009) the demand of anti-theft system is increasing, meanwhile, the requirements to the system performance is also becoming higher and higher.

For all these statistics there are requirements should protection systems provide which due to be available in the system of protection to help users protect their property.

The current anti-theft systems consist of object tracking systems, object alarming systems and so on. But these systems have some limitations:

- **High cost:** the equipment to track or make alarm involves high cost.
- **High false-alarm rate:** the system feel the movement of the object and then it will make alarm, but sometimes, the movement is made by the natural elements such as wind or rain instead of theft, so the false-alarm will misleading the owners.
- **Easy to be disabled:** the thieves can break the alarm or tracking system to disable its functions and thus avoid to be found (Song et al., 2008).

In order to avoid these limitations and drawbacks of the current security systems, new system must be developed to better satisfy the customers' needs. The real-time recorder has been identified as the future trend of the anti-theft systems. The real-time recorder can update the current status of the object immediately so such record cannot be destroyed, thus the anti-theft function will not be disabled (Huaqun et al., 2009).

So, this study is to develop not expensive tracking system security in the places indoor as room, and it will be able to determine automatically. A Security camera real time recorder for personal property room surveillance is required to be as a solution of the research issues.

2.4 OBJECT MOVEMENT AND COMPRESSED VIDEO

There are many algorithms in the detection of movement of the body in video streaming, therefore, some algorithms were mentioned in this study and that were used to identify and detect movement of an object in the video streaming by several authors.

The obtained video is not effective and not practical for Long-term human monitoring. Automatic detection of irregular movement that could attract the attention of the system operator and the operator. The algorithm uses the macroblock motion vectors that are created in any case as part of the video compression process (Kiryati).

Detect in real time from moving objects. Algorithm combines the method divides the time, optical flow method, background double Filter (DBF) method and morphological methods of treatment to achieve better performance (Lu, 2008).

Detect the moving object. Propose a new algorithm for real-time motion detection prominent in complex environments by combining temporal difference imaging and temporal area of the movement that has been liquidated (Ying-Li).

tracking of security should be capable to face effectively handle three main areas, a first stage for the detection of object movement, and the second stage is to recognize

the object is human or not, and the third stage is track the object through numerous frames (Olckers, 2009).

Description of the detection system for objects to move from a mobile platform in real time using stereo camera calibration. The algorithm used in the RANSAC beyond detection. Use a formula based on the disparity space. The system is capable of on its ability to detect objects moving independently in the 16 Hz for 320 × 240 stereo image sequence using a standard laptop computer (Agrawal).

An integrated, detection on real-time face and analysis system for demographic. Has been detected of Faces extraction algorithm using the fast recently proposed by Jones and Viola. Demographic classification combines estimates from the face detection much to reduce the error average. The entire system processes 10 frames per second on Intel PIII 800 MHz (Shakhnarovich).

Algorithm is developed to combine the skin to detect the tone and structure of learning adaboost forward to push the state of the art algorithm. Across experiments that can be seen, and the speed and by 4-5 times, and the disclosure of the performance of any effect. And has been implemented in the TI DM642 platform of existing international and the environment of scarce (Huang).

2.5 FACE DETECTION

There are many algorithms of face detection in video streaming, therefore, some algorithms were mentioned in this study and that were used for face detection in the video streaming by several authors.

Face detection framework that is able to process images with suitable quickly to achieve high rates of detection. Can be divided existing methods for detecting the face into the image on the basis of the methods and ways to build feature. System

developed using the hybrid algorithm includes the promotion boosting algorithm and a hyper plane to train a classifier. Simple Haar-based features a Features of response used by Viola and Jones, AdaBoost algorithm (A.S.M Shihavuddin1, 10 No.1, January 2010).

Object detection system that is running on the video data in real time in hardware by the human face such as the goal object. to produce System able to reduce the time and cost required to create a working model devices. Implementation to be held in 30 frames per second, which is approximately 1000 times faster than the same algorithm in software and run approximately 9-60 times faster than the speed of algorithms according to other programs. (McCready, 2000).

IMSC evolved many techniques on the face recognition models, for example, analysis of facial expression and facial expression cloning. The proposed face detection on real-time system interacts facility with these advanced techniques. Interaction with the head of an estimate means that we automatically obtain the direction of the President is subtracted from the areas of face detection. (Neumann).

2.6 SUMMARY

This chapter discussed the background of previous research relevant to working with this study. To use this approach have been identified for the development of surveillance cameras recorded the application in real time to help the user to save his personal belongings in an enclosed places.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

Research methodology is more than just a collection of ways to conduct research, in a systematic way to solve the problem of search (Hoffer *et al.* 2002).

This chapter describes the research methodology for this study. For carry out this study the Waterfall model will be used. It is an appropriate methodology to be applied in the field of software development.

The Waterfall model of software development is a sequential process, which is making steady progress and flowing to the bottom (such as the waterfall) through the stages. Waterfall model of development has its roots in industries construction and manufacturing; very orderly in physical environments after the disaster that fact changes too expensive. In the absence of formal software development methodologies exist at that time, this model for hardware-oriented has been adapted simply of software development (Luciano, 2005).

Is often cited officially for the first time that the waterfall model to be an article published in 1970 by (Rovce).

So, the waterfall model confirms go to the next stage only when the previous stage is complete and perfect. Nonetheless, the waterfall models have many modified waterfall models which might contain minor or main differences in this process (Guimarães L. R).

There is advantage of use waterfall model of development, which let and allows easily for departmental supervision and departmentalization. With waterfall may set a timetable with deadlines of all development stages (Luciano, 2005).

There is good advantage to use Waterfall for problems that are comprehensible. For this reason it used even now as section of repetitive development (Luciano, 2005)..

The waterfall development has disadvantage where it no let or allow for revision or reflection so much. As soon as application in testing phase, that so difficult to return for make some change which were not learnt at the stage of the concept. There are substitutes of the waterfall model that contain joint application development (GAD), and rapid application development (RAD), compatibility and stability and building and reform, and form a spiral (Luciano, 2005).

3.2 RESEARCH DESIGN METHODOLOGY

The methodology of this study adapted from the waterfall methodology (Luciano, 2005). The stages of this methodology are:

1. Requirements

2. Design

3. Implementation

4. Evaluation

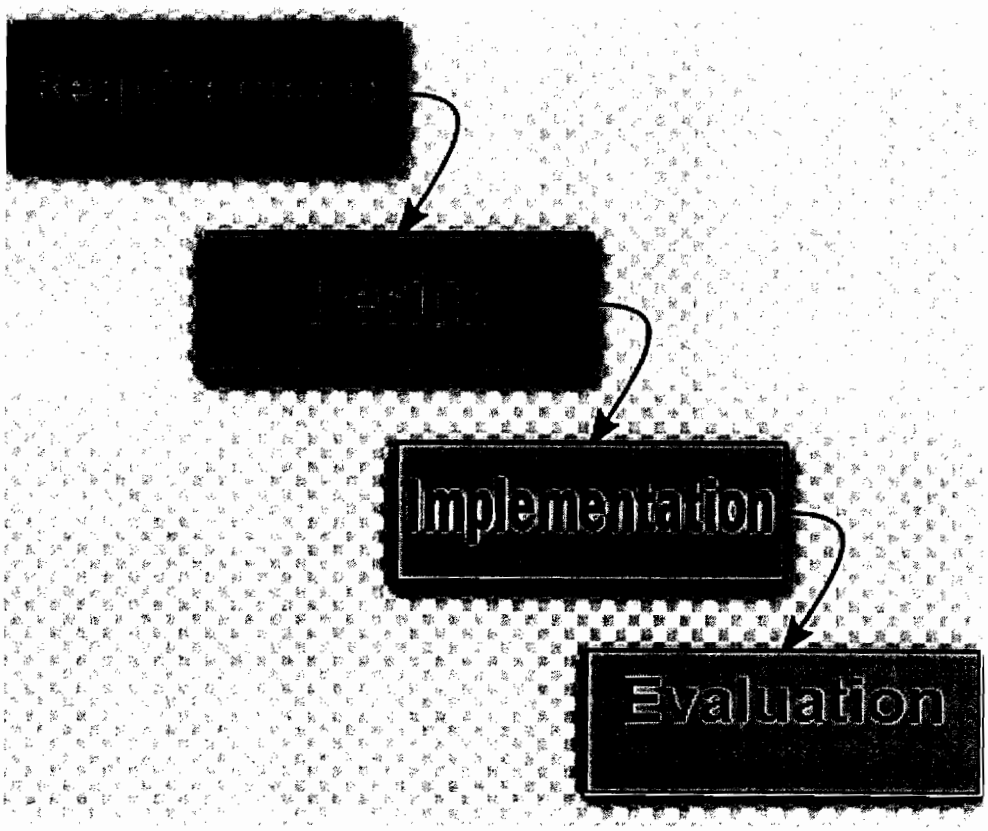

Figure 3.1: The waterfall methodology (Luciano, 2005).

3.2.1 REQUIREMENT

In this phase will decide what will need the system as requirement. Use cases are specified into detail. The recording and uploading record to the internet are two basic requirement of the system.

It is a vital issue to define the requirements of software. The well defined requirements will lead to a success software development while the bad defined requirements will result in poor performance of the software (Liu & Huang, 2008).

The definition and specification of software requirements can be write in use cases, process specifications and so on (Xuefeng & Yuewu, 2008). It is important to write them in a clear way to be presented and it must be complete, or the software development will not satisfy the customers, which means it fails (Bin et al., 2008).

There are four steps in the software requirement engineering, which are requirement gathering, requirement analysis, and requirement evolving and requirement management. In all the four steps, software developers are playing an important role.

3.2.2 DESIGN

The shift all the requirements necessary and the proposal of the previous studies in the design of more detailed, as well as a front for eye-catching in the interface of a better understanding of the purpose of implementing such and such an attractive way for users interest of the system. After that, building the prototype of security camera real time recorder for personal property's room surveillance through technology on the Application. The prototype of security camera real time recorder for personal property's room surveillance in order to design takes into account the UML diagrams. UML diagrams consist of the use case diagram, sequence diagram and class diagram in order to assist the development stage. After that, use of the Internet database engine and Active Server Pages (C#) to develop the prototype. In the end

of this stage security camera real time recorder for personal property's room surveillance will be achieved.

3.2.3 IMPLEMENTATION

After designing the system, this study will go forward in the development of the prototype of security camera real time recorder for personal property's room surveillance. Will translate the code to complete the design of the program. At this stage, the researcher used the object-oriented programming to create all elements of the system directory partners and all symbols of symbols of the source code and server components.

3.2.4 EVALUATION

Evaluation is the important step to ensure the software quality and usability. Usability test plans must be set and the suitable test users must be got. The specific tasks will be given to the test users to accomplish within the time given. Respondents need to fill in a questionnaire after they tested the prototype. However, it was concluded Davis (1989) to consider the usefulness, ease of use and Outcome/Future Use (PUEU) is to link the strong acceptance of the user, and should not be ignored by those who are trying to design or implementation of successful systems. Will be measured by all the questions in the questionnaire using a Likert scale format ranging from 1-5 as in Table 3.1 (and Afzal Khan, 2000) all the result will be showed in chapter 5.

Table 3.1: Likert Scale Classification

	Strongly	Disagree	Neutral	Agree	Strongly
Score	1	2	3	4	5
Category	Disagree		Neutral	Agree	

3.3 SUMMARY

Based technologies would be executed on the application of existing technologies to help personal property's room surveillance control of their personal belongings in the room (closed places). And have been chosen carefully Waterfall model methodology to develop the proposed system for this study form the waterfall model. The five stages of the waterfall model methodology to carry out security camera real time recorder for personal property's room surveillance are explained. Security camera real time recorder for personal property's room surveillance has been implemented and proved by previous studies. Thus, it is hope that this approach is the most may be convinced to resolve the security problems.

CHAPTER 4

FINDING AND DISCUSSION

4.1 INTRODUCTION

This chapter covers the software and hardware requirements and requirements of prototype design which were discussed in chapter two. The design and implementation of the Security camera real time recorder for personal property's room surveillance system, the prototype requirement, the design of the system using UML notations. And the designing of the graphical user interface of the prototype system.

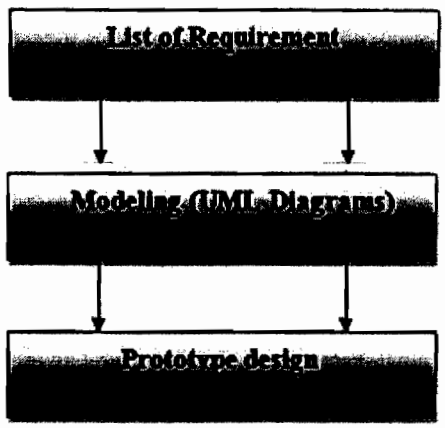

Figure 4.1: Design steps.

