

**THE DEVELOPMENT OF SCHOOL CHILDREN MONITORING
SYSTEM VIA RFID**

BY

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NETWORKING**



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CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project that the original work is my own except as specified in the references and acknowledgement and that the original work contained herein have not been taken or done by unspecified sources or persons.

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(RAFIDAH BT ABD AZIZ)

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ABSTRACT

Today, the number of crime over children is increasing day per day. The implement of School Children Monitoring System via RFID will help to overcome and reduce worried among parents. This project is combination the latest technology using RFID, SMS system, and web based develop using PHP, VB.Net language, Apache Web Server and MySql. When the student enters the main school entrance, they must pass the tag that given to the RFID antenna, and the RFID reader will read the student ID. Then, information about the student such as time in and time out from school will be recorded to web based system and the SMS system automatically sends to their parent's mobile to inform that the children arrived at school safely. The development of SCMS helps school to better manage its student's attendance and will inform the parents when the children enter and back from school. SCMS via RFID will provide the school with a computer system that can store its student's information efficiently in a database. This system also provides the RFID antenna and reader that can detect the student when they touch the tag through reader. Therefore, with SCMS it is hoped that school will have a better and efficient management of its students and hence improves its operations.

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LIST OF ABBREVIATION

RFID	Radio Frequency Identification
SMS	Short Message Service
SCMS	School Children Monitoring System
SMSC	Short Message Service Center
LF	Low Frequency
HF	high frequency
UHF	Ultra high frequency
GSM	Global System for Mobile
HLR	Home Location Register
3G	Third Generation Technology
GPRS	General Packer Radio Service

CHAPTER 1

INTRODUCTION

1.1 Problem Background

Nowadays, crimes always occur. This scenario not involves by adults only, but also happen to children. Parents concern more about serious cases such as missing children, abduction and rape. The crime also involve by school children have been reported in newspapers. Although the school have guards that posted on school grounds 24 hours a day, that simply not enough to monitor the student. To overcome these problems, the authorized need to provide additional security measure.

Some parents do not have the privilege to send or fetch their children at school. Parents usually give a hundred percent of trust to their children to travel themselves. Those children would have to travel by bus, bicycles or walking. Children who travel to and from school by themselves without monitor by their parents are exposed to danger along the way. Beside that, parents usually received late information if anything happen to their children such as accidents or involved in criminals.

The teachers also had a problem during taking attendances. They spend about 5 up to 15 minutes to record the attendances. So, they waste a lot of time.

Development school children monitoring will help parents to ease their worries. Radio frequency Identification (RFID) technology can be used to inform their parents that the student's safe arrived in school. The passive RFID tag (I-Code) give to students and the tag contain serial number that connected to the database system. When they enter the main school entrance, they must touch the tag to the RFDI antenna and the attendance is

automatically update with time in and time out. In the same time parents will automatically received the Short Message Services (SMS) from the system that inform their children arrived and back from school.

1.2 Problem Statement

With a number of students commuting a long distance to the school, school administrators and parents recognized the need for enhanced measures to ensure the safety of the children. Parents are anxious about the children's safety especially children who travel by themselves. These groups of children are exposed to danger along the way. Monitoring the student will make overcome the limitation of safety. Implement the monitoring system using RFID can offer additional security applications for children.

Recognizing batch of students entering school every morning is difficult given the amount of students. With this new implement, RFID automatically records the exact time a student enters or exits the school, making it possible for school staff as well as parents or guardians to confirm the safe arrival and exit of each child.

In the new system, children are given passive RFID tags, which can be attached to ID card or other personal items. Passive RFID tags do not contain a battery; the power is supplied by the reader. When a passive RFID tag encounters radio waves from the reader, the coiled antenna within the tag forms a magnetic field.

The tag draws power from it, energizing the circuits in the tag. The tag then sends the information encoded in the tag's memory. Because the tags can be read by scanners from a distance of up to 6 centimeters, no specialized entryways are required, and children can come and freely just have to stop at a security checkpoint for a while. Their entry and exit is recorded automatically when they pass by the scanners.

