

RFID EMPLOYEE TRACKER SYSTEM

SITI ZUBAIRA BT MAMAT

This report is submitted in partial fulfillment of requirement for the award of Bachelor of Electronic Engineering (Computer Engineering) With Honors

Faculty of Electronic and Computer Engineering
Universiti Teknikal Malaysia Melaka

April 2011



UNIVERSITI TEKNIKAL MALAYSIA MELAKA
FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER

BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II

Tajuk Projek : RFID EMPLOYEE TRACKER SYSTEM

Sesi Pengajian :

| | | | | |
|---|---|---|---|---|
| 1 | 0 | 1 | 1 | 2 |
|---|---|---|---|---|

Saya SITI ZUBAIRA BT MAMAT

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 (\checkmark) :

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)

ALAMAT TETAP:

32 TAMAN TASIK,
22300 KUALA BESUT,
TERENGGANU.

Tarikh: 29 April 2011

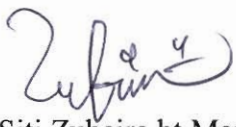
(COP DAN TANDATANGAN PENYELIA)

NOOR MAZLINA BT MAHMOD
Pensyarah


Fakulti Kejuruteraan Elektronik Dan Kejuruteraan Komputer
Universiti Teknikal Malaysia Melaka (UTeM)
Karung Berkunci No 1752
Pejabat Pos Durian Tunggal
76109 Durian Tunggal, Melaka

Tarikh: 29 April 2011

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

Signature: 
Author : Siti Zubaira bt Mamat
Date : 29 April 2011

“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 Degree of Electronic Engineering (Computer Engineering) with Honors.”

Signature : 
Supervisor Name : Mrs. Noor Mazlina Binti Mahmod
Date : 29 April 2011

This project and research work is dedicated to my beloved mother for their devoted caring throughout my life, my sibling also my friends for their encouragement and love.

ACKNOWLEDGEMENT

First of all, I would like to express my sincere thanks and indebted to Mrs. Noor Mazlina Mahmud as my supervisor, thank you very much for accept me as one of your PSM student, help and guidance me a lot during completing the project.

I would like to express my special thanks and a very down to earth and full with sense of humor-great experience to the Faculty of Electronic Engineering and Computer Engineering (FKEKK) on putting into practice the Final Year Project as a compulsory chore for the final year students prior to complete their course.

Indirectly, this relate prepare the students technically to facilitate the world of electronics all over their working verve. Not forgetting Universiti Teknikal Malaysia Melaka for their contribution on the facilities and also equipment as well as creating a platform to the final year student to achieve and carry out their projects in durable manner.

I also wish to extend heartfelt thanks to my friends Mohd Faizan, Siti Hajar, my entire classmate and also my senior Nur Hafizah for your help and guidance during my project. Finally, I wish to thank to my lovely mother and my siblings for their support, I love you so much and also to my lectures and friends for their encouragement, strength and support.

Thank you.

ABSTRACT

Projek ini bertujuan membangunkan sistem RFID pelacak untuk memantau kehadiran dan lokasi setiap pekerja di tempat kerja yang penting bagi organisasi. Sistem ini diharapkan dapat membantu organisasi untuk meningkatkan prestasi persekitaran kerja antara semua kakitangan organisasi. Setiap kakitangan akan diberikan dengan ID pintar dengan tag RFID tertanam. Lokasi tertentu di tempat kerja akan meletakkan pembaca RFID untuk mencari kakitangan. Ini akan memastikan pentadbiran, pengurus atau bos untuk memantau kehadiran kakitangan mereka dan untuk mencari kakitangan mereka jika mereka memerlukan kakitangan akan. Pada akhir setiap hari sistem akan menghasilkan laporan kehadiran dari semua kakitangan dalam organisasi untuk nota. Biasanya pekerja cuba untuk datang lewat ke tempat kerja dan lokasi kakitangan tidak dapat dikesan. Lokasi kakitangan tidak dikesan ketika pekerja berada di luar dari tempat kerja dan ini memakan masa apabila pentadbiran, pengurus atau bos untuk mencari kakitangan mereka dengan kadar segera. Projek ini dilaksanakan adalah untuk memastikan waktu keluar masuk, kehadiran dan meninggalkan disamping untuk memastikan lokasi kakitangan samada mereka berada dalam atau diluar dari tempat kerja. Sistem ini juga mengandungi tiga unsur utama untuk memastikan bahawa projek ini selesai dengan iaitu melaksanakan dan penyebaran peranti (Pekakasan dan perisian) sepaeti pembaca RFID, kad RFID, antena RFID, antaramuka dan database. Kesimpulannya projek ini adalah untuk membina sistem yang berkesan yang secara automatik merakam dan memantau kehadiran pekerja dan berkesan bagi sebuah organisasi dan untuk memudahkan pentadbiran, pengurus atau bos kemudahan untuk mengakses kehadiran pekerja serta mengesan lokasi pekerja dengan kadar segera.