4.2 SOFTWARE AND HARDWARE REQUIREMENTS

1- One web cam.

2- Visual Studio 2008- C#, Programming language to generate the interface and the code.

4.3 REQUIREMENTS OF PROTOTYPE DESIGN

The internet it will be used as source to determine Functional and non- Functional requirements.

Listed below are the functional requirements and non-functional requirement of the system. In the priority column, the following short hands are used:

- M – mandatory requirements (something the system must do)
- D – desirable requirements (something the system preferably should do)
- O – optional requirements (something the system may do)

4.3.1 FUNCTIONAL REQUIREMENTS

A function or techniques designed to identify system components, attribute, and identify needs that meets with the required output. All technical requirements for this system included in the **Table 4.1**

Table 4.1: Functional Requirements

No.	Requirement ID	Requirement Description	Priority
	SCRTRS _01	**open camera**	
1.	SCRTRS _01_01	The User can to open camera	M
	SCRTRS _02	**object movement**	

2.	SCRTRS _02_01	The system can capture pictures to make image processing for detect object movement and save compressed video.	M
	SCRTRS _03	**Send Email and make alarm**	
3.	SCRTRS _03_01	The system can send all compressed videos that captured by the System to specific Email and make alarm.	M

4.3.2 NON-FUNCTIONAL REQUIREMENTS

The requirements of the Security camera real time recorder for personal property's room surveillance system that are not related to the functional aspect. Which describes the concept that should be capable adhered into the prototype and development of the prototype.

Table 4.2: Non-functional requirements

No	Requirement ID	Requirement Description	Priority
	SCRTRS _04	**Reliability issues**	
4.	SCRTRS _04_01	The system should be able of processing a given number of Applications within a given time frame with no errors and the system should be available and operational all the time (real time).	M
	SCRTRS _05	**Usability issues**	
5.	SCRTRS _05_01	The system must be easy to use it so must design best interface for user can integrate also manual user (help)	M
	SCRTRS _06	**Response Time / Speed**	
6.	SCRTRS _06_01	The system should be able the process any transaction at the highest speed and avoid unnecessary interaction. As a low response time, the users may feel frustrated and decide not use this system.	M
	SCRTRS _07	**Security issues**	
7.	SCRTRS _07_01	The **SCRTRS** system should not compromise the	M

		student information at any time. The user information will never be sold to other parties and will be kept secure at all times. Users will be authenticated to ensure that no unauthorized users gain access to private information.	
	SCRTRS _08	**Maintainability issues**	
08	SCRTRS _08_01	The **SCRTRS** source code will be kept well structure and documented so that it is easier to maintain and extend the system. All changes to the system shall be documented.	M
	SCRTRS _09	**Portability issues**	
9.	SCRTRS _09_01	The **SCRTRS** must be supported by different type of hardware and system (windows, Unix...)	M

4.4 PROTOTYPE DESIGN

The design of the system includes UML diagrams. The UML diagrams involved are use case diagram, class diagram and sequence diagrams. The following section illustrates the design of the system. The Rational Rose 2000 is used to draw necessary diagrams that help in the development stage.

4.4.1 USE CASE DIAGRAM

Use case diagram, as displayed in Figure 4.2 describes the overall interaction between the system and its users:

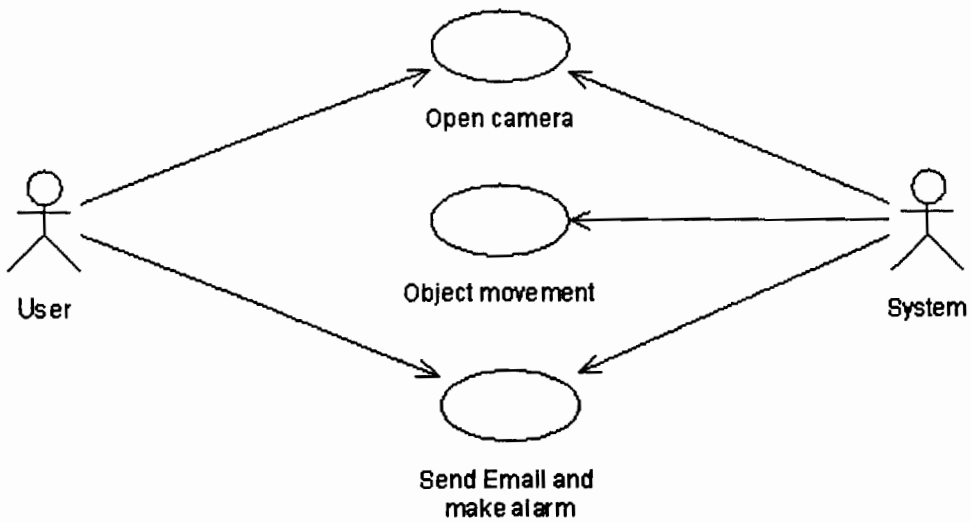

Figure 4.2: SCRTRS Use Case Diagram

Figure 4.2 shows the main functions of the system which includes:

- Open camera
- Object movement
- Send Email and make alarm

4.4.2 USE CASE SPECIFICATIONS

A. USE CASE SPECIFICATIONS (OPEN CAMERA)

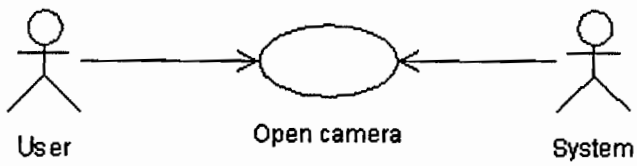

Figure 4.3: Open Camera

1- BRIEF DESCRIPTION

By this use case the User can to open camera to start the System to make object movement operation.

2- PRE-CONDITIONS

The User must be logged in on the system.

3- CHARACTERISTIC OF ACTIVATION

Event driven by the User

4- FLOW OF EVENTS

4-1 BASIC FLOW

This use case begins when the User click one open camera, the System will show the list of all cameras which are available and connected with the computer. This use case end when the User clicks on exit.

4-2 ALTERNATIVE FLOW

Not applicable.

4-3 EXCEPTIONAL FLOW

Not applicable

5- POST-CONDITIONS

Camera opened.

B. USE CASE SPECIFICATIONS (OBJECT MOVEMENT)

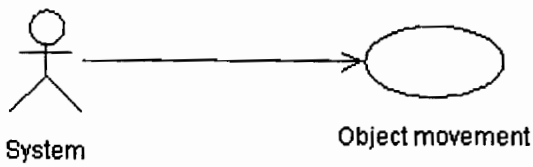

Figure 4.4: Object Movement

1- BRIEF DESCRIPTION

By this use case the system can start to capture the picture to make image processing. And the System can compare the first picture with the new picture that captured by System. And the System can save compressed video when it will detect object movement after image processing between the first picture and the new captured picture.

2- PRE-CONDITIONS

The User must be click on open camera.

3- CHARACTERISTIC OF ACTIVATION

Event driven by the System

4- FLOW OF EVENTS

4-1 BASIC FLOW

This use case begin when the User click one open camera, the System will start to take picture after that the System will take new picture for compare it with the

Previous picture. When the System detects object movement after image processing between the previous picture and the new captured picture. After that the System start to save compressed video and the System will stop to save compressed video when the System detects stop object movement after image processing between the previous picture and the new captured picture.

This use case end when the User clicks on stop camera or exit.

4-2 ALTERNATIVE FLOW

Not applicable.

4-3 EXCEPTIONAL FLOW

Not applicable

5- POST-CONDITIONS

Object movement is detected.

C. USE CASE SPECIFICATIONS (SEND EMAIL AND MAKE ALARM)

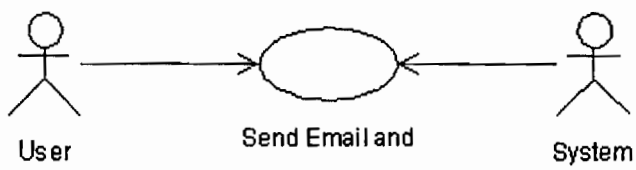

Figure 4.5: Send Email and Make Alarm

1- BRIEF DESCRIPTION

By this use case the system can send all video that saved by the System to specific Email and make alarm.

2- PRE-CONDITIONS

The User must enter to the system.

3- CHARACTERISTIC OF ACTIVATION

The User entered to the System

4- FLOW OF EVENTS

4-1 BASIC FLOW

This use case begin when the User will choose that folder will have all video which captured and saved by system, after that The User will choose which Email he want to send videos to it, and the User can write subject and litter, after all this operation now the User can press on the Start Run-time Monitoring to start the operation. The

System will check that folder if Empty will not send Email otherwise send Email and make alarm.

This use case is end when the User clicks one stop monitor button or exit.

4-2 ALTERNATIVE FLOW

Not applicable

4-3 EXCEPTIONAL FLOW

E1: wrong input: the system will display message Error Sending Message.

5- POST-CONDITIONS

Email sent and alarm made.

4.4.3 ACTIVITY DIAGRAM

A. OPEN CAMERA ACTIVITY DIAGRAM

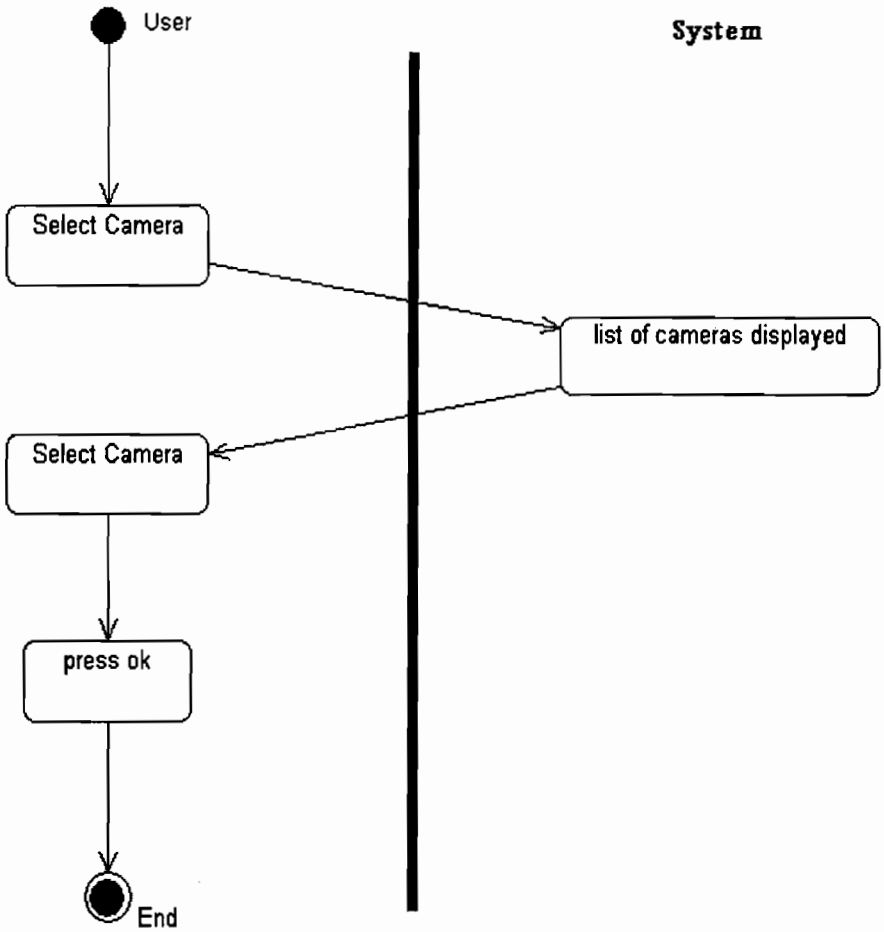

Figure 4.6: Open Camera Activity Diagram

Figure 4.6 shows in details of open camera activity diagram how the user opens camera as follow:

- User press open camera.
- Select available camera and press ok.