1.3 Objectives

This research aims to:

- 1.3.1 To develop Short Message Services (SMS) Systems received by parents and contain information about attendance of the student.
- 1.3.2 To develop School Children Monitoring System database for student attendance connected with RFID devices.
- 1.3.3 To integrate and testing the SMS system and School Children Monitoring System.

1.4 Project Scope

- 1.4.1 The simulator testing and implement is held at FTMSK lab.
- 1.4.2 The project is focusing for selected student from different classes who enter main entrance at testing area. The student will give sample tag with their identification card.
- 1.4.3 The sample will be taken from each class about five students per class. Short Message Services (SMS) system received by mobile (parent) that contains only time in and time out and check for the attendance.
- 1.4.4 Limit of distance because passive tags have practical read distances ranging from about 10 mm up to about 6 meters. If the target is far from the reader, the target cannot be monitoring.

1.5 Project Significance

This project will benefit many parties. Not only to the researcher, this project also will benefit to parents, school children and school administrator such as the teachers. Implement the monitoring system using RFID can offer additional security applications for children. The children whom travel

themselves are attached with the passive RFID tags. So, when the children enter the school, they will be scan and automatically update their attendance.

This project also gives benefit to the parents. This project helps to ease worries among the parents. It will overcome limitations of current safety that provided by school. Parents just make sure that their children always wear the passive RFID tag. Parent will automatically receive a message from the system when their children enter and leave the school.

With this new implement, it can help teachers to ease the process of attendance taking. With RFID implement, automate attendance taking will develop too. With passive tag and reader, the children entry or exit is recorded automatically when they pass by the scanners.

1.6 Summary

This chapter provides what to be expected out of the proposed system. In this chapter, problems are discussed in the early section. Project's objectives, scope, limitation and significance of project are covered in this chapter. Review of related literature is discussed in the next chapter.

CHAPTER 2

LITERATURE REVIEW

The literature is a valuable resources and an important storehouse of knowledge and thinking about a topic area. This chapter will discuss more about all of the information related to the project. It is structured in subtopics of RFID, short message services, children monitoring system and other related applications. The literature review in this paper is based on Internet, journal, books, articles, and from newspapers.

2.1 Radio Frequency Identification (RFID)

2.1.1 What Is RFID?

Radio frequency identification as known as RFID is a generic term of technologies that use radio to automatically identify people or object. The acronym refers to small electronic devices that consist of small chip and an antenna. The chip typically is capable of carrying 2,000 bytes of data or less. The RFID provides a unique identifier for that object. The RFID device must be scanned to retrieve the identifying information. Refer <http://www.rfidjournal.com>.

Refer to <http://en.wikipedia.org/wiki/rfid>, RFID is a method of string and remotely retrieving data using devices called RFID tags or transponders. The RFID tag is a small object that can be attached to or incorporated into a product, animal, or person.

James Brusey et al. (August 2003) in their Workshop on Reasoning with Uncertainty in Robotics at IJCAI, Acapulco, Mexico stated that RFID stands for “radio frequency identification”, and it's a technology that enables

remotely storing and retrieving information by means of electromagnetic radiation.

2.1.2 The RFID System

An RFID system may consist of several components: tags, tag readers, edge servers, middleware, and application software. In a typical RFID system, individual objects are equipped with a small, inexpensive tag. When an RFID tag passes through the electromagnetic zone, it detects the reader's activation signal. The reader decodes the data encoded in the tag's integrated circuit (silicon chip) and the data is passed to the host computer for processing. In some RFID solutions a return receipt can be generated. Refer <http://www.rfidjournal.com>.

An RFID system consists of two main components, RFID tag (transponder) and RFID reader. RFID tag is usually attached to the object to be identified and carries information in an electronic microchip. RFID detects tags and performs read/write operations on RFID tags (Lara Srivastava, April 2005).