ABSTRACT

This project is aimed at developing an RFID tracker system to monitor the attendance and the location of every employee in the workplace that of importance to an organization. The system is hoped to help organization to increase the performance of the working environment among all the staff of the organization. Every staff will be provided with a smart ID with embedded RFID tag. Certain location at the workplace will be put an RFID reader to locate the staffs. This will be ease the administration, manager or bosses to monitor the attendance of their staff and to find their staff if they need the staff immediately. The system will generate the daily attendance report of all the staff in the organization for record. Arise nowadays is the employee try to skip their work during work hour and the staff location undetected. The location of the staff not be detected when employee go out from workplace and also waste the time when the administration, manager or bosses want their staff immediately. This project implemented is to ensure the employee time in or time out, attendance and leave effectively and to ensure the location of the staff whether the staff is in or out of workplace. This RFID Employee Tracker system contains three main elements in order to ensure that this project completes successfully, that is designing part, implementing part and deployment the devices (hardware and software); which are RFID reader, RFID tags, RFID antenna, Graphical User Interface (GUI) and a database. In conclusion at the end is to build an effective system that automatically record and update attendance of the employee n effective attendance for an organization and to make the administration, manager or bosses to access the attendance of employee and easy to track the employee location in required immediately.

TABLE OF CONTENTS

| CHAPTER | TITLE | PAGE |
|----------|---------------------------------|------|
| | PROJECT TITLE | i |
| | REPORT VERIFICATION STATUS FORM | ii |
| | DECLARATION | iii |
| | SUPERVISOR DECLARATION | iv |
| | DEDICATION | v |
| | ACKNOWLEDGEMENT | vi |
| | ABSTRAK | vii |
| | ABSTRACT | viii |
| | TABLE OF CONTENTS | ix |
| | LIST OF FIGURES | xiii |
| | ABBREVIATION | xvi |
| | | |
| I | INTRODUCTION | |
| 1.1 | Introduction of Project | 1 |
| 1.2 | Objectives of Projects | 2 |
| 1.3 | Problem Statements | 2 |
| 1.4 | Scope of project | 2 |
| | 1.4.1 User | 3 |
| | 1.4.2 System functionality | 3 |
| | 1.4.3 System operability | 4 |
| | 1.4.4 Development tool | 4 |

| | | |
|-----------|--|----|
| 1.5 | Methodology | 5 |
| | 1.5.1 Data collection/background study | 6 |
| | 1.5.2 Data analysis | 6 |
| | 1.5.3 Design | 6 |
| | 1.5.4 Implementation | 6 |
| | 1.5.5 Testing | 7 |
| | 1.5.6 Deployment | 7 |
| | 1.5.7 Maintenance | 8 |
| II | LITERATURE REVIEW | |
| 2.0 | Introduction of RFID | 9 |
| 2.1 | History of RFID | 9 |
| 2.2 | Basic Concept | 10 |
| | 2.2.1 Definitions | 11 |
| | 2.2.2 Modulation | 12 |
| | 2.2.3 System Handshake | 13 |
| | 2.2.4 Backscatter Modulation | 13 |
| 2.3 | RFID Components | 15 |
| | 2.3.1.1 Type of tags | 16 |
| | 2.3.1.2 The Basics Passive RFID Tags | 17 |
| | 2.3.1.3 Power supply of tag | 19 |
| | 2.3.2 Readers and Antennas | 19 |
| | 2.3.3 Middleware | 20 |
| 2.4 | Microsoft Access | 21 |
| 2.5 | Visual Basic | 23 |
| | 2.5.1 Language Features | 25 |
| 2.6 | RFID versus Barcode | 26 |
| 2.7 | Existing RFID tracking system | 28 |
| | 2.7.1 RFID door entry | 28 |

