UNIVERSITI TEKNIKAL MALAYSIA MELAKA

FACULTY OF ELECTRICAL ENGINEERING

PROJEK SARJANA MUDA

(PSM 2)

BEKU 4983

SECURING DOOR ACCESS AND MONITORING

Tang Wee Meng

BEKC

May 2009

"I hereby declared that I have read through this report entitle "securing door access and monitoring" and found that it has comply the partial fulfillment for awarding the degree of Bachelor of Electrical Engineering (Control, Instrumentation and Automation)"

Signature   :   _____

Supervisor"s Name :   Prof. Madya Dr. Ismadi Bugis

Date   :   13 May 2009

SECURING DOOR ACCESS AND MONITORING

TANG WEE MENG

**A report submitted in partial fulfillment of the requirements for the degree of
Bachelor In Electrical Engineering
(Control, Instrumentation and Automation)**

**Fakulti of Electrical Engineering
Universiti Teknikal Malaysia Melaka**

May 2009

I declare that this report entitle "securing door access and monitoring" is the result of my own research except as cited in the references. The report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature   :   _____

Name   :   TANG WEE MENG

Date   :   13 May 2009

To

my beloved parents

and

my lecturers and friends

ACKNOWLEDGEMENTS

The project wouldn't be a success without contributions and supports of many people. There are many people that I would like to thank for their supports, guidance and cooperation during the period of my final year project.

First of all, I would like to thank my project supervisor, Prof. Madya Dr. Ismadi Bugis for his guidance and teachings. He plays a significant role in guiding me to accomplish this project.

Next, I would also wish to express my gratitude to my parents for their support and their understanding.

Last but not least, a special thanks to all my friends that helped me in this project.

ABSTRACT

Access control is the ability to permit or deny the use of a particular resource by a particular entity. An accessing system is a commonly used modern system to control the access to certain resources. By using an access system, we can secure an access point without much supervision. There are varies types of access control system in the market now. They are biometric access system, card scanning access system, password access system and etc…

The primary target of this research project is to develop a fully automated access system that is auditable and traceable. A simple access control system will be model by using simple equipment such as computers, microcontrollers, RFID tags and readers, microphone and etc… A simple speech analysis system will be adapted into this project. This new function will increase the security level of this particular access control system. This research project will focus on the design of automatic access control system with the support of simple hardware arrangement and software development.

ABSTRAK

Kawalan akses adalah keupayaan membenarkan atau menafikan penggunaan satu perincian sumber oleh satu entiti tertentu. Sistem kawalan akses adalah satu sistem moden yang biasa digunakan untuk mengawal akses bagi sesuatu sumber. Dengan menggunakan sistem kawalan akses, kita dapat mengawal sesuatu titik akses tanpa penyeliaan yang banyak. Terdapat pelbagai jenis sistem kawalan akses yang telah diperkenalkan di dalam pasaran sekarang. Sebagai contohnya: sistem akses pengimbasan biometrik, sistem akses pengimbasan kad, sistem akses pkata laluan dan sebagainya…

Tujuan utama projek penyelidikan ini adalah merekabentuk satu system kawalan akses yang berfungsi secara automatic serta boleh diaudit dan dikesan. Satu model system kawalan akses akan dibina dengan menggunakan peralatan yang ringkas seperti komputer, mikropengawal, kad dan alat pembaca RFID, mikrofon dan lain-lain lagi… Satu fungsi analisis suara akan diadaptasikan ke dalam projek ini. Fungsi baru ini akan meningkatkan tahap sekuriti system kawalan akses ini. Projek penyelidikan ini akan bertumpu kepada reka bentuk sistem kawalan akses dengan sokongan perkakasan yang ringkas serta pembinaan perisian.

