

KINDERGARTEN SMART CARD

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To my beloved father, mother, and to all my siblings and friends.

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ABSTRACT

This project is based on the fact that in Malaysia, there is no system which is based on Radio Frequency Identification (RFID) technology that had been applied in any kindergarten institutions; which is for kids' supervision and auto attendance taking purposes. Although RFID technology had emerged from the late 1920s, but its application for that time is very limited as it is used for civil aviation only. Plus, the cost is much higher and the tags size is bigger compared to RFID evolution these days. The RFID technology now can be applied in many types of application. One of them is for the kindergarten kids' monitoring with auto-attendance taking system. This system is very suitable for the kindergarten because RFID based system is very efficient and faster compared to manual way of taking attendance. Plus, this project system can increase the awareness of parents and teachers regarding to the children presence time at kindergarten because a SMS notification will be sent to the parents (date and time arrive). Today, not all of the parents sent their kids to the kindergarten by themselves. They might go by bus, with relatives or even with neighbours. Although the cost is a bit higher compared to conventional way, but the price is worthy as this system is durable and the tags are reusable for long-term use. Furthermore, the kindergarten institutions are not consuming a very large space contrast to universities, primary schools or office building; thus, the kindergarten administrator does not have to spend too much money to invest on this system. This Kindergarten Smart Card project contains three main elements in order to make sure that this project completes successfully, that is designing part, implementing part and integrating the devices (hardware and software); which are RFID reader, RFID tags, RFID antenna, GSM modem, Graphical User Interface (GUI) and a database.

ABSTRAK

Projek ini diilhamkan berdasarkan pada kenyataan bahawa di Malaysia, tiada sistem Radio Frequency Identification (RFID) teknologi yang telah dilaksanakan pada mana-mana institusi tadika yang bertujuan untuk kawalan pemerhatian terhadap kanak-kanak dan pengambilan data kehadiran mereka. Walaupun penggunaan teknologi RFID telah diperkenalkan sejak tahun 1920-an, namun aplikasinya sangat terhad. Sistem RFID ketika itu hanya digunakan untuk tujuan ketenteraan. Tambahan pula, harganya yang tinggi dan saiz RFID tag yang besar berbanding dengan revolusi RFID pada zaman ini. Kini, teknologi RFID telah diperluaskan aplikasinya di dalam pelbagai bidang. Antaranya ialah kawalan pemerhatian terhadap kanak-kanak tadika dan juga pengambilan data kehadiran mereka secara automatik. Sistem ini amat bersesuaian untuk institusi tadika kerana RFID merupakan suatu sistem yang efisien dan pantas berbanding cara sedia ada untuk pengambilan data kehadiran pelajar. Malahan, sistem projek ini dapat meningkatkan tahap pengawasan ibu bapa dan guru tadika terhadap waktu kehadiran kanak-kanak ke tadika, dengan adanya sistem penghantaran SMS kepada ibu bapa. Pada zaman arus permodenan ini, tidak semua ibu bapa menghantar sendiri anak-anak mereka ke tadika. Mereka mungkin pergi ke sekolah dengan menaiki bas, dihantar oleh sanak-saudara mahupun jiran tetangga. Walaupun kos harga bagi sistem ini tinggi, namun ianya berbaloi kerana system ini mempunyai jangka hayat yang lama serta kad tagnya yang boleh dipakai semula untuk jangka masa panjang. Lagipun, sebuah institusi tadika tidak merangkumi keluasan persegi yang besar berbanding bangunan universiti, sekolah menengah ataupun pejabat; maka, pihak tadika tidak perlu melaburkan wang yang banyak untuk sistem ini. Projek ini terdiri daripada tiga unsur utama; iaitu bahagian merekabentuk, bahagian pelaksanaan dan mengintegrasikan peranti (hardware dan software); iaitu pembaca dan kad RFID, antenna RFID, modem GSM, Graphical User Interface (GUI) dan pangkalan data.

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ABBREVIATION

RFID	-	Radio Frequency Identification
IFF	-	Identity Friend or Foe
AM	-	Amplitude Modulation
FM	-	Frequency Modulation

CHAPTER 1

INTRODUCTION

Chapter 1 will cover the introduction part of this Final Year Project 2009/2010 of Degree. It contains subchapters of objectives, problem statements, scopes of project, methodology and report structure.

1.1 Introduction of Project

Nowadays, kindergarten institutes grow rapidly as education has become one of important element in our lives. Education is vital in order to guarantee one's future especially in finding a job. Kindergarten is a part of pre-school; where a form of education for young children which serves as a transition from home to the commencement of more formal schooling. Children are taught to develop basic skills through creative play and social interaction.¹ In Malaysia, children usually attend kindergarten between the ages of three and six. In the mean time, not all of the kids are sent to the kindergarten by their parent, some of them going to school (kindergarten) by bus or even sent by their neighbors or relatives. This factor had make most of the

¹ "Kindergarten", [Online free encyclopedia], Wikipedia Foundation, Inc., June 2008. Available: <http://en.wikipedia.org/wiki/Kindergarten>

parents feel curious and concern about their children presence in school, whether their child be in school on time or not.

