

ASSET TRACKING SYSTEM (ATS)

LAU SIEW JOO

This report is submitted in partial 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 2010



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER

BORANG PENGESAHAN STATUS LAPORAN

PROJEK SARJANA MUDA II

Tajuk Projek : ASSET TRACKING SYSTEM

Sesi Pengajian : 2009/2010

Saya LAU SIEW JOO

mengaku membenarkan Laporan Projek Sarjana Muda ini disimpan di Perpustakaan dengan syarat-syarat kegunaan seperti berikut:

1. Laporan adalah hakmilik 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*

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

TERHAD*

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

TIDAK TERHAD

Disahkan oleh:

(TANDATANGAN PENULIS)

(COP DAN TANDATANGAN PENYELIA)

Alamat Tetap: 195 'MUARA TABUAN' PHS 2, LRG
2A1A, JLN MUARA TABUAN, 93450, KUCHING,
SARAWAK.

Tarikh:

Tarikh:

“I hereby declare that this report is the result of my own work except for quotes as cited in the references.”

Signature :.....
Author : LAU SIEW JOO
Date :.....

“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 : PUAN NOOR MAZLINA BINTI MAHMOD
Date :.....

Dedicated to my family, specially to my beloved mother, father and sisters, my lectures and lastly my friends.

ACKNOWLEDGEMENT

First and foremost, I would like to express my sincere gratitude to my supervisor, Puan Noor Mazlina Binti Mahmod for her encouragement and guidance. The success of the project would not be possible without her comments, ideas and endless support throughout the period of completing this project. My acknowledgement also goes to Encik Mohidden Bin Mansor for contributing the information needed in order to start the project. His time and effort provided is very much appreciated.

Besides, I would also like to take this opportunity to thank my university, Universiti Teknikal Malaysia Melaka (UTeM) for providing me the facilities and information to successfully complete this project. Not only that, without this course provided by UTeM, I would not be able to gain this valuable experience from this project.

I would also like to thank my friends who have helped me in some part of this project. The completion of this project is part of their effort and time for giving me the thoughtful advices and information.

Finally, my honorable appreciation goes to my families who have been providing the countless support and encouragement throughout my study at Universiti Teknikal Malaysia Melaka (UTeM). Their continuing support is part of the reason why I am able to complete this course and project.

ABSTRACT

This study aims to develop a project by final year undergraduate. The project concerns about the design and the development of the Asset Tracking System. This project will enhance the efficiency for laboratory assistant of FKEKK to track the location of the assets. This paper will describe the functionality of the system and the analysis of the asset tracking system. I believe that by using the Asset Tracking System, laboratory assistants would be able to locate the asset in a laboratory in a shorter time and at the same time reducing the manual workload. With the implementation of some simple design into the system, a reliable and useful asset tracking system will be produced.

ABSTRAK

Kajian ini bertujuan untuk menghasilkan satu Projek Sarjana Muda oleh mahasiswa tahun terakhir UTeM. Projek ini adalah mengenai reka bentuk and penghasilan *Asset Tracking System*. Tujuan projek ini adalah untuk meningkatkan kecekapan pembantu makmal FKEKK untuk mengetahui lokasi aset dalam makmal. Tesis ini menerangkan fungsi-fungsi yang disediakan dalam *Asset Tracking System*. Analisis yang bersesuaian telah dijalankan bagi mendapat idea-idea untuk menghasilkan satu sistem yang sesuai untuk digunakan di makmal. Saya percaya bahawa dengan menggunakan *Asset Tracking System*, pembantu makmal akan dapat mencari aset di makmal dalam masa yang singkat berbanding dengan sistem manual yang digunakan sekarang.