TABLE OF CONTENTS

LIST OF TABLE

LIST OF FIGURE

LIST OF SYSBOLS AND TERMS

AC	Alternating current
API	Application programming interface
CMOS	Complementary metal–oxide–semiconductor
DC	Direct current
EEPROM	Electrically Erasable Programmable read-only memory
FKE	Faculty of Electrical Engineering
GUI	Graphical User Interface
GPL	General Public License
IDE	Integrated development environment
I/O	Input / output
IP	Internet Protocol
LAN	Local Area Networks
LINQ	Language Integrated Query
MAC	Media Access Control
PIC	Peripheral Interface Controller
RAM	Random Access Memory
RDBMS	Relational database management system
REX	Request-to-exit
RF	Radio frequency
RFID	Radio-frequency identification
ROM	Read-only Memory
TCP	Transmission Control Protocol
TTL	Transistor–transistor logic
UART	Universal asynchronous receiver/transmitter
UDP	User Datagram Protocol
USB	Universal Serial Bus
UTeM	Universiti Teknikal Malaysia Melaka

WPF   Window Presentation Foundation

LISTS OF APPENDIES

CHAPTER 1

INTRODUCTION

1.1   Background

Along with the audacious rise in crime rate, property and personal security had become an important issue of the public. Social members are being aware of the importance and need for advancement in security. Due to this matter, many companies or organizations are making research and development in security as one of their top priorities.

Oxford dictionary (1999, p. 565) [3] defines secure as a transitive verb that means to make something safe or firm. In other words, a security system must be safe and firm without causing much annoying problems to protected subject. A successful security system must consist of three basic elements which are authentication, authorization and access control. Authentication is a process that verifies someone‟s identity. This usually involves a username and a password, but can include any other method of demonstrating identity, such as a smart card, retina scan, voice recognition, or fingerprints.

Authorization is a process that gives permission to an entity to gain a particular resource. This is usually determined by finding out whether that person is a part of a particular group, or has a particular level of security clearance. This is an important element that commonly being applied in the access control system database.

Finally, access control is the ability in controlling access to restricted resources. According to Wikipedia (2008) [13], Access control is "the ability to permit or deny the use of a particular resource by a particular entity." Access can be granted or denied based on a wide variety of criteria, such as the network address of the client, the time of day, the phase of the moon, or the browser which the visitor is using.

1.2   Problem Statement

Conventional locks and keys are the simplest and the cheapest way to secure a place. However, this method is not the best way to choose. In the eye of security experts, it is being considered as a very poor security method that has lots of disadvantages.

The disadvantages of conventional method are as follows:

a) Easiness to duplicate keys

Conventional keys can be duplicated easily by unauthorized user by sending the original keys to locksmith. A duplicated key can be made within less than a minute at a very cheap price. Unauthorized user can access to a building easily without permission of owner.

b) Lost of keys forced owner to change locks

Conventional keys and locks are custom made. Each lock comes with few sets of key only. If you lose a traditional key, the only way to maintain security is to change all the locks that it can access. This method will cost an amount of money if a ring of key is lost.

c) Key usage cannot be traced and logged

Conventional method is limited to securing sites only. Entry records are not being recorded when users accessing through any access point. It is not efficient when we are trying to monitor a site.

d) Inefficiency of providing user-level and time-of-day access control

Conventional keys always work, even when you don"t want them to. There are probably few legitimate reasons why a site needs to be accessed on Sundays at 3 a.m., but you can"t restrict access times with traditional keys.

e) Limitation in supporting remote access

If an unexpected event comes up and you want to allow access to a site immediately, you can"t if you use traditional physical locks.

f) Heavy key ring problem

With conventional keys, users will end up carrying large, heavy key rings in order to access multiple sites.