B. OBJECT MOVEMENT ACTIVITY DIAGRAM

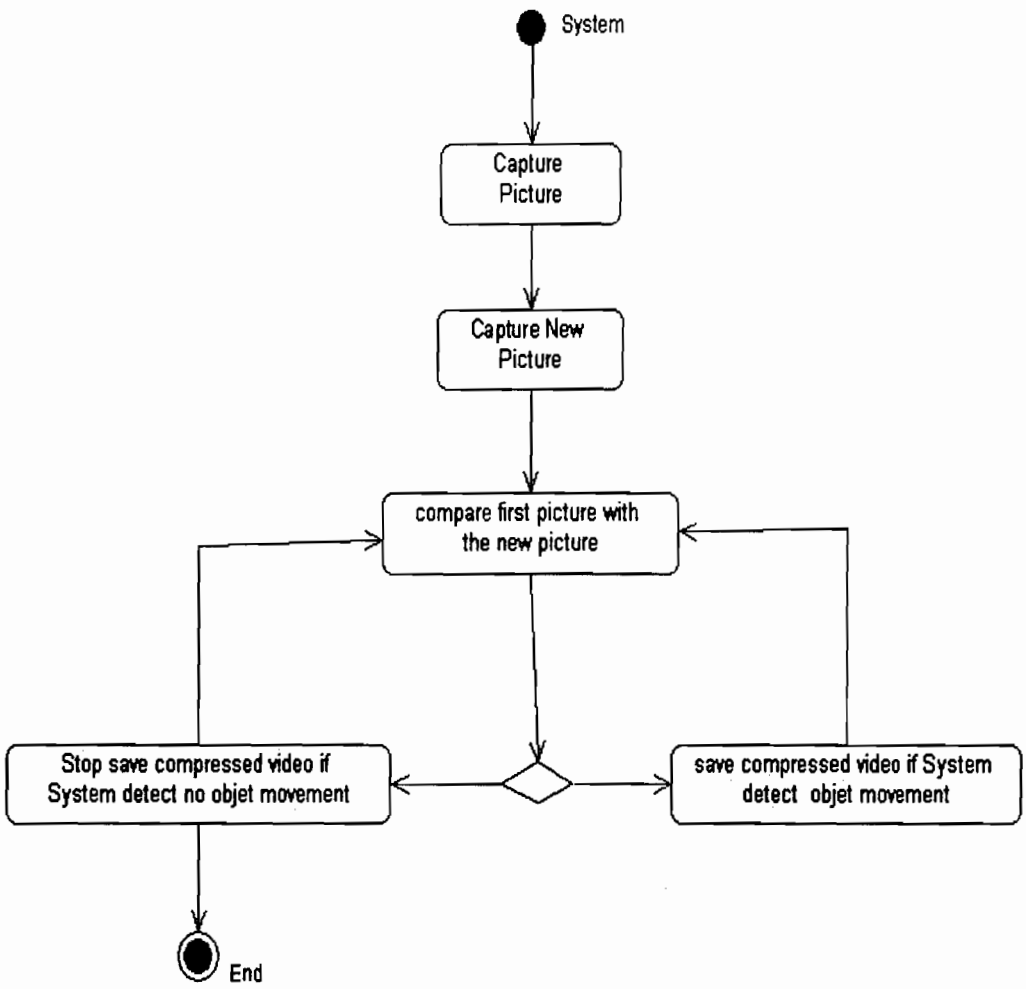

Figure 4.7: Object Movement Activity Diagram

Figure 4.7 shows in details of object movement activity diagram how the system recognizes object movement as follow:

- Capture picture.
- Capture new picture.
- Compare first picture with new picture by (processing image).
- Detect there is object movement or not for save compress video or not.

C. SEND EMAIL AND MAKE ALARM ACTIVITY DIAGRAM

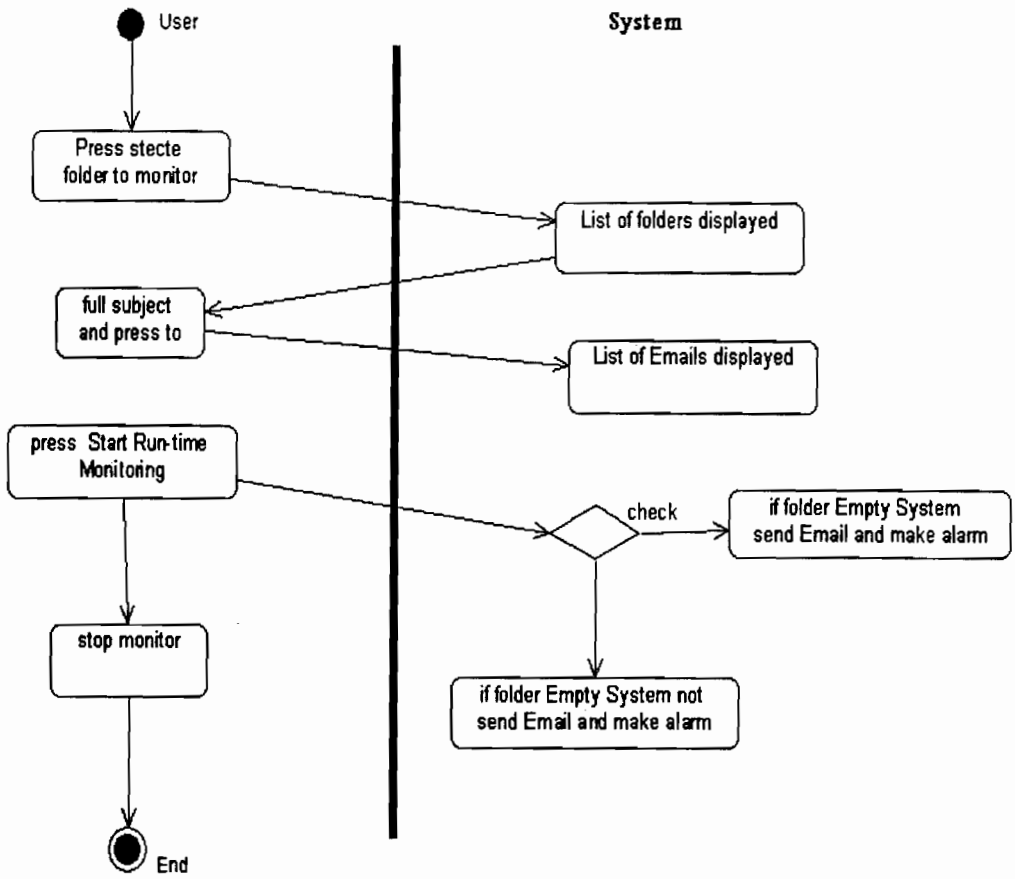

Figure 4.8: Send Email and Make Alarm Activity Diagram

Figure 4.8 shows in details of send email and make alarm activity `diagram, how the system will Send Email and make alarm as follow:

- The user select folder and Email after that press on start run time monitoring.
- The system check the folder if empty or not to send Email.

4.4.4 SEQUENCE DIAGRAM

A. OPEN CAMERA SEQUENCE DIAGRAM

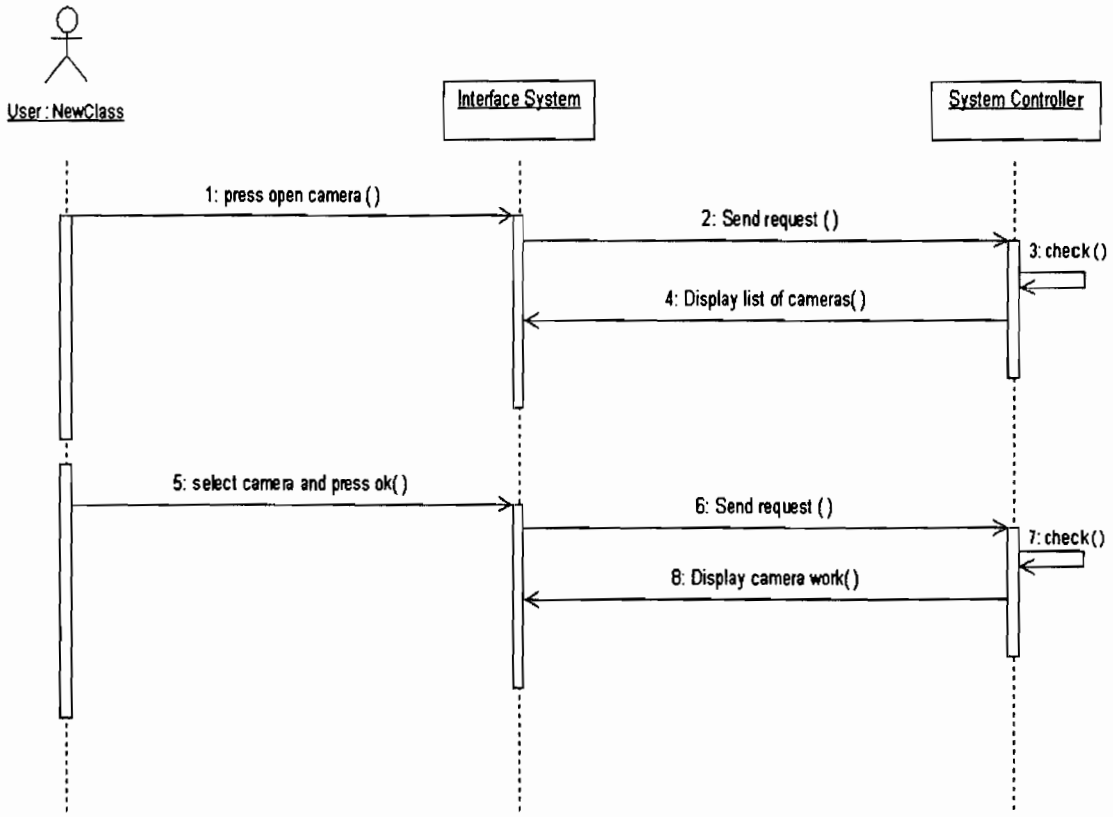

Figure 4.9: Open Camera Sequence Diagram

Figure 4.9 shows in details of open camera sequence diagram, how the user opens camera as follow:

- User press open camera
- Select available camera and press ok

B. OBJECT MOVEMENT SEQUENCE DIAGRAM

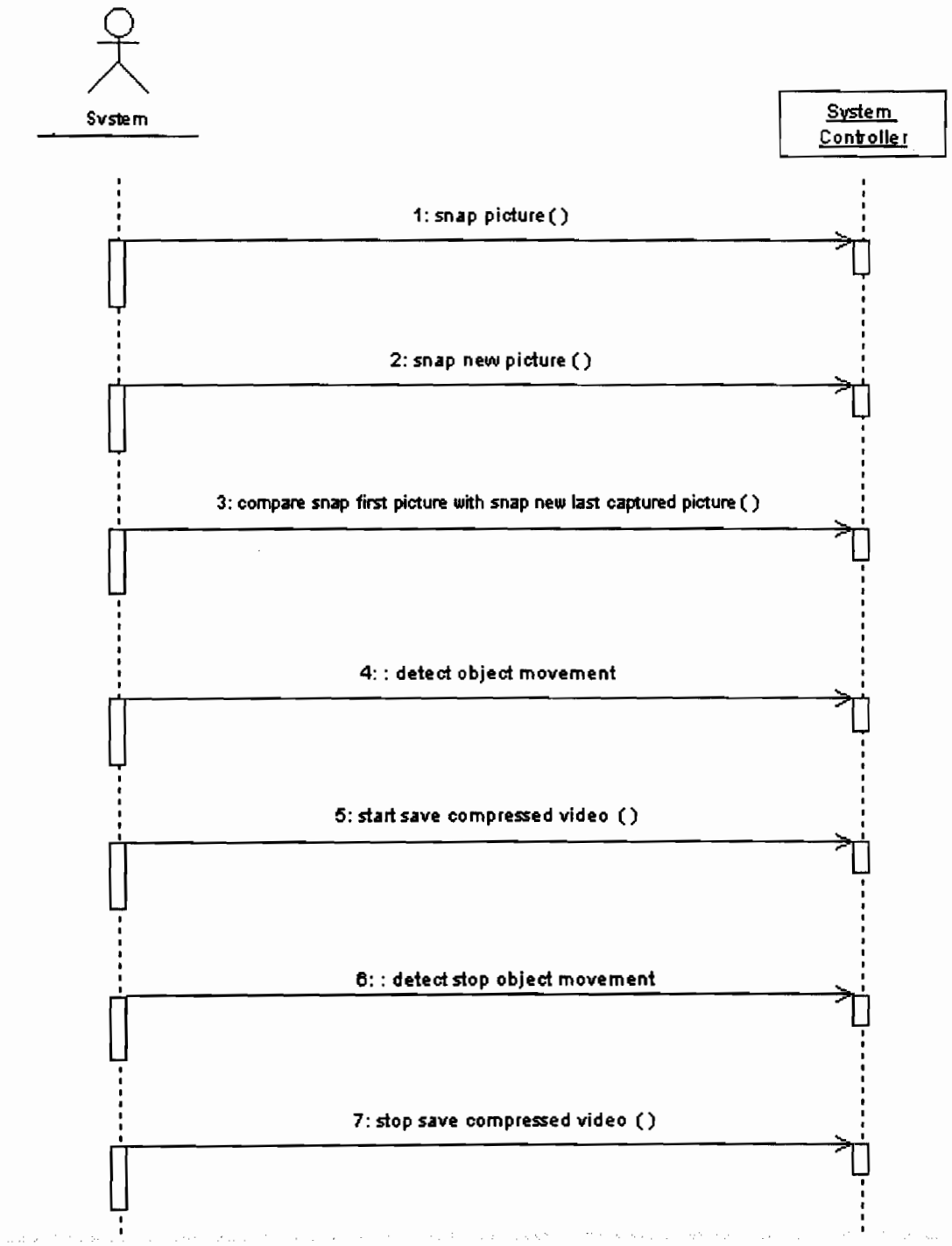

Figure 4.10: Object Movement Sequence Diagram

Figure 4.10 shows in details of object movement sequence diagram, how the system recognize object movement as follow:

- Capture picture.
- Capture new picture.
- Compare first picture with new picture by (processing image).
- Detect there is object movement or not for save compress video or not.