TABLE OF CONTENT

CHAPTER	TITLE	PAGE
	PROJECT TITLE	i
	CONFIRMATION FORM	ii
	DECLARATION	iii
	SUPERVISORS CONFIRMATION	iv
	DEDICATION	v
	ACKNOWLEDGEMENT	vi
	ABSTRACT	vii
	ABSTRAK	viii
	TABLE OF CONTENT	ix
	LIST OF TABLE	xv
	LIST OF FIGURE	xvi
	LIST OF ABBREVIATION	xviii
	LIST OF APPENDIX	xx
I	INTRODUCTION	1
	1.1 Overview	1
	1.2 Problem Statement	2
	1.3 Project Aims	2

1.4	Scope	3
1.4.1	System Operability	3
1.4.2	System Functionality	4
1.4.2.1	Registering New Equipment	4
1.4.2.2	Searching Equipment	4
1.4.2.3	Borrowing Equipment	4
1.4.2.4	Reporting On Malfunction Equipment	5
1.4.2.5	Tracking Login User	5
1.4.3	User	5
1.4.3.1	Administrator	5
1.4.3.2	Head Of Laboratory	6
1.4.3.3	Laboratory Assistant	6
1.5	Significant Of Project	6
II	LITERATURE REVIEW	7
2.1	Overview	7
2.2	Introduction	7
2.3	Introduction Of Barcode Technology	8
2.4	Types Of Identification System	9
2.5	Barcode Symbologies	9
2.5.1	Types Of Symbologies	10

2.5.1.1	UPC Code	10
2.5.1.2	EAN Code	11
2.5.1.3	Interleaved 2 Of 5	11
2.5.1.4	Code 3 Of 9 (Code 39)	12
2.5.1.5	Code 128	12
2.6	Types Of Barcode Readers	13
2.6.1	Hand Held Readers	13
2.6.1.1	Pen Wand	13
2.6.1.2	Automatic Hand Held Scanners	13
2.6.1.3	Charge Coupled Device Scanner	14
2.6.2	Fixed Mount Readers	14
2.6.2.1	Fixed Mount Moving Beams Laser Scanners	14
2.6.3	High Speed Conveyor Mountable Readers	14
2.7	Significance Of Barcode Technology	15
2.8	Application Of Barcode Technology In Warehouse	16
2.8.1	Advantages Of Using Bar Code Technology In Warehouse Management	16
2.8.2	Implementation Of Barcode Generator	17
2.9	Personal Home Page (PHP)	17
2.9.1	Syntax	17
2.9.2	Why Choose PHP?	18
2.9.3	Comparison Of PHP With Other Web-Based Languages	18
2.10	JavaScript	19
2.10.1	Why Choose JavaScript	19

2.10.2	Comparison Of JavaScript With Other Scripting Languages	20
2.11	MySQL	20
2.11.1	Why Choose MySQL	21
2.11.2	Comparison Of MySQL With Other Databases	22
2.12	Summary	23
III	METHODOLOGY	25
3.1	Overview	25
3.2	Iterative And Incremental Model	25
3.2.1	Initial Planning	26
3.2.2	Planning	26
3.2.3	Requirements	27
3.2.4	Analysis and Design Phase	27
3.2.5	Implementation	27
3.2.6	Testing	28
3.2.7	Evaluation	28
3.2.8	Deployment	28
IV	RESULT AND DISCUSSION	29

4.1	Result	29
4.2	Buttons Available In the System	30
4.3	Function Analysis	32
4.4	Asset Tracking System	34
4.4.1	Overview	34
4.4.2	Login Page	34
4.4.3	Homepage	35
4.4.4	Register New User	36
4.4.5	Log History	37
4.4.6	Barcode Generator	38
4.4.7	Help Page	39
4.4.8	Search Equipment Page	40
4.4.9	Logout	41
4.4.10	Borrowing Transaction	42
4.4.11	Faulty Equipment Transaction	43
4.4.12	Homepage For Laboratory Assistant	44
4.4.13	Register New Equipment	45
4.4.14	Search Equipment	46
4.4.15	Edit Page	47
4.4.16	Delete Page	48
4.4.17	Borrowing/Returning Equipment	49
4.4.18	Repair and Service Request Form By University	50
4.4.19	Repair and Service Request Form By Vendor	51