| | | |
|------------|--|----|
| | 2.7.2 RFID Pallets | 29 |
| 2.8 | RFID Traceability | 31 |
| III | METHODOLOGY | |
| 3.0 | Project Outline Review | 32 |
| 3.1 | Data Collection | 35 |
| 3.2 | Data Analysis | 35 |
| 3.3 | Design Database | 36 |
| 3.4 | Deployment | 37 |
| 3.5 | Maintenance | 37 |
| IV | DATA ANALYSIS | |
| 4.1 | User Interface Design | 38 |
| 4.2 | Tagging the RFID cards | 44 |
| 4.3 | Flow Chart of Employee Tracker System | 46 |
| | 4.3.1 Flow Chart of Each User | 46 |
| | 4.3.2 Flow Chart of Administrator viewer | 47 |
| | 4.3.2 Flow Chart of Manager/Supervisor/Bosses viewer | 49 |
| 4.4 | Actual Result versus Expected Result | 50 |
| 4.5 | Project Analysis | 51 |
| V | CONCLUSION AND RECOMMENDATION | |
| 5.1 | Conclusion | 52 |
| 5.2 | Recommendation | 53 |

| | |
|-------------------|-----------|
| REFERENCES | 55 |
| APPENDIX A | 57 |
| APPENDIX B | 58 |
| APPENDIX C | 60 |
| APPENDIX D | 62 |

FIGURES

| NO | TITLE | PAGE |
|----|--|------|
| 1 | Methodology of the project | 4 |
| 2 | Modulated Backscattering Signal overview | 12 |
| 3 | Data exchange between an RFID reader and a tag. | 12 |
| 4 | Type of RFID | 14 |
| 5 | RFID reader | 17 |
| 6 | Microsoft Access 2010 | 20 |
| 7 | Visual Basic logo | 21 |
| 8 | Methodology chart | 30 |
| 9 | Main page of Employee Tracker System | 35 |
| 10 | The error message when the device not properly connects. | 35 |
| 11 | Interface at each door. | 36 |
| 12 | Login for admin, manager, boss and supervisor. | 37 |
| 13 | Login Successful. | 37 |
| 14 | View the id number for each employee. | 38 |
| 15 | Interface form for searching location of employee. | 39 |
| 16 | Time and date recorded in database | 39 |
| 17 | Attendance view | 40 |
| 18 | Red light indicated before card scanned | 41 |
| 19 | Green light appears when tags scanned and detected. | 41 |
| 20 | Example of printed RFID card and before printed | 42 |
| 21 | Flowchart for Current attendance record viewer | 42 |

| | | |
|----|--|----|
| 22 | Flowchart for Administrator Viewer | 43 |
| 23 | Add user in Access database | 44 |
| 24 | Flow Chart of Manager/Supervisor/Bosses viewer | 45 |
| 25 | Expected result for the whole operation of Employee Tracker System | 46 |

ABBREVIATION

| | | |
|------|---|--|
| RFID | - | Radio Frequency Identification |
| AM | - | Amplitude Modulation |
| FM | - | Frequency Modulation |
| RF | - | Radio Frequency |
| ISO | - | International Organization for Standardization |
| UHF | - | Ultra High Frequency |

CHAPTER I

INTRODUCTION

Chapter 1 will cover the introduction part of this Final Year Project 2010/2011 of Degree. It contains subchapters of objectives, problem statements, scopes of project, methodology and report structure

1.1 Introduction of Project

This project is aimed at developing an RFID tracker system to monitor the attendance and the location of every employee in the workplace that of importance to an organization. The system is hoped to help organization to increase the performance of the working environment among all the staff of the organization. Every staff will be provided with a smart ID with embedded RFID tag. Certain location at the workplace will be put an RFID reader to locate the staffs. This will be ease the administration/manager/bosses to monitor the attendance of their staff and to find their staff if they need the staff immediately. The system also will generate the daily attendance report of all the staff in the organization for record.