Lara Srivastava (2005) states normally readers are connected with an additional interface to forward tag information to another system, like a PC or robot control system. The most common RFID system, the reader transmits a low-power radio signal to the tag, which receives the signal and uses it as a power source to activate the embedded integrated circuit, and then transmits the information stored in it back to the reader through the antenna. The information carried by the RFID tag is the identity of the tag and other relevant information

2.1.3 Type Of RFID

2.1.3.1 Type Of Power Supply

There are three types of RFID, active, passive, and semi passive RFID tag. Active RFID and passive RFID are fundamentally different technologies. Active RFID tags have an internal power source (battery).The battery that can be used as a partial or complete source of power for the tag's circuitry and antenna, and may have longer range and larger memories than passive tags, as well as the ability to store additional information sent by the transceiver. Some active tags contain replaceable batteries for years of use (JR Tuttle, 1997).

Passive RFID tags have no internal power supply (battery).The power is supplied by the reader. When a passive RFID tag encounters radio waves from the reader, the coiled antenna within the tag forms a magnetic field. The tag draws power from it, energizing the circuits in the tag. The tag then sends the information encoded in the tag's memory and temporarily stores a very small amount of energy from the reader's signal to generate its own quick response. Music or clothing store placed the reader at entrance to detect an asset or person with a passive tag moving through the door. As quoted by Dempsey (2004) "The key point here is that these systems don't really provide location at all; since the readers have such a limited range, location is surmised from which reader last read the tag.

Even though active RFID offer best performance than passive RFID, most of the researcher prefers to use passive RFID in their system. Chatterjee et al. (2004), Science Application International Corporation (2002) and Larsson and Qviberg (2004) stated that passive RFID is a low-cost to install and can function for a number of years without maintenance. According to Mr. William Sharp, President of Advanced Research Company, most tags being targeted for use today are passive RFID. Hayashi et al. (2003) and Ni et al.

(2004) are some researchers who prefer long life active RFID tag for their research.

Lara Srivastava (April 2004) state that semi-passive tag, which employs an embedded battery to achieve better performance. Normally, such tags are only activated when they are in the reading range of a reader.

For development school children monitoring system, passive RFID tag will be using to accomplish this project. This RFID are choosing because the tag functions without a battery; these tags have a useful life of twenty years or more. The tag is typically much less expensive to manufacture the tag is much smaller where some tags are the size of a grain of rice. These tags have almost unlimited applications in consumer goods and other areas.

NAME	POWER SOURCE	TRANSMISSION MODE	RANGE(WITHIN)	LIFE
Passive	Scavenging	Reflective	3 meters	Unlimited
Semi-passive	Battery	Reflective	10 meters	5-10 years
Active	Battery	Active	100 meters	1-5 years

Table 2.1: RFID tags classified by the power source

2.1.3.2 Operating Frequency

The frequency of an RFID system defines the relationship between the tag and reader, and impacts both the transmission range and speed. RFID systems can work in the low frequency (LF), high frequency (HF), ultra high frequency (UHF), and microwave parts of the spectrum. Common frequencies for RFID systems are 125-134 KHz (LF), 13.56 MHz (HF), 860-930 MHz (UHF), and 2.45 GHz (microwave). (SAMSys, <http://www.samsys.com>).

Name	Frequency	Range	Data Rate	Ability To Read In The Vicinity Of Water And Metal	Passive Tag Size	Typical Applications
LF	125 KHz	<0.5 m (1.5 ft)	Slower 	Better 	Larger 	Access control, animal tracking, vehicle immobilizers, POS applications.
HF	13.56 MHz	1m (3ft)	 	 	 	Access control, smart cards, smart shelves, item level tracking
UHF	860-930 MHz	3m (10ft)	 	 	 	Pallet tracking, electronic toll collection, baggage handling
Micro wave	2.45/5.8 GHz	1m (3ft)	 Faster	 Worse	 Smaller	Supply chain applications and electronic toll collection

Table 2.2: RFID tags with different frequencies

2.1.4 Cost

Tags and readers are the main components of an RFID system. The reader's price depends on its features and functionality. UHF readers range in price from USD 500 to USD 3,000. Passive tags are cheaper than active tags. The cost depends on frequency, amount of memory, antenna design and packaging around transponder Refer <http://www.rfidjournal.com>.