4.4.20	Receive Repaired/Refurbished Equipment	52
4.4.21	Receive Repaired Equipment From University	53
4.4.22	Receive Repaired Equipment From Vendor	54
V	CONCLUSION AND RECOMMENDATIONS	55
5.1	Conclusion	55
5.2	Recommendations	56
	REFERENCES	58
	APPENDIX	60

LIST OF TABLE

NO	TITLE	PAGE
2.9.3	Comparison of PHP and JSP	18
2.10.2	Comparison of JavaScript and VBScript	20
2.11.2	Comparison of MySQL, MicrosOft SQL and Oracle	22
4.2.1	Buttons Available for Administrator, Head of Laboratory and Laboratory Assistant Module	31
4.3.1	Function Analysis for Administrator, Head of Laboratory and Laboratory Assistant Module	32

LIST OF FIGURE

NO	TITLE	PAGE
2.5.1.1	UPC-A and UPC-E	10
2.5.1.2	EAN-8 and EAN-13	11
2.5.1.3	Interleaved 2 of 5	11
2.5.1.4	Code 39	12
2.5.1.5	Code 128	12
3.2.1	Iterative and Incremental Model	25
4.4.2	GUI of Login Form	34
4.4.3	GUI of Homepage	35
4.4.4	GUI of Register New User Form	36
4.4.5	GUI of Log History	37
4.4.6	GUI of Barcode Generator	38
4.4.7	GUI of Help Guide	39
4.4.8	GUI of Search Equipment Form	40
4.4.9	GUI of Logout Success Message	41
4.4.10	GUI of Borrowing Transaction	42
4.4.11	GUI of Faulty Equipment Form	43

4.4.12	GUI of Homepage for Laboratory Assistant	44
4.4.13	GUI of Register New Equipment Form	45
4.4.14	GUI of Search Equipment Result	46
4.4.15	GUI of Edit Equipment Form	47
4.4.16	GUI of Delete Confirmation	48
4.4.17	GUI of Borrowing Or Returning Equipment Form	49
4.4.18	GUI of Repair and Service Request by University Form	50
4.4.19	GUI of Repair and Service Request by Vendor Form	51
4.4.20	GUI of Receive Repaired or Refurbished Equipment Form	52
4.4.21	GUI of Receive Repaired Equipment from University Form	53
4.4.22	GUI of Receive Repaired Equipment from Vendor Form	54

LIST OF ABBREVIATION

ACM	-	Association of Computing Machinery
ASCII	-	American Standard Code for Information Interchange
ATS	-	Asset Tracking System
CCD	-	Charge Coupled Device
CPU	-	Central Processing Unit
EAN	-	European Article Numbering
EAN 8	-	Encode 8
EAN 13	-	Encode 13
FKEKK	-	Faculty of Electronic and Computer Engineering
GUI	-	Graphic User Interface
HTML	-	HyperText Markup Language
ID	-	Identity
ITF	-	Interleaved 2 of 5
JIT	-	Just In Time
JPEG	-	Joint Photographic Experts Group
JSP	-	Java Server Pages
LAN	-	Local Area Network
LED	-	Light Emitting Diode
MySQL	-	My Structured Query Language
OCR	-	Optical Character Recognition
RFID	-	Radio Frequency Identification
UGPCC	-	Uniform Grocery Product Code Council
UPC	-	Uniform Product Code
UTeM	-	Universiti Teknikal Malaysia Melaka
PC	-	Personal Computer
PHP	-	Hypertext Pre-Processor

PNG	-	Portable Network Graphics
PT Number	-	Part Number
SPARC	-	Scalable Processor Architecture
VBScript	-	Visual Basic Script

LIST OF APPENDIX

NO	TITLE	PAGE
A	ATS Flow Chart	61
B	ATS Coding	74
C	GANTT Chart	133

CHAPTER I

INTRODUCTION

1.1 Overview

Chapter one of this report explains the objective, scope of asset tracking system and problem statement of the system that is currently used in the Laboratory of Faculty of Electronics and Computer Engineering (FKEKK). Chapter two will cover the research of the related field. Chapter three explains the methods used to develop this project. Chapter four is the result and discussion for this project. Lastly, a conclusion and recommendations will be discussed in the last chapter.