1.2 Objectives of Projects

Objectives of this employee RFID system is to ensure the employee time in/out, attendance and leave effectively and to track the location of the staff at specific location at workplace during work hour. This system also to ease the administration, manager or bosses to monitor and their employee immediately from the record in database besides building an effective system that automatically record and update attendance of the employee in real-time that will allow its manager, bosses or supervisor to see changes as soon as they occur, rather than waiting for updates to be visible at some later date.

1.3 Problem Statements

The purpose of this project was due to some problems that arise in a company which the manager, bosses or supervisor hard to monitor and track employee during working hours if they are not at their desk or cubicle. This system implemented because wasting time and energy for manager, bosses or supervisor to look around for the staff and this problem is not productive for big company beside hard to ensure organizational consistency

1.4 Scope of project

The scope of this project is divided into few main elements which are users, system operability, functionality and development tool.

1.4.1 User

a) Employee

In this system, user is allowable to register in this system and update their information in the system to enable the employer to track the registered employee.

b) Manager, bosses or supervisor

The manager, supervisor or bosses only allow searching employee, register, viewing data and attendance of their employee.

c) Administrator

For the administrator, they are important user in this system because they allow adding, updating, deleting, viewing and searching the user in the system beside to search the employee location.

1.4.2 System functionality

For the functionality of this system, the main function of the system is search location of the employee during work hour beside the employer or administrator allowed to view daily report of user. This system also permits administrator to retrieve database such as add, update and delete of each employee record besides records the current location, date and time accessed by the each user. User also allows registering and updating the information in the system.

1.4.3 System operability

This system only works in range of the RFID reader. The employee tag will be detected by FRID reader and activate the employee card. RFID reader will read the employee information from RFID tag and display on the host computer and read the time and date for attendance record purpose and record the location of the employee. The database of the system will automatically update the employee location and manager/bosses or supervisor can view the location of employee and also daily attendance.

1.4.4 Development tool

In this system, hardware used is RFID tag, RFID reader and the host computer for administrator storing the database whereas software for this system is Microsoft Access and Microsoft Visual Basic.Net.