This project is basically based on RFID operational system. RFID is stands for Radio Frequency Identification. Further definition and description about this system will be discussed later on the Literature Review chapter. This system will be applied at kindergartens. Each of the kids will be provided with an ID card or a wristband. In the ID card or wristband, it will contain a tag that contains the information of the students. The system will detect the tag and read the information of the students. Then, time and date the students' arrival will be automatically recorded into the database. Additional features of this project may be added, which is the time and date of students leave the class or school. It may be recorded too. This will depend on the significant of this feature to this system. The system will also be connected to the GSM modem in purpose of sending a SMS notification to the parents as a report of their children's attendance in the kindergarten.

1.2 Objectives of Projects

The foremost objective of this project is to apply a RFID system as one of the kindergarten security purpose. This system can reduce the parents' anxiety about their child presence at the kindergarten as they will be updated with the time and date of the kids' attendance. This is related to the second objective which is to build a project that can send a SMS to the parents to notify them about the attendance. The next purpose of this project is to reduce the time taken to record kids' attendance. As the time of taking students' attendance can be reduced, there will be an extra time for the teachers to fill it will any valuable activities to improve the children's learning quality and self-building progress. Plus, we can reduce the use of paper-based method which can lead to a positive impact for our green environment condition.

1.3 Problem Statements

Recent kindergarten institutions do not own a system that can be implemented as for their students' security purpose; especially that based on the RFID operational concept. The other problem is that the attendance records of the kids are taken manually by their teachers. This will waste amount of time. The time wasted, actually, can be spent for another useful educational activity. Another difficulty is some of kindergartens do not have guards to help the teachers in monitoring the arrival of the kid in the morning due to the numbers of teacher in kindergarten these days, is insufficient, as the number of kids attending the kindergarten is increasing. Parents also do not have the confirmation whether their children arrive at the kindergarten; safely and on time.

1.4 Scope of Project

The scope of this project is divided into three main elements which are users, system operations and functionality.

1.4.1 Users

The targeted users of this RFID system project are; kids at the kindergarten, administrator (teachers) and parents.

1.4.2 Operations

For the operations part, the kids' card or wristband will have to scan on or through the RFID antenna. Then, the antenna will detect the tag and activate it. RFID reader will then reads the kids information from the tag, display it on the host computer and read the time and date for the attendance record purpose. Database of the system will be automatically updated and their parents will receive a SMS notification.

1.4.3 Functionality

For the functionality scope, this project will apply the concept of RFID (Radio Frequency Identification). The system will send and receive data when its tag and reader meets with specific frequency ranges; within their minimum and maximum distance. The function of host computer in this project is to display the general information of the students and store their detail information and attendance in databases. The development of the database will involve the application of any suitable and related software such as Visual Studio 2005. The software can be used to build user interfaces for this project. This matter will be discussed in detail in the Literature Review chapter and Preliminary Result part. GSM modem will be implemented in the project to send a SMS report to the parents.

1.5 Significant of Project

This project is significant as it differs from other projects. This project will be applied at kindergartens which based on RFID concept. The RFID system that will be applied is for the students' Identification, Time and Attendance reasons. This project will apply a GSM modem in order to send a SMS notification to the parents. Furthermore, this project involves the integration between database, host computer, RFID and GSM modem.

Contributions from this project are; it will provide a security purpose of the kindergarten students. Furthermore, it is one of methods to save time and it is a systematic way especially in handling the kids' attendance and discipline. This will increase parents and teacher awareness about the children presence in the kindergartens and indirectly, it will has a potential to gain the parents trustworthy on the kindergartens' administration management.