C. SEND EMAIL AND MAKE ALARM SEQUENCE DIAGRAM

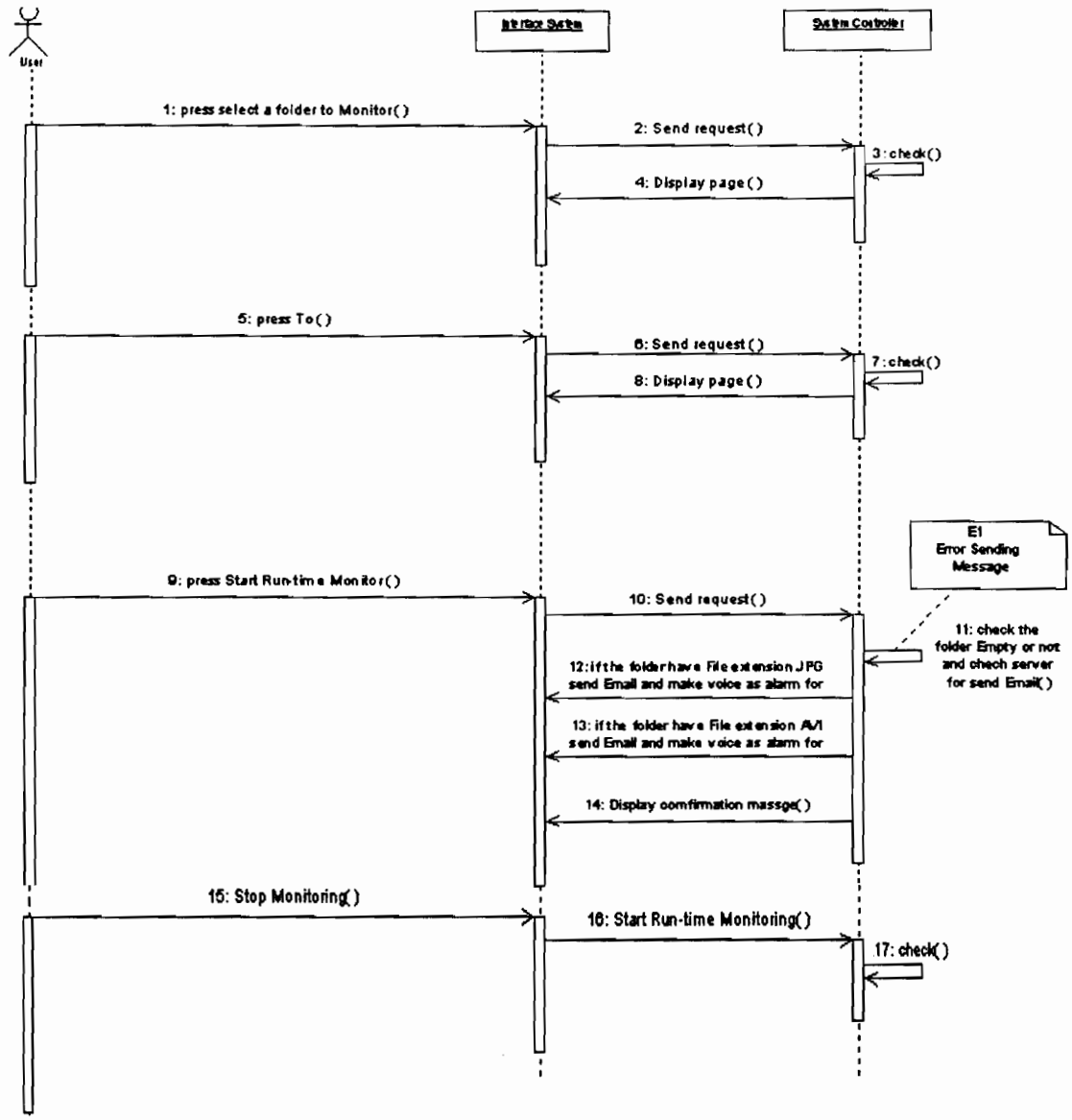

Figure 4.11: Send Email and Make Alarm Sequence Diagram

Figure 4.11 shows in details of send email and make alarm activity `diagram, how the system will Send Email and make alarm as follow:

- The user select folder and Email after that press on start run time monitoring.
- The system check the folder if empty or not to send Email.

4.4.5 COLLABORATION DIAGRAM

A. OPEN CAMERA COLLABORATION DIAGRAM

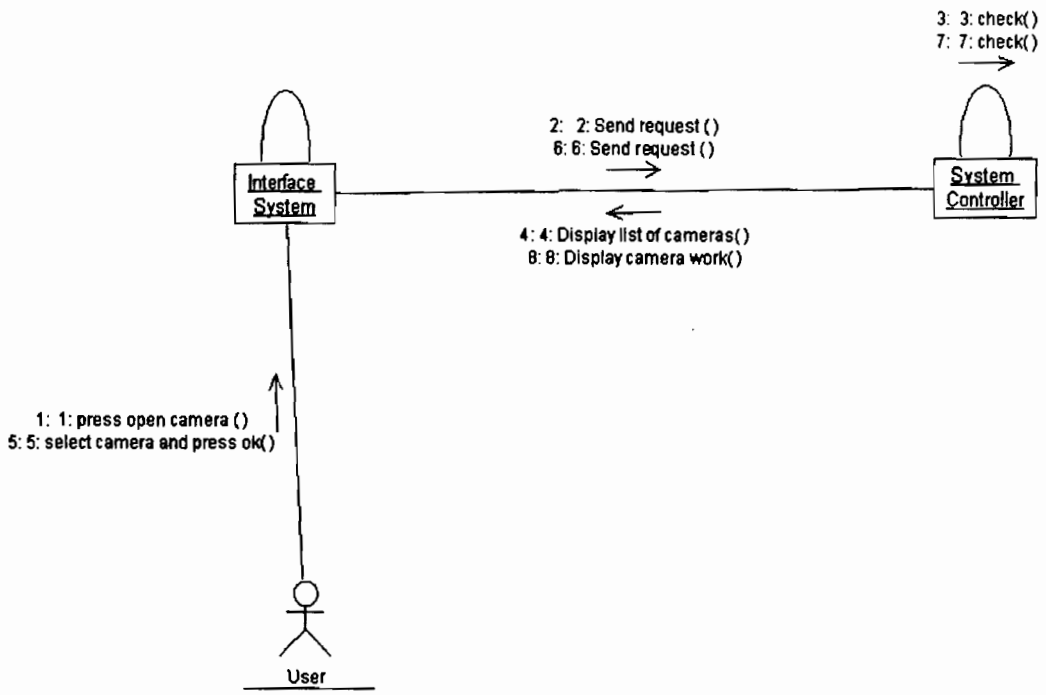

Figure 4.12: Open Camera Collaboration Diagram

Figure 4.12 shows in details of open camera collaboration diagram, how the user opens camera as follow:

- User press open camera
- Select available camera and press ok

B. OBJECT MOVEMENT COLLABORATION DIAGRAM

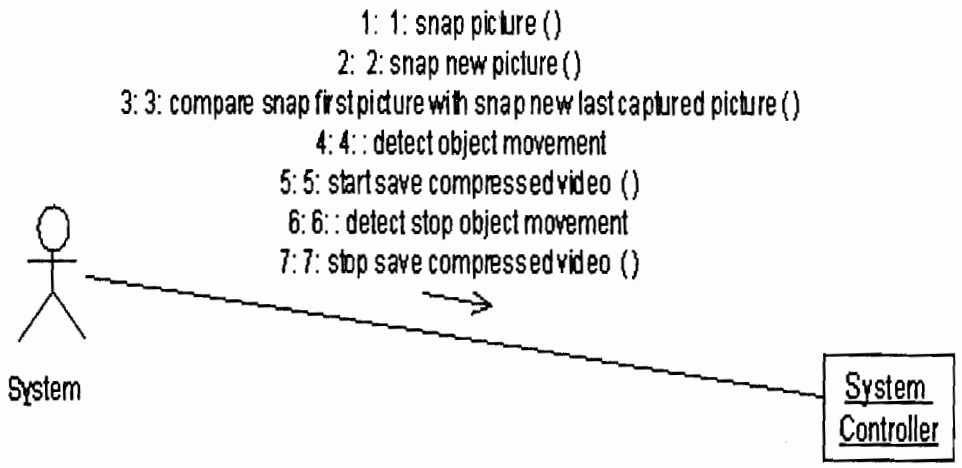

Figure 4.13: Object Movement Collaboration Diagram

Figure 4.13 shows in details of object movement collaboration diagram, how the system will identify object movement as follow:

- Capture picture.
- Capture new picture.
- Compare first picture with new picture by (processing image).
- Detect there is object movement or not for save compress video or not.

C. SEND EMAIL AND MAKE ALARM COLLABORATION DIAGRAM

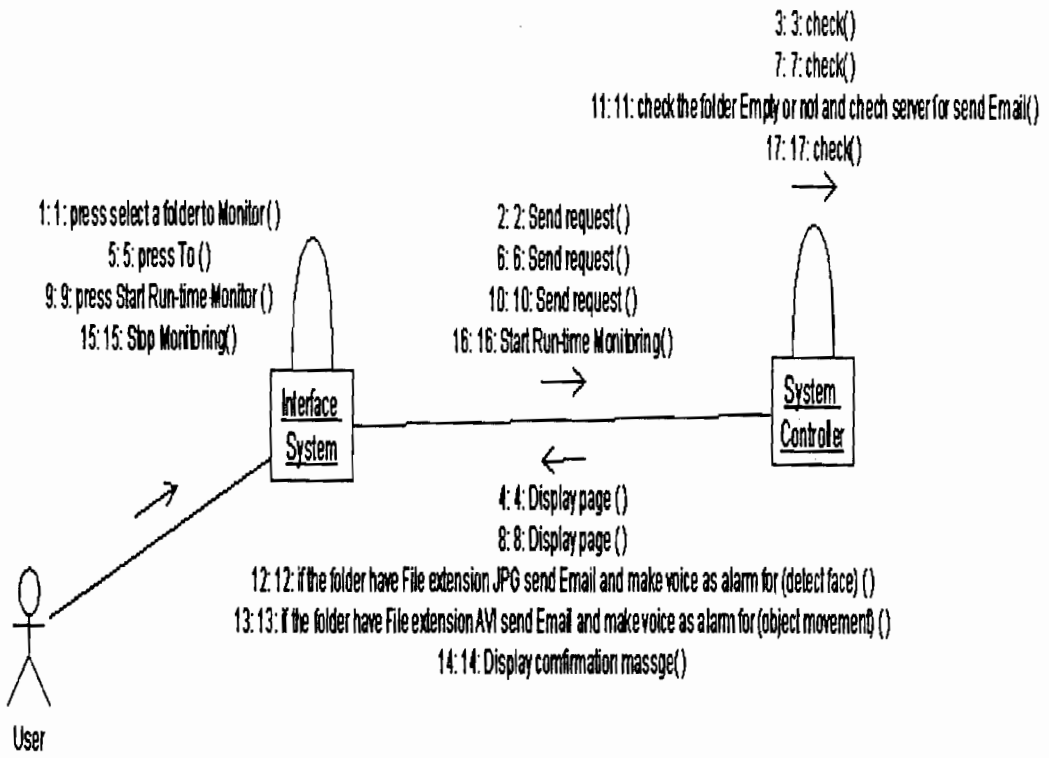

Figure 4.14: Send Email and Make Alarm Collaboration Diagram

Figure 4.14 shows in details of send email and make alarm activity `diagram, how the system will Send Email and make alarm as follow:

- The user select folder and Email after that press on start run time monitoring.
- The system check the folder if empty or not to send Email.

4.4.6 INTERFACE DESIGN

The prototype of security camera real-time for personal property's room control system has been successfully at this stage and all the functional requirements of the system that have been defined have been achieved in full.

