



# **UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

## **RFID DOCUMENT CONTROLLED ROOM**

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Electronic Engineering Technology (Telecommunication) with Honors

by

**EZZAH EZZATIE BINTI ESMOM**

**B071110073**

**900221-14-5144**

**FACULTY OF ENGINEERING TECHNOLOGY**

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## BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

TAJUK: **RFID Document Controlled Room**

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## **APPROVAL**

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Electronic Engineering Technology (Telecommunication) (Hons.). The member of the supervisory is as follow:

.....

(Project Supervisor)

## **ABSTRAK**

“Radio Frequency Identification” (RFID) adalah satu teknologi baru yang menggabungkan penggunaan gandingan elektromagnet atau elektrostatik dalam bahagian radio frekuensi spektrum elektromagnet untuk secara unik mengenalpasti objek, haiwan, atau seseorang. Projek "RFID Document Controlled Room" dibangunkan dengan menggunakan sistem “Radio Frequency Identification” (RFID). Selain itu, tujuannya adalah untuk memperbaiki dan menggantikan cara semasa sistem pinjaman yang membolehkan peminjam mengambil dokumen itu tanpa kebenaran. Bilik dokumen terkini boleh menyebabkan kehilangan bagi dokumen itu seperti dicuri atau diletakkan pada tempat yang salah oleh peminjam. Selain itu, peminjam boleh dengan mudah mengambil dokumen tanpa kebenaran pemilik bilik dokumen dan ia mempunyai potensi untuk kehilangan disebabkan kecurian atau tercicir. Dalam usaha untuk memperbaiki sistem, projek ini dibangunkan dengan perisikan sistem bilik dokumen yang mengintegrasikan dengan sistem RFID dan pangkalan data yang menyimpan data mengenai maklumat tentang peminjam dan dokumen. Dalam projek ini, dokumen yang berada di dalam bilik dokumen akan selamat dengan kunci magnet yang hanya boleh dibuka dengan menggunakan tag RFID berdaftar. Selain itu, projek ini juga boleh mengetahui maklumat terperinci mengenai peminjam dan dokumen yang telah dipinjam. Dokumen tidak mudah hilang dengan kewujudan "RFID Document Controlled Room" dan dokumen itu boleh disimpan dengan selamat di dalam bilik dokumen ini.

## **ABSTRACT**

Radio Frequency Identification (RFID) is a new technology that incorporates the use of electromagnetic or electrostatic coupling in the radio frequency portion of the electromagnetic spectrum to uniquely identify the object, animal, or person. RFID tags are not an “improved bar code” as the proponents of the technology. This “RFID Document Controlled Room” project is developed by using Radio Frequency Identification (RFID) system. The purpose is to improve and replace the current way of borrowing system which can simply takes the document without permission. This project also to facilitate the centralization of borrower records within the document environment. The current document room can cause the losses of the document such as been stolen or misplaced by the borrower. Moreover, the borrower can easily take the document without the owner of the document room permission and it has potentially to loose due to stolen or misplace. In order to improve the system, this project is developed intelligence document room system that integrates with RFID system and database of borrower and document information. In this project, the document inside the document room will be secure by magnetic lock which only can unlock by using the RFID tags. Besides that, this project also knows the detail information about the borrower and the document had been borrowed. The document will not easily lose with this “RFID Document Controlled Room” and the document can kept safely in this document room.

## **DEDICATION**

A special feeling of gratitude to my beloved parents, siblings, friends who have encouraged, guided and inspired me throughout my journey of education. I also dedicate this dissertation to my supervisor who have supported me throughout this process. I will appreciate all they have done. All of you have been my best supporters.

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# TABLE OF CONTENT

Abstrak	i
Abstract	ii
Dedication	iii
Acknowledgement	iv
Table of Content	v
List of Tables	ix
List of Figures	x
List of Abbreviations, Symbols, Nomenclatures	xii

## CHAPTER 1: INTRODUCTION

1.1	Background	1
1.2	Problem Statement	3
1.3	Objectives	4
1.4	Project Scope	5
1.5	Project Significance	6

## CHAPTER 2: LITERATURE REVIEW

2.1	RFID System	7
2.1.1	History and Concept of RFID	9
2.1.2	Radio Wave	12

2.1.3	RFID Tags	13
2.1.3.1	Passive Tags	15
2.1.3.2	Semi-Passive Tags	17
2.1.3.3	Active Tags	17
2.1.4	RFID Reader	20
2.1.5	PIC Microcontroller	21
2.2	Programming Software	22
2.2.1	Microsoft Visual Basic	22

### **CHAPTER 3: METHODOLOGY**

3.1	Introduction	25
3.2	Block Diagram	26
3.3	Flowchart of Project Development	28
3.4	Hardware Development	29
3.4.1	RFID Device Description	29
3.4.1.1	RFID Tag	29
3.4.1.2	RFID Reader	31
3.4.2	Circuit	32
3.4.2.1	PIC 16F877A Microcontroller	32
3.4.2.2	Voltage Regulator Module	34
3.4.2.3	Relay	36
3.4.2.4	Push Pull Solenoid	37