To overcome these problems, electronic access control system is being introduced. Electronic access control system is a modern system that commonly used to protect properties of owner. This new method had brought a revolution to the security method of man kind. It effectively reduces the managing cost of remote sites by lowered down the human supervision needed. There are varies types of access control system available in the market nowadays such as bar code system, magnetic stripe system, Wiegand card system, proximity card system, smart card system, pin system and etc…

The advantages of electronic access control system are as follows:

a) Electronic keys are difficult to duplicate

Duplicating electronic keys requires a much higher degree of sophistication. This makes an access system much more secure than it could ever be with physical keys.

b) Never have to change locks

An electronic user database means that you never have to change locks at your sites. If a keycard is lost, it can be immediately removed from the database and a new one can be issued. If an employee leaves the company, his or her access rights can be deleted within seconds. This greatly lowers the overall exposure to risk.

c) A single key for each user that grants access into multiple access points

With electronic access, a single key or access code grants user access to multiple access points that they are eligible to access. This significantly reduce users" burden by avoiding users to carry heavy key rings when trying to access multiple sites.

d) Flexible

Additional access can easily update remotely at database or directly at the access point during emergency.

e) Complete history log

Every entry to sites is logged/recorded for later review. This is an invaluable tool when investigating vandalism or theft.

f) Electronic control system is customized for each user

Electronic access control gives security system the ability to set user-level access rights all the way down to individual doors and times. This greatly minimizes exposure to risk of security system by granting nothing more access authority then is necessary.

1.3   Project Objective

The main aim of this project is to design and development a fully automated access control system that is secure, reliable, auditable and traceable.

The objectives of this project are as follows:
   a) To design a local controller unit by using simple equipments.
   b) To design a Graphical User Interface (GUI) for server unit and access points.
   c) To build a database for security system by implementing MySQL.

1.4   Project Scope

The focus of this project is on the software interfacing and circuit design of a security system, decision logarithm for access control and detail discussion regarding to this project. Aspects such as development of database and networking for access system will also covered in this report.