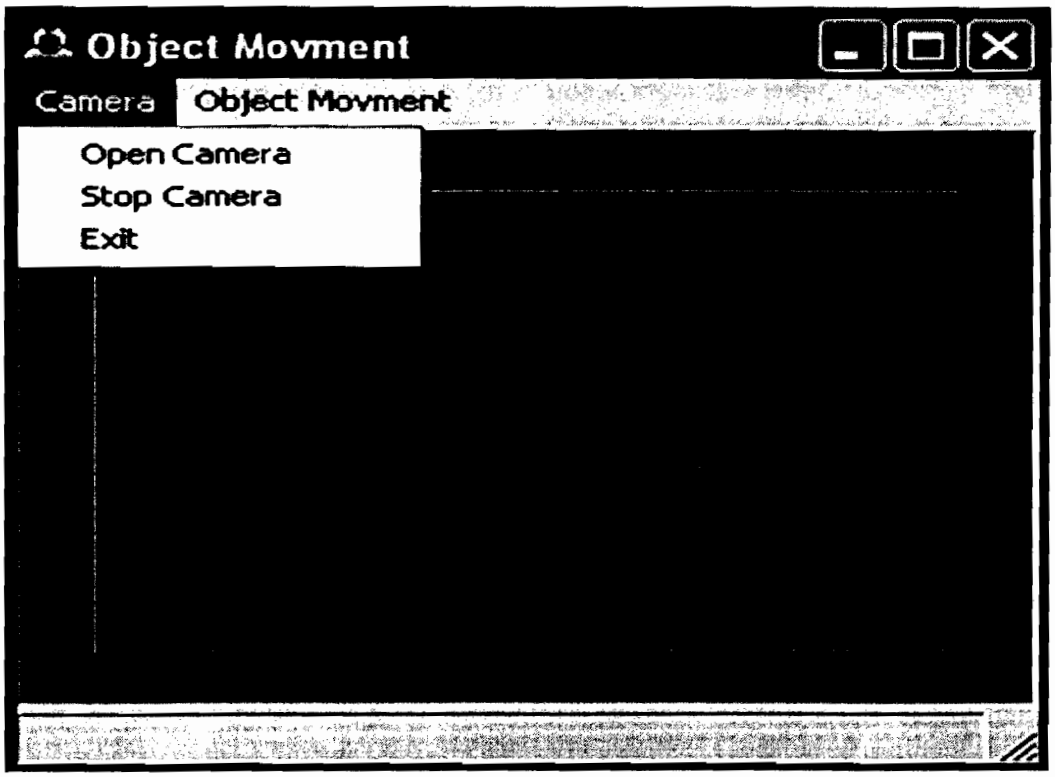

Figure 4.15: Main Page of Object Movement

As shown in Figure 4.15, this main page of object movement the users of this page can open and stop camera and can select any kind of operations of object movement or exit from this page.

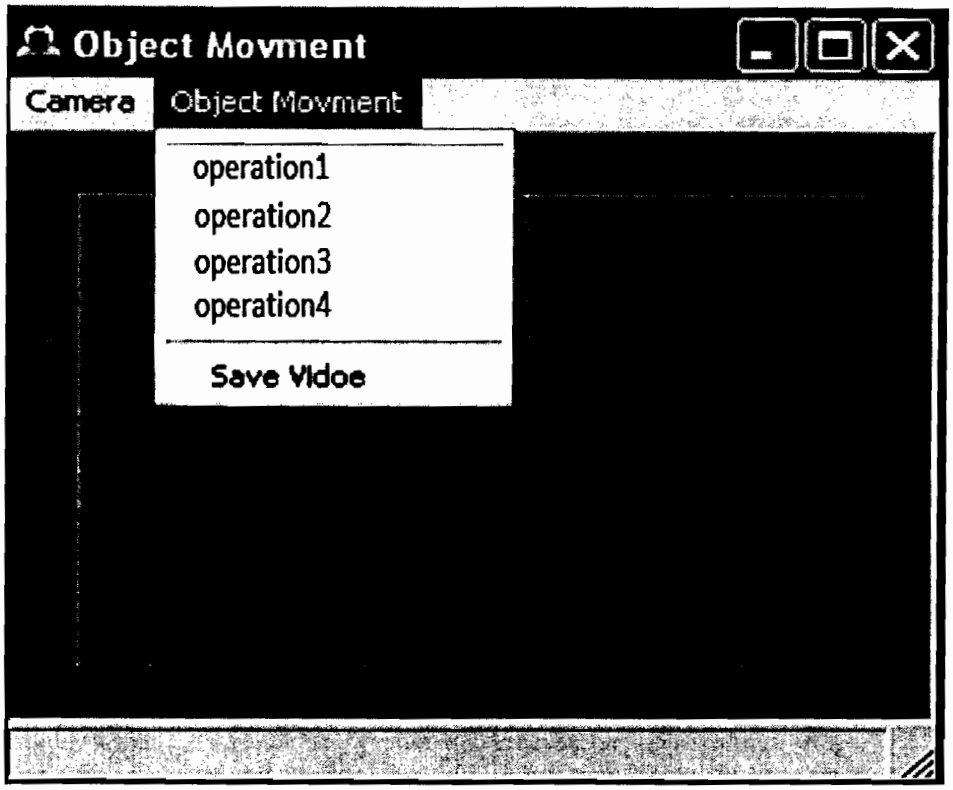

Figure 4.16: Page of Operations of Object Movement

As shown in Figure 4.16, this main page of object movement the users of this page can open select any kind of operations of object movement (operation1, operation2, operation3, operation4) or exit from this page.

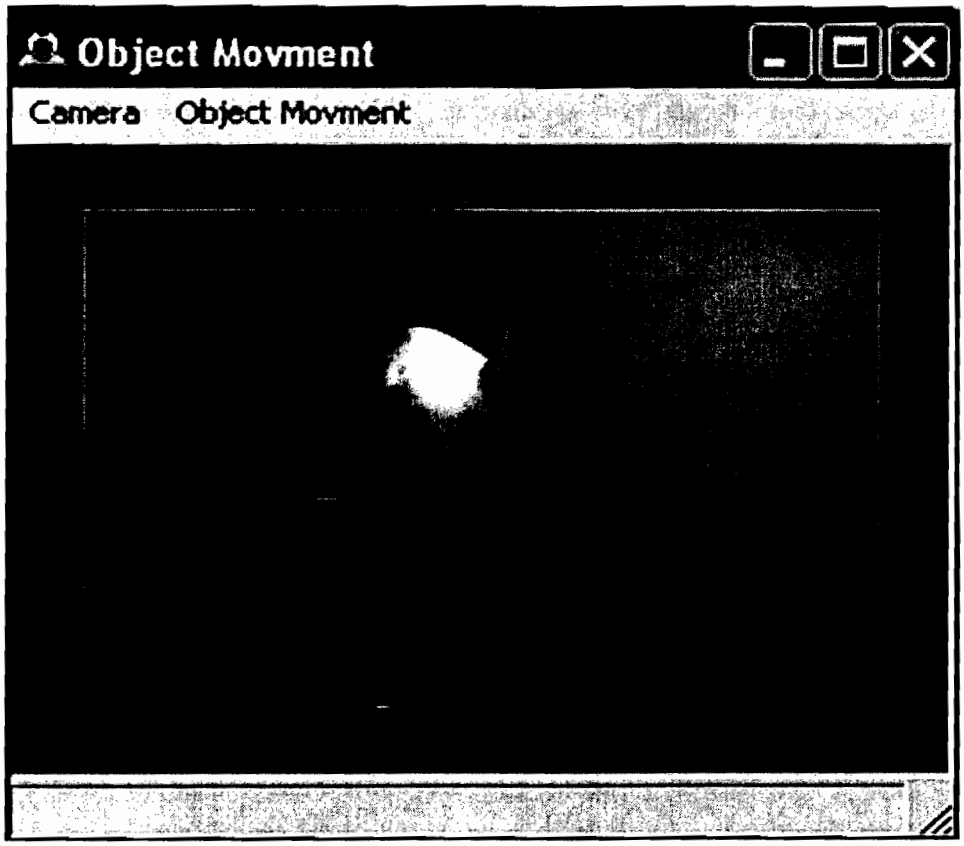

Figure 4.17: Page of operation1 of Object Movement

As shown in Figure 4.17, this main page of object movement the users when select operation of object movement (operation1) the system will show that as shown in Figure 4.17.

Figure 4.18: Page of Operation2 of Object Movement

As shown in Figure 4.18, this main page of object movement the users when select operation of object movement (operation2) the system will show that as shown in Figure 4.18.

Figure 4.19: Page of Operation3 of Object Movement

As shown in Figure 4.19, this main page of object movement the users when select operation of object movement (operation3) the system will show that as shown in Figure 4.19.

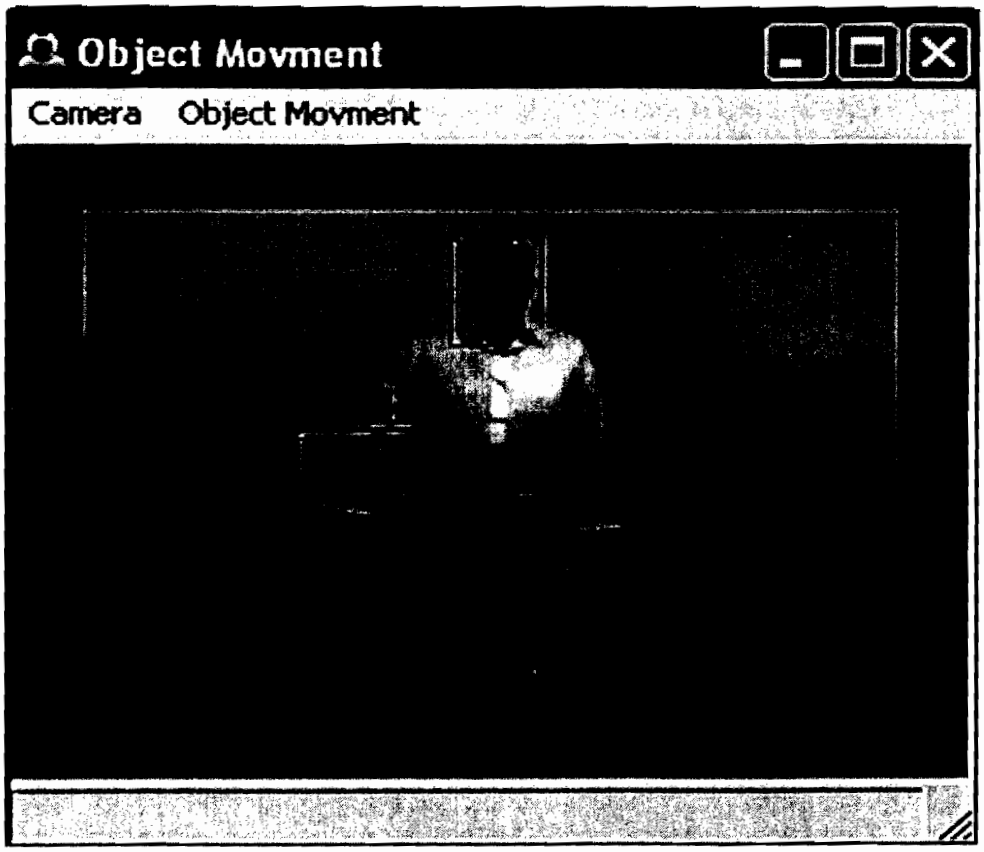

Figure 4.20: Page of Operation4 of Object Movement

As shown in Figure 4.20, this main page of object movement the users when select operation of object movement (operation4) the system will show that as shown in Figure 4.20.

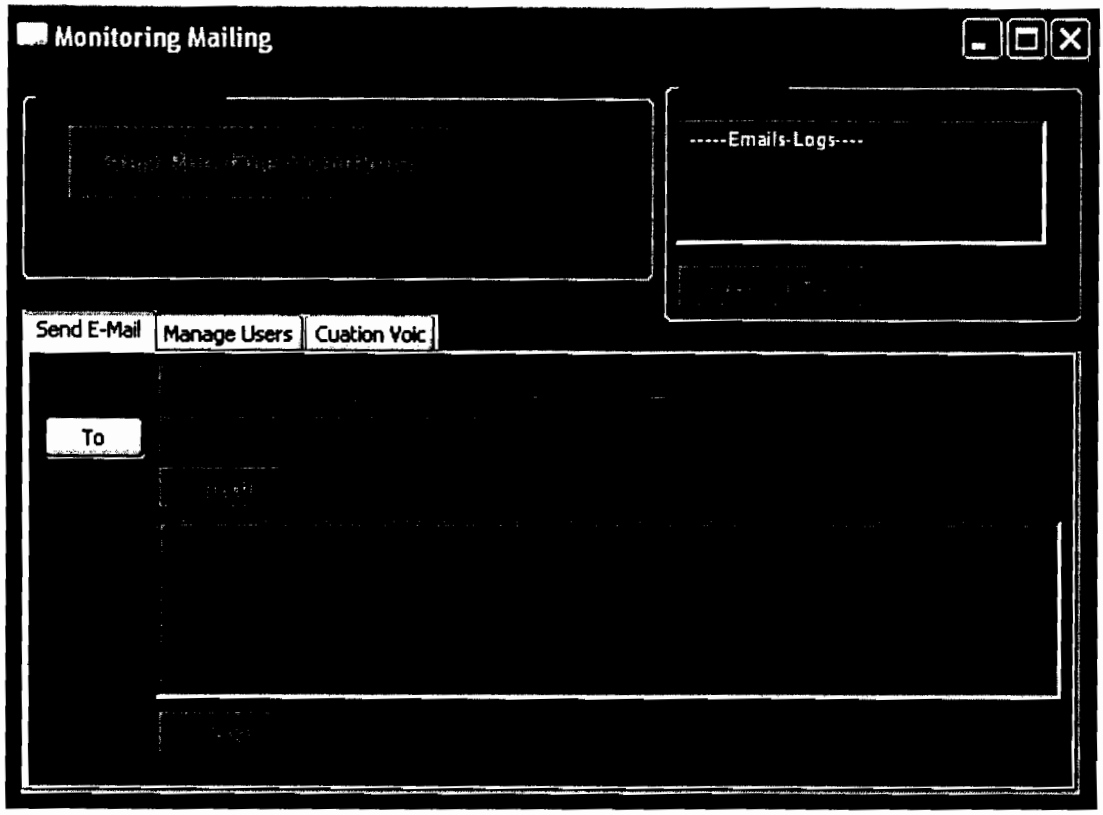

Figure 4.21: Main Page of Monitoring Mailing

As shown in Figure 4.21, this main page of monitoring mailing the users of this page can select folder that have all video saved by system and can select which Email will send videos. The user can open loge file for show the history of emails sent and which sent or not sent.

