



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

PARENT ACCESS USING RADIO FREQUENCY IDENTIFICATION (RFID) SMARTCARD

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

by

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DECLARATION

I hereby, declared this proposal project entitled “Parent Access using Radio Frequency Identification (RFID) Smartcard” is the result of my own project research excepted in references.

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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 on Electronic Engineering Technology Telecommunication (Hons.). The members of the supervisory committee are as follow:

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ABSTRACT

“Radio Frequency Identification (RFID) is the one of the technology that uses electromagnetic and electrostatic couple in the radio frequency portion to transmit uniquely identification wirelessly. Functionality of RFID is more powerful then barcode system. Nowadays, many organizations are warming up of using RFID to conduct more efficient and effective management system, business process, data application and it also saving cost. Through the RFID technology information, the system presents the RFID label information with unique identification for user to achieve object tracking purpose. In other hand, RFID technology may read the information stored in a tag with a RFID reader in a few meter. RFID technology has a great potential in “Parent Access using Radio Frequency Identification (RFID) Smartcard” to improve student safety, significant reduce cost and management service. This system is great in use at hostel management to control the record of incoming and outgoing student. Every parent of the student will provide with unique identification tags (smartcard) that will make them access to take their children staying in hotel. This system will eliminate manually book record and help user to use paperless environment. The integration of RFID technology authentication with the data base record will directly eliminate manually book record and easy to recall the data.

ABSTRAK

“*Radio Frequency Identification (RFID)*” merupakan teknologi yang menggunakan elektromagnetik dan elektrostatik di bahagian frekuensi radio untuk menghantar pengenalan unik tanpa wayar. Fungsi *RFID* adalah lebih baik berbanding sistem kod bar. Pada masa kini, kebanyakan organisasi-organisasi menggunakan teknologi *RFID* bagi menjalankan sistem pengurusan yang lebih cekap dan berkesan, proses peniagaan, aplikasi data dan dapat menjimatkan kos pengurusan melalui teknologi *RFID*. Sistem ini dapat membentangkan maklumat daripada pengenalan unik bagi mencapai tujuan pengesanan sesuatu objek. Selain itu, teknologi *RFID* boleh membaca maklumat yang disimpan di dalam tag dengan pembaca pada jarak beberapa meter. Teknologi *RFID* mempunyai potensi yang besar dalam “*Parent Access using Radio Frequency Identification (RFID) Smartcard*” bagi meningkatkan keselamatan pelajar, mengurangkan kos pengurusan, dan meningkatkan perkhidmatan pengurusan. Sistem ini dapat di gunakan oleh pengurusan asrama bagi mengawal pelajar keluar masuk dan pulang ke kampung halaman. Setiap ibu bapa akan di berikan pengenalan unik (kad pintar) yang dapat membolehkan mereka mengakses untuk mengambil anak mereka yang tinggal di sekolah berasrama. Sistem ini dapat menghapuskan rekod buku secara manual dan membantu pengguna kepada penggunaan persekitaran tanpa kertas. Intergrasi pengesanan teknologi *RFID* dengan rekod pengkalan data secara langsung akan menghapuskn penggunaan buku rekod secara manual dan mudah untuk menyemak kembali data.

DEDICATIONS

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LIST OF ABBREVIATION, SYMBOLS AND NOMENCLATURE

RFID	-	Radio Frequency Identification
ATM	-	Automatic Teller Machine
LF	-	Low Frequency
HF	-	High Frequency
UHF	-	Ultra-High Frequency
AIDC	-	Automatic Identification and Capture
GPS	-	Global Position Satellite
ITS	-	Intelligent Transportation System
RF	-	Radio Frequency
Hz	-	Hertz
CPU	-	Central Processing Unit
EEPROM	-	Electrically Erasable Programmable Read-Only Memory
RAM	-	Random Access Memory
VBA	-	Visual Basic Application
BASIC	-	Beginners All-purpose Symbolic Instruction Code
PCB	-	Printed Circuit Board
IDE	-	Integrated Development Environment
SPICE	-	Simulation Program with Integrated Circuit Emphasis
PIC	-	Programmable Interface Controller
LED	-	Light Emitting Diode
TTL	-	Transistor-Transistor Logic
IFF	-	Identification Friend of Foe
GUI	-	Graphic user Interface
UART	-	Universal Asynchronous Receiver/Transmitter
USART	-	Universal Synchronous/Asynchronous Receiver/Transmitter

DTR	-	Data terminal Ready
DSR	-	Date Set Ready
CTS	-	Clear To Send
RX	-	Receiver
TX	-	Transmitter
RTS	-	Request To Send
IC	-	Integrated Circuit
VDD	-	Voltage Drain Drain
VSS	-	Voltage Source Source
RS	-	Recommended Standard