1.5   Methodology

```
                        ┌─────────────────┐
                        │      START       │
                        └─────────────────┘
                                 │
                                 ▼
                    ┌───────────────────────────┐
                    │   Information Gathering     │
                    │             &               │
                    │        Draft Design         │
                    └───────────────────────────┘
                                 │
                                 ▼
                    ┌───────────────────────────┐
                    │  Learn programming language: │
                    │                             │
                    │         C# & SQL            │
                    └───────────────────────────┘
                                 │
                                 ▼
                    ┌───────────────────────────┐
                    │      Learn to interface:     │
                    │                             │
                    │ Serial, Parallel, Ethernets Ports │
                    └───────────────────────────┘
                                 │
                                 ▼
                    ┌───────────────────────────┐
                    │     Acquiring Components     │
                    └───────────────────────────┘
                                 │
                                 ▼
                    ┌───────────────────────────┐
            ┌──────►│ Design Graphical User Interface │
            │       │             &               │
            │       │      Hardware Assembly       │
            │       └───────────────────────────┘
            │                    │
       NO   │                    ▼
            │                ◇ Testing ◇
            └────────────────   &   
                            Troubleshooting
                                 │ YES
                                 ▼
                    ┌───────────────────────────┐
                    │       Writing Report        │
                    └───────────────────────────┘
                                 │
                                 ▼
                        ┌─────────────────┐
                        │       END        │
                        └─────────────────┘
```
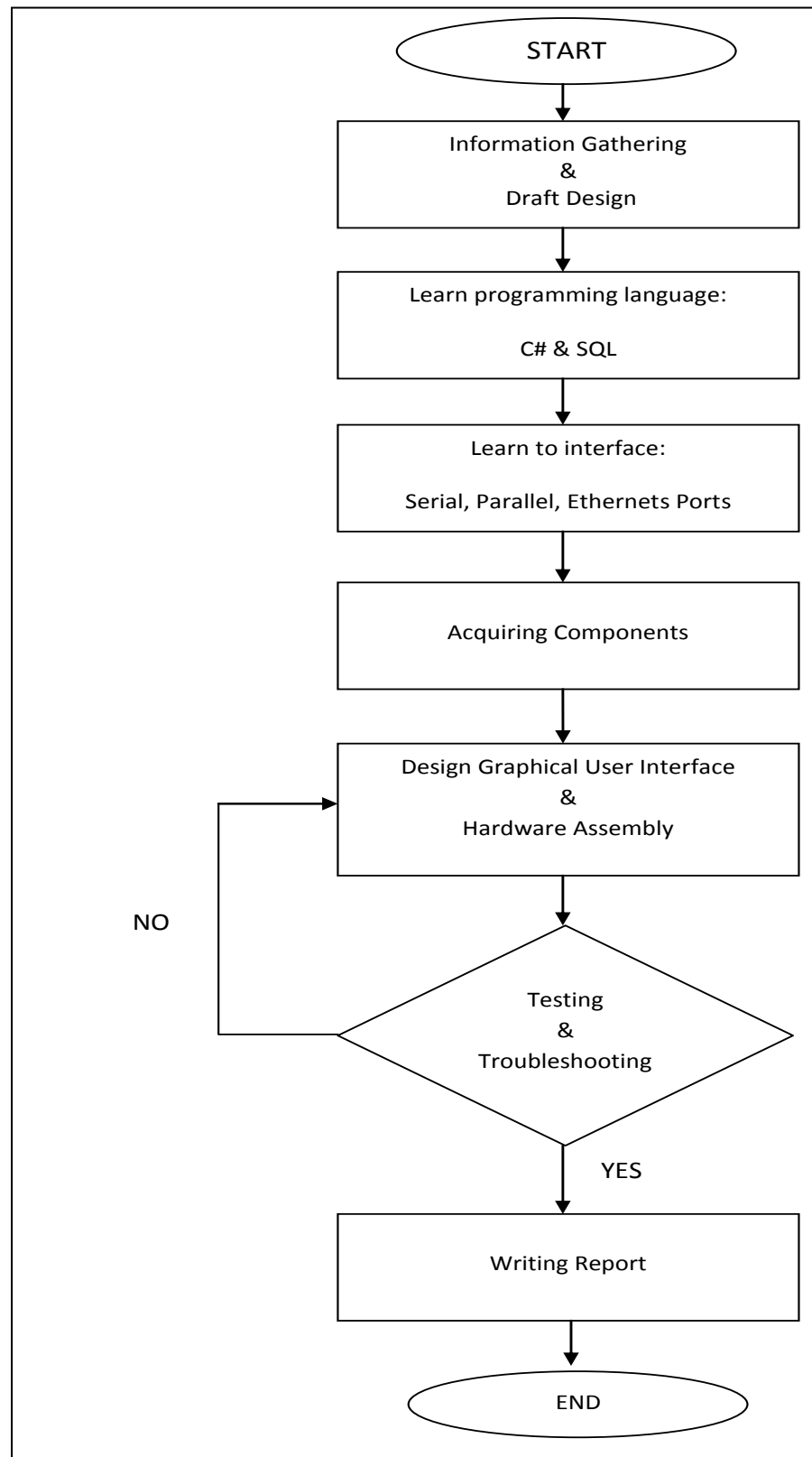
Figure 1.1: Methodology flow chart

1.6 Project Planning

Table 1.1: Gantt chart

PERANCANGAN PROJEK *PROJECT PLANNING*												
Senaraikan aktiviti-aktiviti utama bagi projek yang dicadangkan. Nyatakan jangka masa yang diperlukan bagi setiap aktiviti. *List major activities involved in the proposed project. Indicate duration of each activity to the related month(s).*												
	2008							**2009**				
Aktiviti Projek *Project's Activities*	J	J	A	S	O	N	D	J	F	M	A	M	J
1. Title Selection & Literature Review	▓												
2. Research of Information.	▓	▓											
3. Learning C# & SQL	▓	▓											
4. Interface PC with serial, parallel, Ethernets ports.		▓	▓										
5. Acquiring Hardware Components & Hardware Assemble.			▓										
6. Start design GUI			▓	▓	▓	▓	▓	▓					
7. Preparing PSM 1 report				▓	▓								
8. Troubleshooting & Data Analysis						▓	▓	▓	▓				
9. PSM 2 report											▓	▓	▓