3.4.2.5	Magnetic Sensor	38
3.4.2.6	Light Emitting Diode (LED)	40
3.6	Software Design and Development	41
3.6.1	Microsoft Office Access	41
3.6.2	Visual Basic	42
3.6.3	Proteus 8 Software	44

#### **CHAPTER 4: RESULT & DISCUSSION**

4.1	Introduction	46
4.2	Overall Result	47

#### **CHAPTER 5: CONCLUSION & FUTURE WORK**

5.1	Introduction	57
5.2	Conclusion	57
5.3	Future Work	58

<b>REFERENCES</b>	<b>59</b>
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#### **APPENDICES**

A – Coding for PIC16f877A

B – Coding for Visual Basic

## LIST OF TABLES

2.1	Comparison of RFID and Other RFID Technologies	9
2.2	Differences Capabilities of Passive Tags	16
2.3	Primary Differences between Passive and Active RFID Tags	19

# LIST OF FIGURES

2.1	Basic Concepts of RFID	11
2.2	Data Carried By Carrier Waves To and From the RFID Tags	13
2.3	Differences Types of Tags in Term of Distance	14
2.4	Semi-Passive Tags	17
3.1	Block Diagram	26
3.2	Flowchart of Project Development	28
3.3	RFID Tags	30
3.4	RFID Reader	31
3.5	PIC 16F877A	33
3.6	Flowchart of PIC 16F877A	34
3.7	Voltage Regulator Module	35
3.8	LM 7805	35
3.9	Operation of Relay	37
3.10	Push Pull Solenoid	38
3.11	Magnetic Sensor	39
3.12	Light Emitting Diode (LED)	40
3.13	Window for Creating New Project	42
3.14	Flowchart for Software Development	43

3.15	Proteus 8 Professional Software	44
3.16	Proteus Schematic Capture	45
4.1	The Process of Borrowing the Document	47
4.2	The Process of Returning the Document	48
4.3	User Registration by the Owner	49
4.4	Document Addition by the Owner	50
4.5	The Selection of Com Port to Connect with RFID System	51
4.6	Borrower touch the RFID tag on the RFID Reader	52
4.7	Borrower touch the RFID Tag of the document on the RFID Reader	53
4.8	The details about the borrower and document kept safely	54
4.9	Other registered borrower returning the document by others	55
4.10	Borrow Return Record	56

## **LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE**

RFID	-	Radio Frequency Identification
IC	-	Identification Card
ROM	-	Read-Only Memory
RAM	-	Random Access Memory
EEPROM	-	Electrically Erasable Programmable Read Only Memory
CMOS	-	Complementary metal oxide semiconductor
EAS	-	Electronic Article Surveillance
LF	-	Low Frequency
HF	-	High Frequency
UHF	-	Ultra High Frequency
MBS	-	Modulated Backscatter
PIC	-	Programmable Interface Controller
VB	-	Visual Basic
IDE	-	Integrated Development Environment
RAD	-	Rapid Application Development
GUI	-	Graphical User Interface
COM	-	Component Object Model

LED	-	Light Emitting Diode
DC	-	Direct Current
AC	-	Alternate Current
DBMS	-	Database Management System
PCB	-	Printed Circuit Board



# CHAPTER 1

## INTRODUCTION

### 1.1 Background

Radio Frequency Identification (RFID) is a new technology that incorporates the use of electromagnetic or electrostatic coupling in the radio frequency portion of the electromagnetic spectrum to uniquely identify the object, animal, or person. RFID tags are not an “improved bar code” as the proponents of the technology. An RFID system consists of three components which is the tag (transponder), the reader (interrogator) and the host computer (controller).

The reader communicates with tags in its wireless range and collects information about the object to which tags are attached. The antenna uses radio frequency waves to transmit a signal that activates the transponder. When it is activated, the tag transmits the data back to the antenna. RFID technology differs from bar codes. RFID can read the tag using RF, meaning that the RFID reader can be read from a distance, right through our clothes, wallet, backpack or purse.

Besides that, the RFID tag consists of unique ID for each tag. The technology used in RFID has been around since early 1920s. In our country, this technology already been used for several years in certain place such as in Highway through 'Touch N Go' and our government also apply this technology in identification card (IC). Some places, they prefer to used barcode which is cheaper than RFID. In few years later, there is not impossible if RFID will replace the barcode system in daily life.

"RFID Document Controlled Room" is a project about the system for document control for document room which makes both parties easy to manage. The project implementation is basically involving RFID system which contain the programmable RFID tag. The owner will provide the programmed RFID tag to the borrower which can be use in order to borrow the documents.

Therefore, this project could assist the owner to minimize the documents losses. Even though, the owner is not available in the room, the borrower still can borrow the documents by touch the RFID reader using RFID tags. This is because the owner can monitor the documents files through the personal computer which store in the web-based database system. The application of RFID system result is more efficient and compliment for both party.