CHAPTER 1

INTRODUCTION

1.1 Background

Radio Frequency Identification (RFID) is the wireless use of electromagnetic fields or electrostatic coupling in a radio frequency portion to transfer data. RFID technology has been available for more than fifty years. The purpose of RFID is automatically identifying and tracking tags attached to objects. An RFID system consists of three main components which is tag as a transponder, the reader and the computer host as a controller. The acronym refers to small electronic device that consist of a small chip and antenna to transmit and receiver. RFID card is a device contain a coil and a chip while placed on a RFID reader the card gets induced power from the reader and then the data present in the card is serially transmitted.

The RFID device serves the same purpose as a barcode or a magnetic strip on the back of a credit card or ATM card. It also provides a unique identifier for that object. Thus, the barcode or magnetic strip must be scanned to get the information while the RFID device must be scanned to retrieve the identifying information. One of the key differences between RFID and barcode technology is RFID eliminates the need for line of sight reading that bar coding depends on. RFID also scanning can be done at greater distances than barcode scanning because of the high frequency RFID system offer more transmission range.

The main purpose of this project “Parent Access Using Radio Frequency Identification (RFID) Smartcard” is to record the attendance and time the parents take their children live in the hostel using RFID smartcard tag. Each parent are providing with authorize smartcard tag to swipe over the reader to record their attendance. By using RFID reader and RFID smartcard, it allows parents to access at the security guard to pick up their child. In hostel, time is wasted in “book record” for recorded time student back to their hometown as it is done manually. In this

system, authorize parent is given an RFID smartcard tag. This tag contains an integrated built in circuit that is used for storing, processing information through modulating and demodulating of the radio frequency signal that is being transmitted to the RFID reader.

Thus, the data store in this card is referring as the identification of the parent and their child. Once the parent places the smartcard in front of the RFID reader, it reads the data and verifies it with the data store in the data base. If the data matches, then it displays a message on the monitor and display recorded data which is time the parents pick up their child. If parents are unable to take their children, warden of the hostel will access behalf of their parents. The database will record the names of the students.

1.2 Problem Statement

“Parent Access Using Radio Frequency Identification (RFID) Smartcard” propose to improve the current method they are not secure and efficient when the parent pick up their children live in the hostel. The “book record” are the current method were used mostly in schools are not secure because the student does not guarantee taken by their parents. This method high risk and very difficult to the hostel and school management control the safety of the students return to their hometowns.

Thus, it also wastes a time to record the data manually will cause errors to occur and also difficult to recall data back. Therefore, this project implement create a systematic record will apply with RFID technology and database to improve the manually book record. This system not only gives benefit to the school management, but is also benefit to the parent.

1.3 Objective

In this project, discuss about the improvement of book record system and the main objectives of this project are;

- i. to develop an intelligent system record with RFID and database system to be able parent access to take their children.
- ii. to facilitate the hostel management to check back time record students return home once the parents access the smartcard to the RFID reader and ensure that students are taken by their parents with the smartcard access.
- iii. to study interface between RFID system, Microsoft Access and Visual Basic

1.4 Project Scope

The main archive of this project is developing a smart parent access using RFID technology. There are several scope will be covered in this project, which are;

- i. to appropriate RFID smartcard tag and RFID reader for this application. There are several types of RFID reader and smartcard tag sold in the market with the different criteria such as frequency to be considered, type of smart tags either passive tag, semi-passive or active and type of RFID reader.
- ii. to design and implement a database system to record the data. Thus, Microsoft access use to develop the information in database and it will be display and store by using interface on Visual Basic. The information includes basic information of student and their parent, time record when the parent taken their children once the smartcard access to the RFID reader.
- iii. to implement the system in parents access using RFID system. The system will record the attendance and time the parents take their children. Each parent are

provide with authorize smartcard tag to swipe over the reader to record their attendance and time.

1.5 Project Significance

It essential implement the “Parent Access Using Radio Frequency Identification (RFID) Smartcard” that could enhance a higher level of security for student during back to their hometown. The integration of RFID authentication with the database record will directly eliminate manually book record. Among the significance of this problem are;

- i. to replace book record system into computerized that integrated with RFID technology.
- ii. to store and record all information relate with the time and attendance management in a database.
- iii. to monitor time student return and back to their home town and more secure.
- iv. to provide irrefutable parent access for time and attendance during take their child.

1.6 Project Overview

“Parent Access Using Radio Frequency Identification (RFID) Smartcard” project are combination of 5 chapters that contains and elaborates specific topic such as Introduction, Literature Review, Methodology, Result and Discussion and Conclusion.