1.7   Comparison with existing product

A comparison between an existing product in local market and proposed product has been conducted. A stand alone RFID door access control system had been selected as the subject.
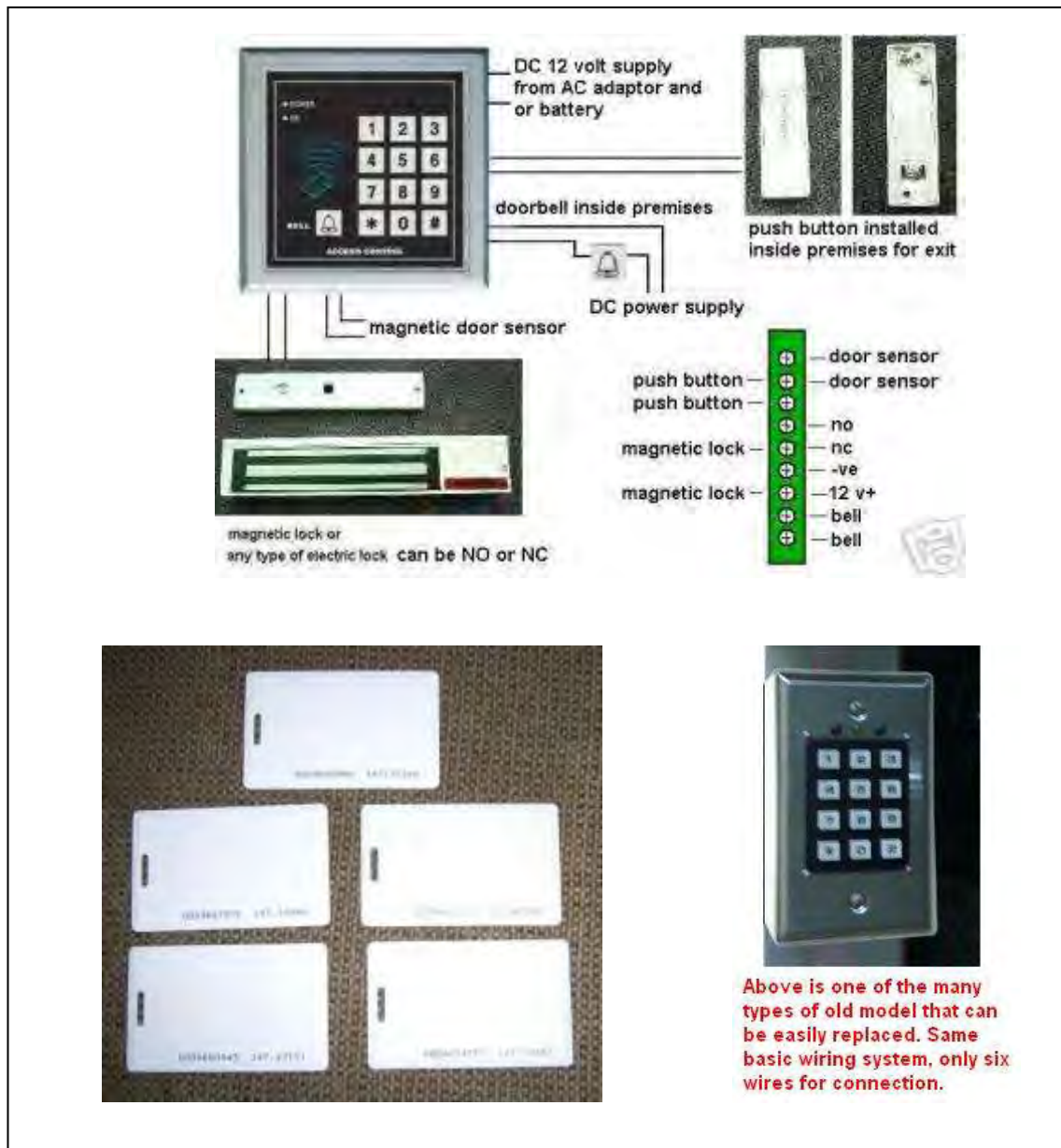

Figure 1.2: Stand alone RFID door access control system