1.6 Methodology

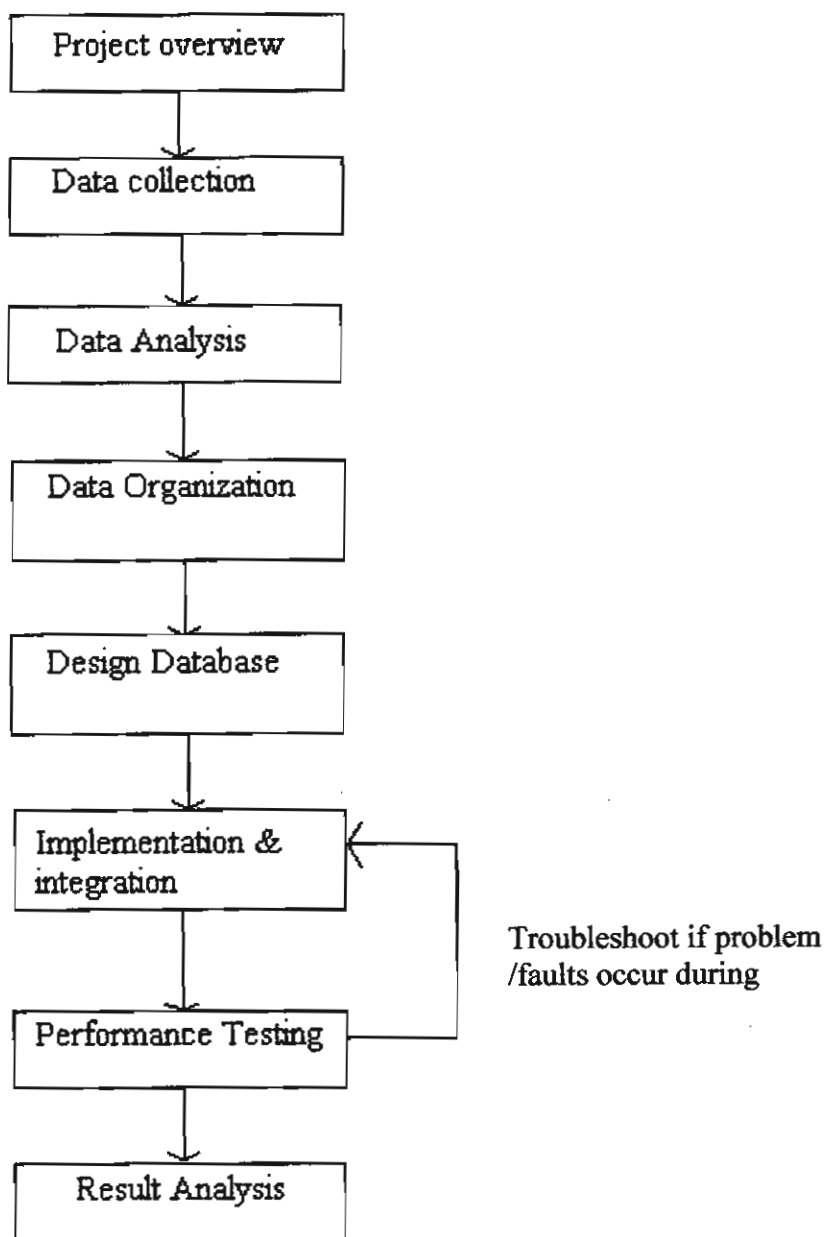


Figure 1: Methodology chart

1.6.1 Project Overview

Before proceed to the other methods, the first thing being considered here, is the project overview. Overall overview of this project allows me to understand the project's title better; along with, its requirements, concept, user targeted, scope and equipments needed. This step also helps me in getting roughly ideas on how to get started with this project.

1.6.2 Data Collection

Data collection process starts after a fully understand on the project's topic. All information related to the project will be gathered. Sources for the data collection for RFID system will be searched via internet, books, journals and also, can be obtained by ask and discuss on the subject matter with supervisor, lecturers, technicians or engineers. The literature review had been made regarding to RFID system, but it will be stated and described in the next chapter.

1.6.3 Data Analysis

After gathering all the information gained, the next procedure is to analyze them. At this stage, the research will be focused more on specific and important data. The purpose is to identify the relevant literature which related to the project.

1.6.4 Data Organization

The data will then be classified into several required categories such as; system functionality, definition, software, and hardware related; so that the information is synchronized systematically and easy to access for further research.

1.6.5 Design Database

This process will involve software part (Visual Basic .NET, Microsoft Access 2003 and others software related). The approach will be used in this procedure is designing approach and analysis approach. These approaches are important as we need to display the kids' general information, also, to store, add and update their necessary information and to take their attendance automatically. Plus, 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.

1.6.6 Implementation & Integration

At this phase, the RFID system, database and GSM modem installation will be implemented. After that, both system and database should be integrated with each other correctly so that they will operate simultaneously because the concept of this project is; RFID reader will detect the kids' card/wristband, and then the system will automatically recorded their attendance into the database. At the same time, the GSM network modem will send a SMS notification to the parent about the date and time of arrival.

1.6.7 Performance Testing

The performance of the complete project system will be checked by testing the system, in order to know whether the output is accurate and the system is well-functioned or not. If not, the errors or the cause of failure should be identified and fixed (troubleshoot).

1.6.8 Result Analysis

The actual result must be observed and analyzed, to confirm whether the objectives are accomplished or not

CHAPTER 2

LITERATURE REVIEW

This chapter will focused more on the fundamental review of the project's system. It contains definitions, descriptions, comparisons and theory discussions of the devices (hardware) and software (database) involved.

2.1 History of RFID

During the World War II in 1920s, the all Identity Friend or Foe (IFF) system was used in British aircrafts. The IFF system comprised important components of interrogator and *transponder*. The interrogator was the radar system and the transponder was an unwieldy box of tubes with dials and switches. The term *interrogator* provides the guidance as to how the system worked: the ground station sent out a radar signal, and the transponder receiving this signal reflected it back, causing the radar antenna to receive a stronger return than it otherwise would have. The *transponder* also 'swept' the frequency of its return back and forth over a small range as it responded, causing the radar return to pulsate according to a specific rhythm.

As we can see here, RFID technology emerged in the 1920s as a way of somewhat identifying aircraft for military purposes, and has since been used widely in