ADA 3523

UNIVERSITY MALAYA

Remote Monitoring System

TAN CHIN KEE

WGD00045

Supervised by

Dr P.Sellappan

This project is submitted to

Faculty of Computer Science and Information Technology

University Malaya

In partial fulfillment of requirement for

Degree of Master of Information Technology (MIT)

Session 2000/2001

Perpustakaan Universiti Malaya

A511140188

Abstract

Research is conducted to analysis and evaluate about the **Remote Monitoring System**. The details process of developing the Remote Monitoring System will be discussed throughout whole section of this project. The primary objective of this project is to explore on how Remote Monitoring CCTV process work as well as the application area used in Remote Monitoring CCTV system. This project involves creating a real time monitoring video camera system as a prototype.

The developer will perform the development of the system according to system development life cycle. Stages of the system development life cycle for developing the remote monitoring software are also analyzed and evaluated. Prototyping model are used to describe the series of the software engineering stages. Beside that, the Internet research and interview methodology are used to analysis the existing system. The detail of development methodologies and the components of setting up remote monitoring system would be discussed later. Legal Aspects are also another important aspect to be discussed.

Several important features such as remote monitoring via computer network, via dial up telephone modem and via Internet browser as well as system design would be discussed deeply later.

The idea of this system is come from Burger King restaurants. Burger King restaurants in the United Kingdom are piloting a real time monitoring and

business intelligence solutions. Mr. Paul Bobo, manager checks up on his Burger King restaurant form the comfort home computer 30 minutes away in Tallahassee (The Wall Street Journal-August 30, 2001).

Some of the information such as program source code, sample software, and sample-recording files would be included together in the CD.

Acknowledgments

I am grateful to the numerous individuals who provide help and support in this thesis. First, I wish to thank Dr. Sellappan for his valuable advices, support and guidance. I owe tremendous gratitude to Dr. Sellappan. His advices and guidance is greatly helping me to improve and complete this excellent thesis. Dr. Sellappan is a great project supervisor and leader.

Second, I wish to thank all the staffs in the Faculty Science Computer and Information Technology, University Malaya especially Mr Sim, who is always willing to provide technical support.

Thanks to Cipher Tec (M) Sdn Bhd. Mr. Soo and Mr. Mohd Haslee for their valuable ideas and support. Their provide excellent idea for me to write this thesis.

Most of all, I am grateful to my family. A very special thanks to my family and my wife *Boon Har,* for their support and encouragement. This thesis and project is very challenging, especially when I encounter problems in the software development process.

Table of Content

Remote Monitoring System

Item		Page
Chapter 1	**Project Specification**	**1**
	1.1 Objective	1
	1.2 Source of Data	1
	1.3 Project Scope	2
	1.4 Project Schedule	2
Chapter 2	**What is Remote Monitoring System?**	**4**
	2.1 Overview	4
	2.2 Close Circuit Television/Traditional CCTV	5
	2.2.1 How Does CCTV Work	7
	2.3 Digital Close Circuit Television	7
	2.3.1 How Does Digital CCTV Work	8
	2.4 Legal Aspect Regarding Employing Video Cameral	9
Chapter 3	**Application Area And Comparison**	**11**
	3.1 Overview	11
	3.2 Application Area of Remote Monitoring System	13
	3.3 Advantages of Remote Monitoring System	15
	3.4 Disadvantages of Remote Monitoring System	19
	3.5 Comparison – RMS vs Traditional CCTV	22
Chapter 4	**Components of CCTV System**	**24**
	4.1 Video Camera	24
	4.1.1 Wired Camera	25
	4.1.2 Wireless Camera	28
	4.2 Video Recorder	29
	4.3 Multiplexer	31
	4.4 Video Capture Card	32
	4.5 Transmission Media	32
	4.5.1 Conducted Media	33
	4.5.2 Radiated Media	35
Chapter 5	**Types of Remote Monitoring System**	**37**
	5.1 Overview	37
	5.2 Using Computer Network for Remote Monitoring	37
	5.3 Using Dial Up Telephone Modem (Circuit Switching)	41
	5.3.1 Understand Modem Command	45
	5.4 Using Internet for Remote Monitoring	47

Chapter 6	**Preliminary Investigation**	**53**
	6.1 Overview	53
	6.2 Clarification and Understand System Requirement	54
	6.3 Define the Scope and Constraints	57
	6.4 Access The Cost and Benefit	58
	6.5 Examine the Technical and Operational Feasibility	59
	6.6 Required Tools and Techniques	59
	6.6.1 Basic Hardware Requirement	60
	6.6.2 Basic Software Requirement	60
	6.7 Types of Methodologies	61
	6.8 The Reason of Choosing Prototyping Methodology	63
Chapter 7	**Requirement Analysis Tools and Techniques**	**65**
	7.1 Overview	65
	7.2 Testing and Evaluate Existing Software	65
	7.3 Fact Finding – Interview	66
	7.4 Fact Finding – Internet Research	67
	7.5 Requirement Analyst Method – Data Flow Diagram	67
	7.5.1 Context Diagram	68
	7.5.2 Lower Level Diagram	68
Chapter 8	**Application Development Using Prototyping**	
	8.1 Overview	75
	8.2 Benefits of Using Prototyping	76
	8.3 Disadvantages of Using Prototyping	76
	8.4 Steps In Prototyping Development	77
	8.5 Development of Remote Monitoring Prototyping	78
	8.5.1 Initial Prototype	79
	8.5.2 First Iteration	81
	8.5.3 Second Iteration (Prototype the network module)	82
	8.5.3.1 Network Module Development Review and Evaluation	84
	8.5.4 Third Iteration (Prototyping the dial up module)	85
	8.5.4.1 Telephone Dial Up Module Review and Evaluation	86
	8.5.5 Fourth Iteration (Prototype the Internet Module)	87
	8.5.5.1 Internet Module Development Review and Evaluation	89
Chapter 9	**System Testing**	**91**
	9.1 Overview	91
	9.2 Unit Testing	91
	9.3 Integration Testing	92
	9.4 System Testing	92
	9.5 Testing Result	93
	9.5.1 Unit Testing Result	93
	9.5.2 Integration Testing Result	95
	9.5.3 System Testing Result	96

Chapter 10 Problem Encounter and Conclusion **102**
10.1 Overview 102
10.1.1 Problem Encounter at Beginning Stage 103
10.1.2 Problem Encounter During Requirements Analysis Tools and Techniques Stage 103
10.1.3 Problem Encounter During Application Prototyping Development Stage 104
10.2 Conclusion 106

References **107**

Appendix I Interview Questionnaire **110**

Appendix II Real Time CCTV **112**

Appendix III JVC C2U Surveillance Software **114**