1.5 Methodology

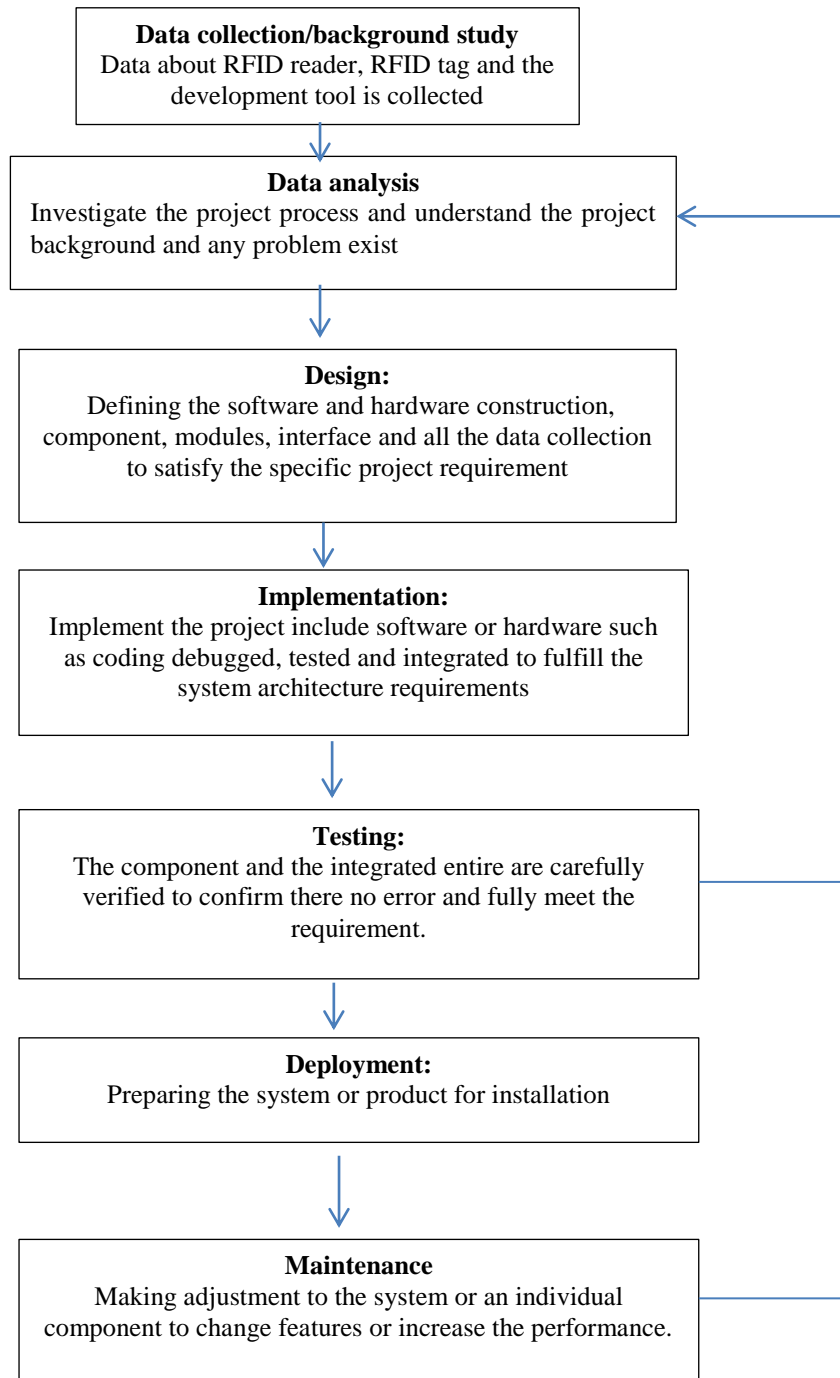


Figure 1.0: Methodology of the project

1.5.1 Data collection/background study

All data related to the RFID system is collected as the hardware and software appropriate to ape this system. For this RFID system Microsoft Access and Microsoft Visual Basic is used in this RFID system. The data used are usually from books, journals and web sites.

1.5.2 Data analysis

After collecting all data related to RFID, the data collection will be analyzed whether or not related to the RFID project. The aim is to identify data that can be used for the project.

1.5.3 Design

This process will involve software part (Visual Basic.NET, Microsoft Access 2003 and others software related). This involved software is important as we need to display the employee general information beside to store, add and update their required information and to take their attendance automatically. Besides that, the analysis approach will help us to understand better on how to integrate between the user interfaces with the database and how it operates with each other. The software involved may be changed depending on the suitability and requirements of the system.

1.5.4 Implementation:

Implement the project include software or hardware such as coding debugged, tested and integrated the entire component to fulfill the system architecture requirements. In this phase the actual development of the software takes place. This phase is also known as coding and verification phase. Based on the algorithms written in the previous phase, software program is written. For every module, software code is written and tested, to check if the correct output is received.

1.5.5 Testing

The component and the integrated entire are carefully verified to confirm there no error and fully meet the requirement. they normally a series of tests, which are run to check the performance of the software, and also to find if any new bugs were introduced into the system, after the previous bugs were fixed. If any more errors do exist, the bugs are fixed only to be retested.

1.5.6 Deployment

Deployment is about preparing the system or product for installation. The software is deployed after it has undergone thorough testing. Once the software has been deployed, in case the customer asks for any changes or enhancements, then the entire process is restarted.

1.5.7 Maintenance

Maintaining and enhancing software to cope with newly discovered problems or new requirements can take far more time than the initial development of the software. It may be necessary to add code that does not fit the original design to correct an unforeseen problem or it may be add more functionality and code can be added or making adjustment to the system or an individual component to change features or increase the performance.

CHAPTER II

LITERATURE REVIEW

2.0 INTRODUCTION OF RFID

Radio Frequency Identification (RFID) is a subset of a group of technologies, often referred to as automatic identification, that are used to help machines identify objects, and which include bar codes and smart cards. RFID refers to the subset of automatic identification that uses radio waves to automatically identify bulk or individual items. An RFID system consists of three components such as a tag (or multiple tags), a reader or interrogator and the necessary supporting infrastructure (both hardware and software).

2.1 History of RFID

RFID was developed out of the radar experiments and development during the Second World War. The actual date of invention is 1948 but this was followed by decades of development and experimentation before commercial applications were implemented.