Chapter 1 basically is an introduction of the project. In this chapter it discusses is all about background of the project, problem statement, objective, scope of the project and project significance. The overall overview of the entire project report will discuss in this chapter.

Chapter 2 covered of the literature review for the development “Parent Access Using Radio Frequency Identification (RFID) Smartcard” system. The related project will be describe generally in this chapter like history of RFID, application of RFID, type of tag and reader and also software and hardware were used. Reference also one of the important part included of this report.

Chapter 3 focused on the methodology of the project. This chapter include project planning, project implement, Gantt chart and flow chart, circuit design, and the entire software and hardware uses will discuss briefly.

Chapter 4 will be discussed about the overall result of project and hardware development and simulation.

Chapter 5 discusses the conclusion and further development of the project.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In this section, we are discussing about the overview history of RFID Technology. There are two main components included in RFID technology which are RFID reader and RFID tag such as passive, active or semi-active and etc. Following by focusing on RFID application nowadays such as asset tracking, manufacturing, payment system, medical and etc. Thus, PIC microcontroller was highlighted in this report as a main controller of the project. It is also included of programming software which are MPLAB, Proteus, Microsoft Access and Visual Basic. In addition, overview of the manually book record of parent attending also covered in this chapter.

2.2 Application of RFID

RFID has applications in various industries and can be applied in many fields. RFID applications help in tracking products in the supply chain and during the manufacturing process. RFID is one of the most technologies being adopted by both industry and academic world. Different kinds of frequency RFID tags have different applications such as LF (Low-frequency) RFID tags are model for scanning objects at close range and UHF (Ultra-high frequency) RFID tags are best for scanning boxes of goods and etc.

2.2.1 RFID Application in Hospitals

According to the Atsushi K. is Director of Healthcare Business a wireless health strategy consultancy based in Tokyo on RFID tops the chart in medicine with vastly increased safety and efficiency, he has a finger on the pulse of Japan's healthcare industry, where wireless solutions have flourished since the 1990s. RFID technology has the potential to change healthcare, but the kind of wireless technology that could make the greatest impact. RFID has not been widely adopted. RFID is not just key to making better use of physical assets, it can have a substantial impact on patient safety. It also has the potential to produce a phenomenal return on investment, but high costs are still proving to be a significant barrier to entry given the state of the economy.

Harland S. has put together some of the best RFID tagging solutions to help hospitals improve asset visibility with direct benefits that can improve patient safety. Active and Passive RFID Technologies can be deployed to provide acute hospitals with a viable solution to improve the visibility and utilization of a number of valuable assets. RFID Baby Tagging Systems is the one of the safety and security for mothers and babies on Maternity Wards. A combination of technology wrapped up in a miniature Radio Frequency Tag protecting new born babies.



Figure 2.1: Baby Tagging System using RFID

According to Huang Y.C., Chu C. P., Lin Y.S., and Kuo C. H., on their case study on RFID application in Hospital for Emergency Department in Department of Computer Science and Information Engineering, Tainan Taiwan. RFID is much more powerful than barcode system. Health care industry is highly valued throughout the world applying the technology in healthcare industry to improve patient health care.

RFID in medical application is also being enthusiastically studied now. RFID application test in hospital have been proposed by many factor such as medical control patient contact history, patient identification equipment and apparatus tracking, injection management, physician order monitoring, medical malpractice prevention, blood bag quality control and also used in operation room. The emergency room is the most complicated and busiest place in a hospital. It is the center for treating patient with accident injury and acute sickness of difference levels of medical.

A patient goes missing and leaves registration record but no clinical record is a frequency scenario in an emergency room. Thus, RFID application in medical treatment process for patient in the emergency room, including alert of excessively queue, patient location tracking and alert of excessively stay. RFID for emergency department application that not only solve patient excessively waiting long time, but also allow the hospital management to monitor the service for the patients provided by the medical personnel at any given time and reduce patient complain.

2.2.2 Using Passive RFID for Document Tracking Applications

Group of Alien Technology (2008) was study of delivering process improvements and cost savings through automatic asset tracking. Passive RFID can be used to track high value documents effortlessly and automatically. In legal, financial services and life sciences firms locating and tracking documents is resource intensive. Manual methods are labor intensive and subject to error. It also make misplaced files are common and with highly and valued highly compensated employees. Thus, introducing intrusive methods of document tracking only serve to reduce productivity and slow the organization's workflow. Passive RFID applications can meet the challenges of tracking documents and other paper based assets and also make automatic capture eliminates human error, improving accuracy and security.