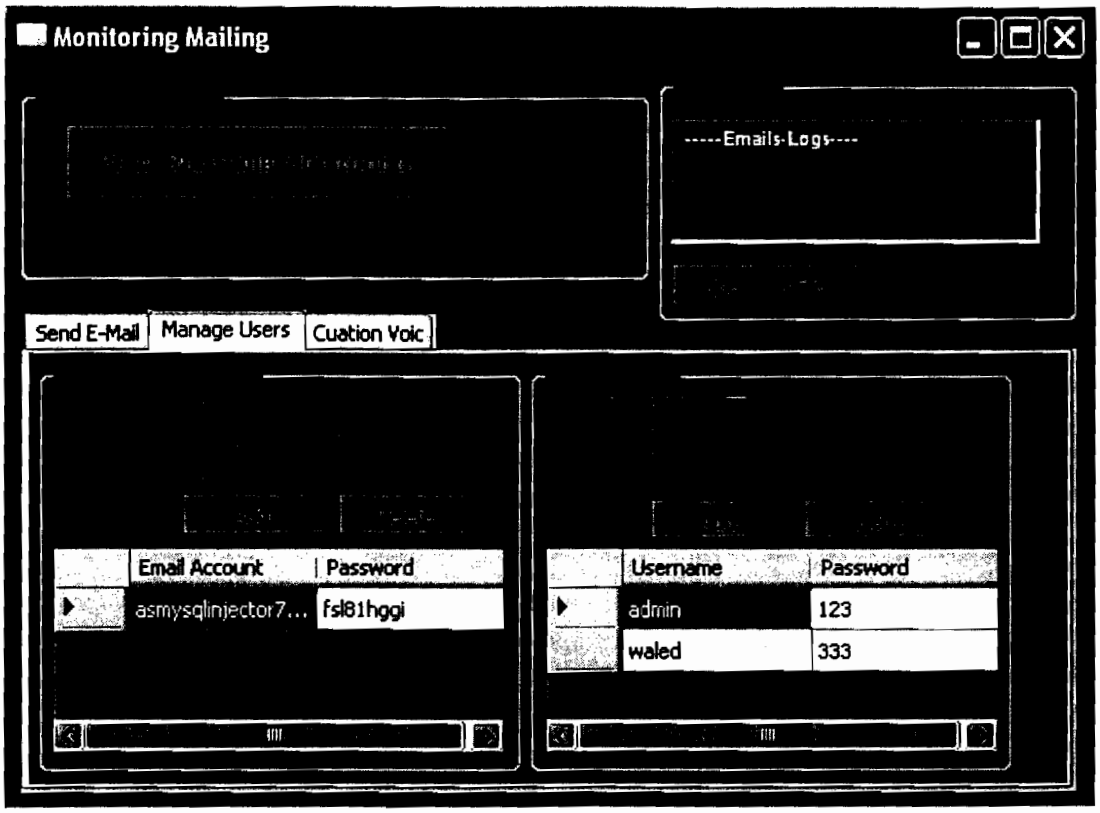

Figure 4.22: Page of Add or Delete Email Account

As shown in Figure 4.22, this main page of monitoring mailing the users of this page can add or delete email account.

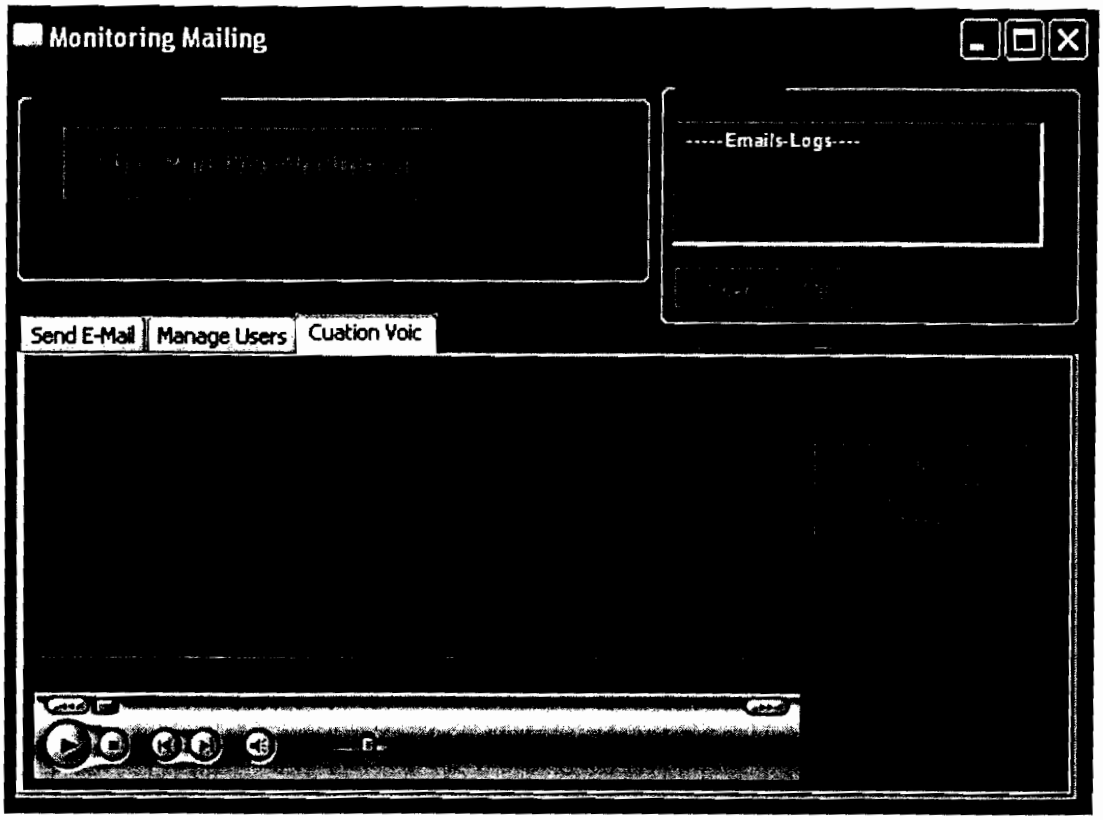

Figure 4.23: Page of Alarm Voice

As shown in Figure 4.23, this main page of monitoring mailing the users of this page can run the voice alarm as try.

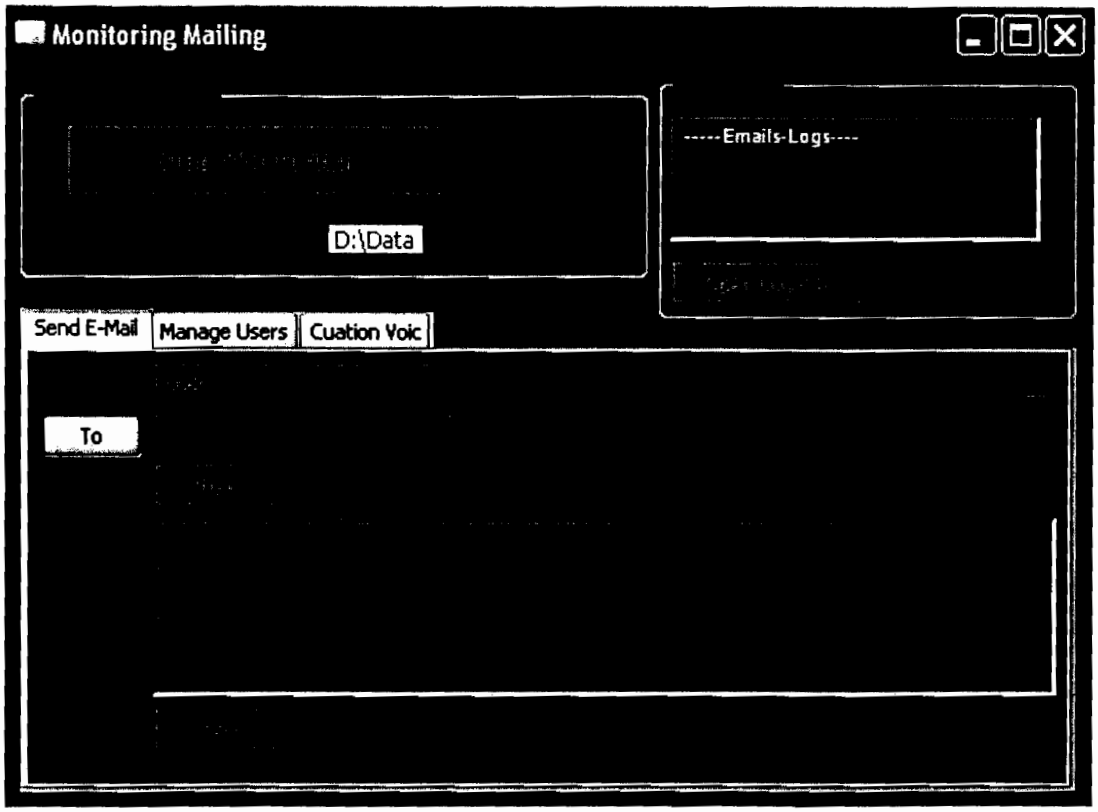

Figure 4.24: Page of Stop Monitoring Mailing

As shown in Figure 4.24, this main page of monitoring mailing the users of this page can stop monitoring mailing by press on Stop Monitoring.

According to Nielsen (2000), the best test users are the ones have the potential to use this software. This principle is more important when the number of test users is not too many.

5.3 INSTRUMENT FOR USER EVALUATION OF SCRTRS

An evaluation used to determine the perception of users on the usability of the prototype SCRTRS. The adaptation of an instrument (Davis, 1989) and (Lewis, 1995). To achieve the usability evaluation objectives of the current study, a quantitative survey was accomplished. A set of open and close ended questionnaire was given to **thirty three** samples of people.

In this study, the questionnaire in final form contains of two parts. The first part about general information of responsive for example age and education. The second part for notices of responsive the usability aspect of the SCRTRS prototype where parted into two parts ease of use and usefulness's part. and there are Uses a five-point Likert scale statements of the second section, ranging from "1" strongly disagree, "2" disagree, "3" no opinion "4" agree "5" strongly agree.

5.4 GENERAL INFORMATION

TABLE 5.1: Profile Of Respondents

	Percent	Frequency N=33
Gender		
Female	**36.4%**	**12**
Male	**63.6%**	**21**
Age		
18-25 years	**24.2%**	**08**
26-35 years	**27.3%**	**09**
36-45 years	**24.2%**	**08**
above 45 years	**24.2%**	**08**
Education		
Degree	**45.5%**	**15**
Master	**42.4%**	**14**
PHD	**12.1%**	**4**
Do you own a camera Device?		
Answer Yes	**90.9%**	**30**
Answer No	**09.1%**	**03**

In the Table 5.1, there were 36.4% of respondents are females and 63.6% of males. In the terms for age the largest group is aged between 26-35 years (27.3%). In the terms for Education the largest group is master (45.5%). Finally, In terms of respondents have a camera Device about (90.9%).