Studies had been done on a few systems which related to tracking system. One of the tracking systems is Asset Tracking System. The Asset Tracking System has been used by the WiseTrack Enterprise. WiseTrack Enterprise uses RFID to track and locate their assets. This model is not suitable to be used as the cost for RFID is relatively high which might not be afforded by certain organization. It is not necessary for a laboratory to spend in such a costly system.

1.2 Problem Statement

Universiti Teknikal Malaysia Melaka (UTeM) has been investing in costly assets such as computers, oscilloscopes, flat screen monitors, software, components and etc. to provide the best facilities to the students and staffs of the university. Different laboratory provides different types of equipments based on the requirement of the laboratory. Therefore, assets borrowing service is available between laboratories, lecturers and students. Due to the easy movement of the assets, the probability of asset misplacing, unreturned and assets lost has increased dramatically.

The system used by the laboratory management of FKEKK will be the main consideration. All of the transactions in the laboratory are based on manual documentation. The documents of each category are separated into different files such as reservation of equipment or reporting malfunction of the equipment. There are a lot of documents inside each file. The Laboratory Assistant face difficulties when they need to find information of a specific asset because they will need to manually search through the shelves or cabinets for the documents with the same PT Number or Serial Number as the asset that is labeled onto it. The PT Number or Serial Number is the same for both asset and Asset Document. Thus, it is time consuming for the Laboratory Assistant to find the specific data of the selected asset that might not even be where it is supposed to be.

1.3 Project Aims

This project proposes a web based tracking system to manage the assets more systematically as well as enhance the security of assets in the laboratory. Asset Tracking System should be able to store, detect, and track the asset in the laboratory with just a few clicks. Furthermore, it can reduce lost of assets in the laboratory.

The next objective is that the barcode reader must detect the bar code label accurately. The bar code reader should be able to decode the correct information based on the bar code label which is composed by a series of bars and spaces.

Different information will have different range of bars and spaces of the bar code label.

Thirdly, the system should be able to track the asset faster. Information of the specific asset should be identified when the bar code label on the asset is scanned using the bar code reader. It is important for the user to scan the bar code label on the asset in order to avoid slow data entry.

Finally, asset tracking system should be able to manage search and retrieval process of the asset. It is possible for the user to key in the PT Number or Serial Number of the asset to search the availability of the asset.

1.4 Scope

This section is described in three categories which is system operability, system functionality and user of this system.

1.4.1 System Operability

Asset Tracking System is specifically developed for the laboratory in FKEKK. This system is a web based system and it is suitable for multiple laboratories as it uses the Local Area Network (LAN) to connect within the University campus which means that the user will be able to log in to this system as long as they have the password within the University network. This means that the system can be viewed online through Internet Explorer or Mozilla Firefox browser. This system will be only used for FKEKK laboratory asset management only.

1.4.2 System Functionality

There are five main areas in this system which includes registering new equipment, searching, borrowing equipment, reporting on malfunction equipment and tracking user.

1.4.2.1 Registering New Equipment

All information of the assets in the laboratory is registered in the system by keying in the equipment name, PT number, date, serial number, and model of the equipment. For the equipment name, there will be a drop down menu for the user to choose if the equipment name has been registered before. If the name does not exist in the drop down menu, the user can enter it manually and the name entered will be shown for the next equipment registration.

1.4.2.2 Searching Equipment

Asset could be searched based on four criteria which is PT Number, Serial Number, Equipment Name or All. 'All' criteria will show the entire asset depending on the user status. If the user is an Admin, the system will display the entire equipment in the laboratory of FKEKK. If the user logs in as Lab Assistant, then it will only display the equipment in their own laboratory. For Admin, there is another option for them to search which is the laboratory. They can choose which laboratory's equipment they want to search for.

1.4.2.3 Borrowing Equipment

The borrowing equipment function allows the users to insert the asset borrowing details, recording and updating the assets location, status of the asset and reporting on assets.