Moreover, all documents can be stored properly and safely through this system. All the information only can be seen by the owner of the document room. In addition, the borrower can only borrow one document at one time.

Lastly, this project helps the owner to store the documents safely. So that, the owner would identify the borrower and time when the document has been borrowed. All the

information stored has been compiled and organized effective and easy to read by the owner.

The implementation of this project consists of RFID system and database programming. Radio Frequency Identification (RFID) is a new generation of auto identification and data collection technology which helps to automate business processes and allows identification of large number of tagged objects like books by using radio waves. RFID system has three components in the system which is transponder or tag, reader and computer software.

## **1.2 Problem Statement**

“RFID Document Controlled Room” project is proposed to improved the method that not efficient when borrow the document from the document room. For this project implementation, it will make document room or procedure to borrow the document easier and efficiently for both parties.

For current document room the borrowing system is not efficient where the borrower just simply takes the documents without owner’s permission. This method will take a high risk for the document losses or being stolen by other people. The document maybe in term of paper sheet and contain important information of owner. Besides that, this method is inefficient and unsystematic which will lead several consequences to owner of document room itself. The documents have potentially lost such as stolen or misplace by the borrower or owner of the document room.

Therefore, this system is applied with an RFID system and database for improving the way to store and let be borrowed by others. This system not only will benefit to owner of the document room, but also for the borrower that can easily reach to the document that they desired. Moreover, this system will help the owner of the document room to know where the document at. Rather than that, the document will not easily lose.

### **1.3 Objectives**

There are two main objectives in pursuing the accomplishment of this project:

- i. To develop intelligence document room system that integrates with RFID system and display the person who borrowed the document.  
The idea is to build document room system to make the system easier and efficiently. Therefore, this idea needs to build database that integrate with the RFID system and will display the person who borrowed the document. Moreover, database also need to capture and record the borrower information.
- ii. To assists a person in monitoring and managing the document by using their own Personal Computer.

## 1.4 Project Scope

The core of this project is the RFID systems synchronize with the software interface and also through the database of borrower information.

- i. Use appropriate RFID tag and reader for the project application.  
There are several types of RFID reader and tag sold in the market. The frequencies of the RFID itself need to be considered in choosing correctly so that both parts can function.
- ii. Design and implement a system in document room using RFID system.  
The tag or the borrower ID card and document tag will scan to the RFID reader. The RFID reader will use to detect the borrower ID card code and document code. The code will be use to compare with database and the information in database will display and store in the software that used.
- iii. Database contains only general information.  
Only general or important information of the borrower are included in the database. The general information stored in the database is the information that include in the smart card of the borrower.

## **1.5 Project Significance**

This project will be a significant endeavor in promoting good system of document room that makes life greater and better. This project will also be beneficial to the owner of the document room and borrower in borrowing system where the owner will know the detail information of the borrower and document that have been borrowed even the owner was not at their document room. Besides that, the documents will not easily loss with this RFID Document Controlled Room.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 RFID System**

RFID stands for Radio frequency identification is a generic term that is used to describe a system that transmits the identity in the form of unique serial number of an object or person wirelessly, using radio waves. RFID is one of the most fundamental technologies that enable wireless data transmission. Although it has been known for a long time, has not been very often used in industry. This is because it was expensive and there is no standardization among the manufacturing companies. It took a long time to be widely utilized. RFID is grouped under the broad category of automatic identification technologies. The intentions of the utilization of the RFID technology have been encouraged in the many ways. For example, by the use of RFID technology, manually achieved workloads will be decreased considerably. RFID technology is universal, useful and efficient. RFID technology increases company efficiency and provides advantages on both company and client-wise. RFID technology is much more secure compared to other networks. (Pala, Z.; Inanc, N., 2007)

The “RFID Document Controlled Room” project involve in personal environment especially focus in fulfill the person to manage and monitor the document room

efficiently. RFID technology and programming information will help the system that manages to facilitate every document is made by programmed a tag for document and borrower so that all the details about document and borrower could be stored through the tag.

RFID system consists of 3 basic components. The basic components are tag, reader and the computer and software for instruction and overall document room system. There are several methods of identification, but the most common is to store a serial number that identifies a person or object, and perhaps other information, on a microchip that is attached to an antenna which is called as RFID tag. The antenna enables the chip to transmit the identification information to a reader. The reader converts the radio waves reflected back from the RFID tag into digital information that can be passed on to computers that can make use of it. (Islam, 2010)

In displaying the tag information, a programmed database also needs to be created. Interface in the database programming is important because it is the format of the details which need to be displayed through the database window. It is displaying the arrangement of the borrower details and all document matters through the database. This chapter will cover on the concept of the project. This project will focus on RFID method for implementing it on document room system.

Compared to other technologies, the RFID has great advantages regarding several factors respectively as shown in figure below which makes it the suitable choice for this project.