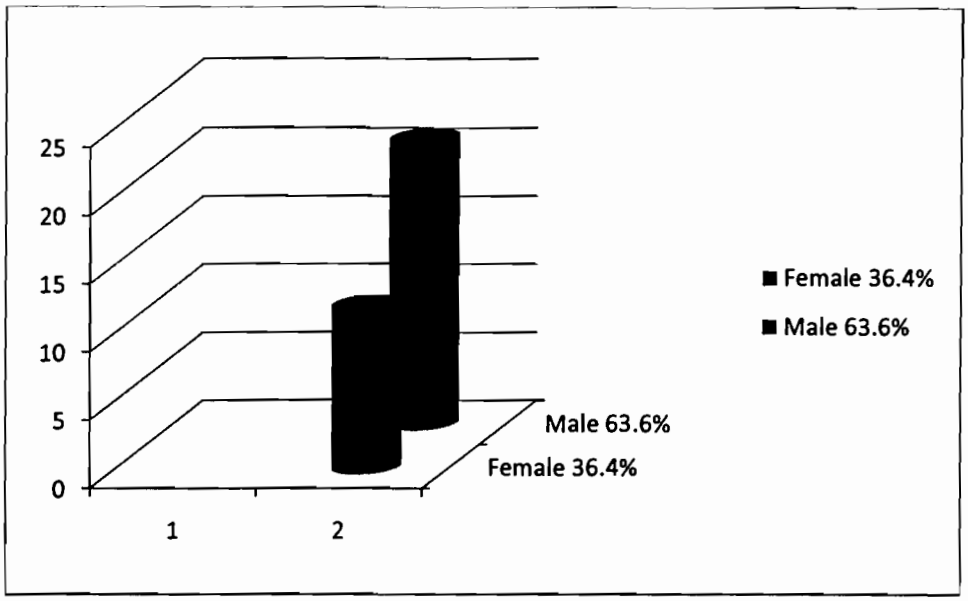

Figure 5.1: Gender

Figure 5.1 shows the Gender percentage of respondents.

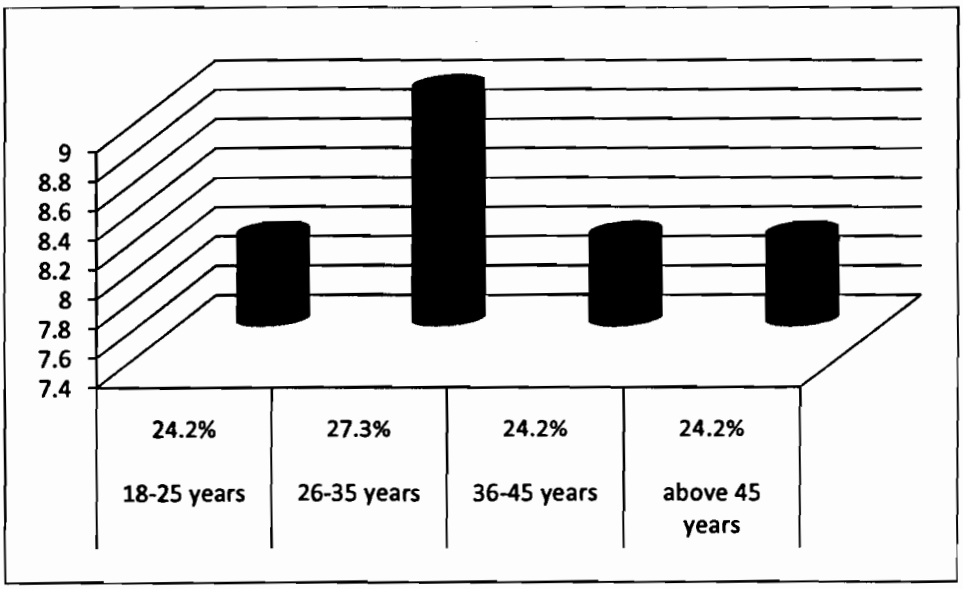

Figure 5.2: Age

Figure 5.2 shows the age percentage of respondents.

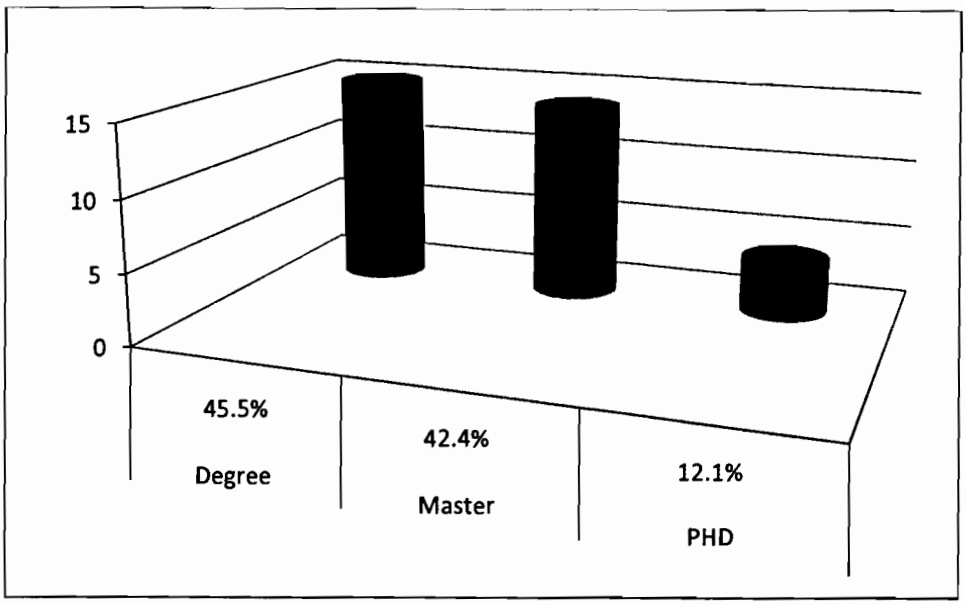

Figure 5.3: Education

Figure 5.3 shows the education percentage of respondents.

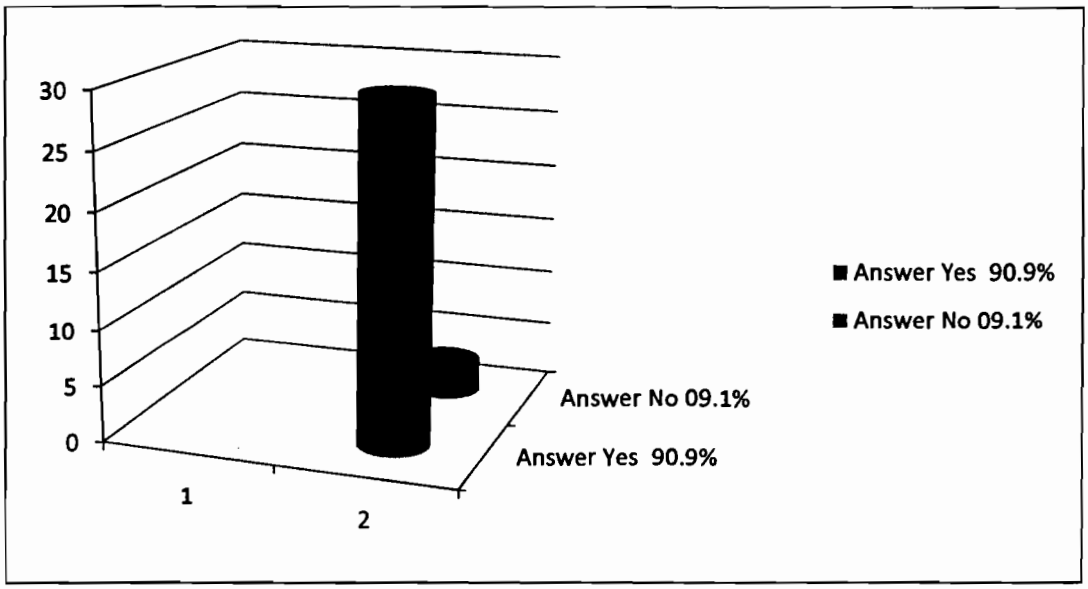

Figure 5.4: Do you own a camera Device?

Figure 5.4 shows the do you own a camera Device? Percentage of respondents.

5.5 RELIABILITY ANALYSIS TEST

Reliability is the range to which an experiment, test, or any measuring procedure yields the same result on repeated trials (Writing guides, 2009). Also reliability is the grade to which measures are free from error and therefore, yield consistent results (Zikmund, 2003).

Many of reliability coefficients with different number like Split half reliability, Parallel, Strictly parallel, Guttman and Cronbach's alpha. One of the most commonly used is Cronbach's alpha because it can be interpreted as a correlation coefficient and ranges in value from 0 to 1 (Coakes, 2005). So, in this study, Cronbach will be used such as a measurement of reliability for each variable.

Table 5.2: result of reliability test

Measures	Mean	Number of items included	Cronbach Alpha
Usefulness	4.15	6	0.762
Ease Of Use	4.09	6	0.722
Outcome/Future Use	4.07	5	0.763

From the analysis done on the instruments listed under each variable in the questionnaire, Table 5.2 shows that Cronsbach's Alpha for the variables eases of use, usefulness and Outcome/Future Use measures have Cronbach alpha of greater than 0.7, thus, these measures satisfy the internal reliability criterion (Pallant, 2007).

Overall the answers of Usefulness, eases of use and Outcome/Future Use from respondents are was Agree.

5.6 ITEMS ANALYSIS

1	2	3	4	5
Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**

Table 5.3: Descriptive Statistics for All Items

	PERCEIVED USEFULNESS						
1.	Using SCRTRS would enable me to accomplish tasks more quickly.	00%	9.1%	6.1%	36.4%	48.5%	**4.24**
2.	Using SCRTRS would improve my performance.	00%	9.1%	9.1%	18.2%	63.6%	**4.36**
3.	Using SCRTRS would increase my productivity.	00%	9.1%	6.1%	27.3%	57.6%	**4.33**
4.	Using SCRTRS would enhance my effectiveness.	00%	00%	39.4%	45.5%	15.2%	**4.24**
5.	Using SCRTRS would make it easier to do my tasks.	00%	9.1%	12.1%	33.3%	45.5%	**4.15**
6.	I would find SCRTRS useful in my everyday tasks.	00%	9.1%	39.4%	33.3%	18.2%	**3.60**
	Group Mean Percentage	00%	7.5%	18.7%	32.3%	41.5%	**4.15**
	PERCEIVED EASE OF USE						
7.	Learning to operate SCRTRS would be	00%	00%	12.1%	39.4%	48.5%	**4.36**

	easy for me.						
8.	I would find it easy to get SCRTRS to do what I want it to do.	00%	00%	12.1%	27.3%	60.6%	**4.48**
9.	My interaction with SCRTRS would be clear and understandable.	00%	9.1%	15.2%	27.3%	48.5%	**4.15**
10.	I would find SCRTRS to be flexible to interact with.	00%	9.1%	30.3%	18.2%	42.4%	**3.93**
11.	It would be easy for me to become skillful at using the SCRTRS.	00%	9.1%	33.3%	24.2%	33.3%	**3.81**
12.	I would find SCRTRS easy to use.	00%	12.1%	30.3%	18.2%	39.4%	**3.84**
Group Mean Percentage		00%	6.5%	22.2%	25.8%	45.5%	**4.09**
PERCEIVED OUTCOME / FUTURE USE							
13.	Was able to complete the transaction quickly using SCRTRS.	00%	00%	33.3%	36.4%	30.3%	**3.96**
14.	I could effectively complete the transaction using SCRTRS.	00%	00%	39.4%	15.2%	45.5%	**4.06**
15.	I was able to efficiently complete the transaction using SCRTRS.	00%	9.1%	18.2%	18.2%	45.5%	**4.18**
16.	I believe I could become productive quickly using SCRTRS.	00%	00%	30.3%	36.4%	33.3%	**4.03**
17.	From my current experience with using SCRTRS, I think I would use it regularly.	00%	00%	33.3%	18.2%	48.5%	**4.15**
Group Mean Percentage		00%	1.8%	30.8%	24.8%	40.6%	**4.07**