According to ABI Research (Oyster Bay, N.Y.) analyst Sara Shah, RFID readers using the UHF band are among the most expensive purchases for

companies complying with supply chain mandates from Wal-Mart and others. These companies consistently cite UHF reader costs as verging on the prohibitive. The typical UHF reader today costs \$2,500 to \$3,000.

2.1.5 Advantages And Limitation

RFID technology offers many benefits for business, manufacturing and tracking process. According to Stanford (2003), RFID related application and benefit. As quoted from the study, “Make no mistake about it—at the high end, RFID tags are wireless, networked, pervasive computers, successfully integrated into their environment. They are easily attached, often of negligible weight and bulk.” Grajales (2003) stated that RFID could enable full control of inventory content and location for vehicles in the facility. Tuttle (1997) stated that the technology overcome other automatic identification approaches such as infrared. Apart from benefits mention above, Ollivier (1996) stated RFID could utilize as car theft prevention.

However, RFID system also has its limitations. Two main limitations of RFID are false negative reads and false positive reads. According James Brusey et al. (August 2003) stated false negative reads where RFID tags are not read at all, and false positive reads where RFID tags are detected when they are not in the interrogation range of the reader. Apart of limitation mention above, Christian Floerkemeier, and Matthias Lampe (April 2004) stated that these failures could be caused by collisions on the air interface, tag detuning, tag misalignment, metal and water in the vicinity of the RFID system.

2.2 Short Message Services (SMS)

2.2.1 What Is SMS?

According <http://www.wikipedia.com> to Short Message Service (SMS) is a service available on most digital mobile phones that permits the sending of short messages. Short messages also known as text messages, or more colloquially SMSes, texts or even texts between mobile phones, other handheld devices and even landline telephones. Other uses of text messaging can be for ordering ring tones, wallpapers and entering competitions.

SMS stands for "Short Message Service." That is used to send text messages to mobile phones. The messages can typically be up to 160 characters in length, though some services use 5-bit mode, which supports 224 characters. SMS was originally created for phones that use GSM (Global System for Mobile) communication, but now all the major cell phone systems support it. Refer <http://www.sharpened.net/glory>.

2.2.2 Process of SMS

Once a message is sent, it is received by a Short Message Service Center (SMSC), which must then get it to the appropriate mobile device.

To do this, the SMSC sends a SMS Request to the home location register (HLR) to find the roaming customer. Once the HLR receives the request, it will respond to the SMSC with the subscriber's status. There are two statuses where inactive or active where subscriber is roaming. If the response is "inactive", then the SMSC will hold onto the message for a period of time. When the subscriber accesses his device, the HLR sends a SMS Notification to the SMSC, and the SMSC will attempt delivery.

The SMSC transfers the message in a Short Message Delivery Point to Point format to the serving system. The system pages the device, and if it responds,

the message gets delivered. The SMSC receives verification that the message was received by the end user, and then categorizes the message as "sent" and will not attempt to send again. Refer <http://www.wikipedia.com> .

2.3 Children Safety

Road accidents involved by children are 1,232 in 2001 (Malaysian Vital Statistics Bulletin). This is equivalent to death of three children everyday in road accident. Abuse is another danger that threatens the lives of the children. As it is largely a hidden affair, abuses are more difficult to tackle. Unicef Malaysia representative, Gaye Phillips pointed out the challenges in preventing physical and sexual abuse among children.

Brownlee and McDonald (1998) study a safe place for children place to play, safety going to and from school, teenagers traveling to entertainment, safety problems and crimes. Problems children have to face are has to cross busy roads, violence on public transport, fear of attack by someone in the street, fear of kidnap, being picked up in the street and other problems e.g. no footpaths (A Safe Place for Children: Views From The Outer Suburbs).

2.4 Children Monitoring

2.4.1 California School Drops RFID Tracking Program.

Brittan Elementary School in Sutter, CA, has abandoned an experimental RFID program after InCom, the company that developed the technology, pulled out of its agreement with the school. Last week, EPIC, along with the Electronic Frontier Foundation and ACLU-Northern California, urged the Brittan School Board in a joint letter to terminate the program that used mandatory ID badges to track children's movements in and around the school with RFID technology. The letter argued that the program breached children's