From the **Table 5.3**, shows the result of eases of use, usefulness and Outcome/Future of the system. From the result of items of **usefulness** there were the Top answer 41.5% of respondents are **Strongly Agree** and overall the answer of **usefulness** was **Agree.** In item one the Top answers 48.5% of respondents are **Strongly Agree** Using SCRTRS would enable me to accomplish tasks more quickly and overall the answer of this item was **Agree.** In item two the Top answer 63.6% of respondents are **Strongly Agree** Using SCRTRS would improve my performance, and overall the answer of this item was **Agree.** In item three the Top answer 57.6% of respondents are **Strongly Agree** Using SCRTRS would increase my productivity, and overall the answer of this item was **Agree.** In item four the Top answer 45.5% of respondents are **Agree** Using SCRTRS would enhance my effectiveness, and overall the answer of this item was **Agree.** In item five the Top answer 45.5% of respondents are **Strongly Agree** Using SCRTRS would make it easier to do my tasks, and overall the answer of this item was **Agree.** In item six the Top answer 39.4% of respondents are **Neutral** I would find SCRTRS useful in my everyday tasks, and overall the answer of this item was between **Neutral** and **Agree.** From the result of items of **eases of use** there were the Top answer 40.6% of respondents are **Strongly Agree** and overall the answer of **eases of use** was **Agree.** in item one the Top answer 48.5% of respondents are **Strongly Agree** Learning to operate SCRTRS would be easy for me and Overall the answer of this item was **Agree.** In item two the Top answer 60.6% of respondents is **Strongly Agree** learning to operate SCRTRS would be easy for me and overall the answer of this item was between **Agree** and **Strongly Agree.** In item three the Top answer 48.5% of respondents is **Strongly Agree** My interaction with SCRTRS would be clear and understandable and overall the answer of this item was between **Agree.** In item four the Top answer 42.4% of respondents

is **Strongly Agree** I would find SCRTRS to be flexible to interact with and overall the answer of this item was between **Agree.** In item five the Top answer 33.3% of respondents is **Strongly Agree** and **Neutral** it would be easy for me to become skillful at using the SCRTRS and overall the answer of this item was so near from **Agree.** In item six the Top answer 39.4% of respondents is **Strongly Agree** I would find SCRTRS easy to use and overall the answer of this item was so near from **Agree.** From the result of items of **Outcome/Future use** there were the Top answer 45.5% of respondents are **Strongly Agree** and overall the answer of **Outcome/Future use** was **Agree.** in item one the Top answer 36.4% of respondents are **Agree** Was able to complete the transaction quickly using SCRTRS and Overall the answer of this item was **Agree.** In item two the Top answer 45.5% of respondents are **Strongly Agree** I could effectively complete the transaction using SCRTRS, and overall the answer of this item was **Agree.** In item three the Top answer 45.5% of respondents are **Strongly Agree** I was able to efficiently complete the transaction using SCRTRS, and overall the answer of this item was **Agree.** In four the Top answer 36.4% of respondents are **Agree** I believe I could become productive quickly using SCRTRS, and overall the answer of this item was **Agree.** In five the Top answer 48.5% of respondents are **Strongly Agree** I believe I could become productive quickly using SCRTRS, and overall the answer of this item was **Agree.**

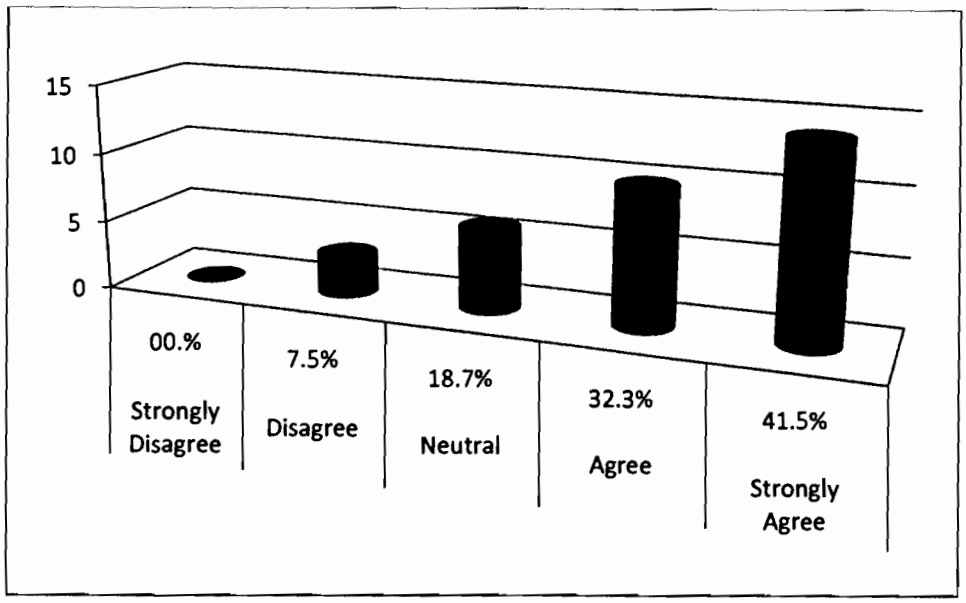

Figure 5.5: Usefulness

Figure 5.5 shows the percentage of usefulness, the highest percentage was 41.5% and the lowest 00%.

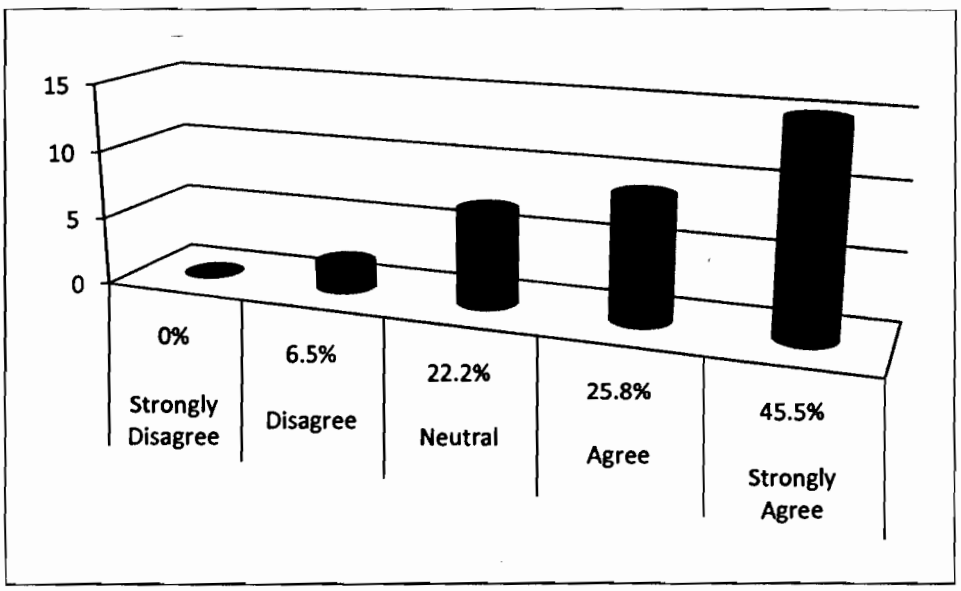

Figure 5.6: Ease of use

Figure 5.6 shows the percentage of ease of use, the highest percentage was 45.5% and the lowest 0%.

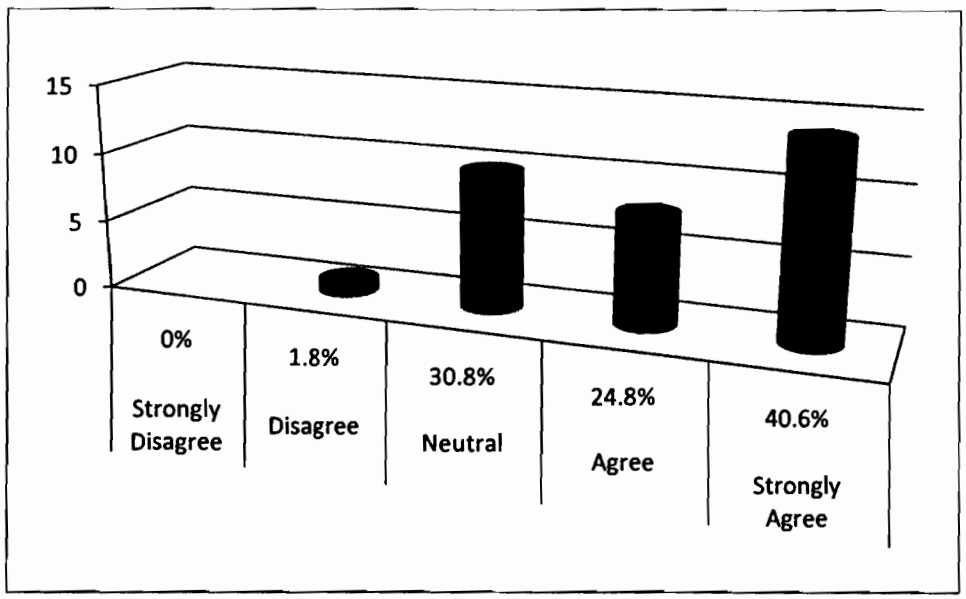

Figure 5.7: Outcome / future use

Figure 5.7 shows the percentage of outcome / future use, the highest percentage was 40.6% and the lowest 0%.

5.7 SUMMARY

Discussed this chapter the analysis of data which obtained from questionnaire. Briefed all respective of respondents about SCRTRS result of the evaluation used to imagine that the respondents agreed that almost SCRTRS and good usability.

CHAPTER 6

CONCLUSION AND FUTURE WORKS

6.1 INTRODUCTION

All the findings which obtained from this study will be showed in this chapter by giving a complete overview on the basis of research objectives. And recommendations for future work.

Security camera real time recorder for personal property's room surveillance introduces channel for security proposed Services, As have been described in the introduction chapter. The objective of this project is to develop not expensive tracking system security in the places indoor as room, and it will be able to determine automatically, and classification and tracking of an object by using at least two cameras. The specific objectives were:

Research Objective 1, 2:

To develop a Security camera real time recorder for personal property's room surveillance (SCRTRS) based on the requirements of this application meant for security proposed Services; in chapter fourth the Results are discussed.

Research Objective 3:

To conduct user evaluation on the SCRTRS; Results are discussed in chapter In achieving the first and second objective, Security camera real time recorder for

personal property's room surveillance (SCRTRS) has been developed. The methodology adopted for the development of the prototype used in this research methodology from the waterfall and there are four steps: requirements, design, implementation and evaluation.

The third objective include usability evaluation SCRTRS. Participated Thirty three participants in the evaluation. The measures for usability evaluation in this study Ease of Use, Outcome/Future Use and Usefulness. Indicate to The results all the users agreed that SCRTRS had good usability in terms of Ease of Use, Outcome/Future Use and Usefulness.

Security camera real time recorder for personal property's room surveillance (SCRTRS) prototype was developed to security Purpose to keep personal property's room surveillance. The results for evaluated the prototype (SCRTRS) was confirm useful to users and it is able to help them to keep their personal property's room surveillance. The results which obtained from this study hope to support and encourage providing security services to will be more efficient and to be available to users at closed places.

6.2 RECOMMENDATIONS AND FUTURE WORK

Hence for future development and expansion of this research, the followings are suggested:

i. Use sends SMS as alert to be more efficient more than just use sends Email.
ii. Use sends SMS by picture as alert to be more clearly.
iii. Develop recognize of the human face to be more efficient more than use skin color.

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APPENDIX A: QUESTIONNAIRE

SECURITY CAMERA REAL TIME RECORDER FOR PERSONAL PROPERTY ROOM SURVEILLANCE (SCRTRS) Prototype Evaluation

This questionnaire is divided into four (4) sections (Section A, B, C, and D). Section A addressing respondent general information; Section B measuring the Perceive of Usefulness of SCRTRS; Section C measuring the Perceive of Ease of Use. Respondent are required to answer all the questions in order to complete the session.

YOURS,

Waled Abubakr Abdulrahman

College of Arts and Sciences (CAS)

University Utara Malaysia (UUM)

A. Respondent General Information

This segment is about your background information. *Please fill up the blanks and mark [v] where appropriate.*

1. Gender: [ ] Male [ ] Female
2. Age: _____ Years.

3. Education background

[ ] Degree [ ] Master [ ] Ph.D.

4. Do you own a cameraDevice [ ] Yes [ ] No

For the next segments, please check or shade the answer to the following questions using the scale below.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**

B. PERCEIVED USEFULNESS							
1.	Using **SCRTRS** would enable me to accomplish tasks more quickly.	1	2	3	4	5
2.	Using **SCRTRS** would improve my performance.	1	2	3	4	5
3.	Using **SCRTRS** would increase my productivity.	1	2	3	4	5
4.	Using **SCRTRS** would enhance my effectiveness.	1	2	3	4	5
5.	Using **SCRTRS** would make it easier to do my tasks	1	2	3	4	5
6.	I would find **SCRTRS** useful in my everyday tasks.	1	2	3	4	5

C. PERCEIVED EASE OF USE						
7.	Learning to operate **SCRTRS** would be easy for me.	1	2	3	4	5
8.	I would find it easy to get **SCRTRS** to do what I want it to do.	1	2	3	4	5

9.	My interaction with **SCRTRS** would be clear and understandable.	1	2	3	4	5
10.	I would find **SCRTRS** to be flexible to interact with.	1	2	3	4	5
11.	It would be easy for me to become skillful at using the **SCRTRS**.	1	2	3	4	5
12.	I would find **SCRTRS** easy to use.	1	2	3	4	5

D. OUTCOME / FUTURE USE						
13.	I was able to complete the transaction quickly using **SCRTRS**.	1	2	3	4	5
14.	I could effectively complete the transaction using **SCRTRS**.	1	2	3	4	5
15.	I was able to efficiently complete the transaction using **SCRTRS**.	1	2	3	4	5
16.	I believe I could become productive quickly using **SCRTRS**.	1	2	3	4	5
17.	From my current experience with using **SCRTRS**, I think I would use it regularly.	1	2	3	4	5

Thanks for Your Participation