

**SMART ANTI-ABDUCT SYSTEM (THEME PARK) USING RADIO
FREQUENCY IDENTIFICATION (RFID)**

ADIBAH BINTI AZMAN

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Faculty of Electronics and Computer Engineering
Universiti Teknikal Malaysia Melaka

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Tajuk Projek : SMART ANTI-ABDUCT SYSTEM (THEME PARK) USING RADIO
FREQUENCY IDENTIFICATION (RFID)

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DEDICATION

“In the Name of Allah, the most Beneficent, the Most Merciful”

Special Dedication to my family and especially my parents

To my supervisor

My friends, my fellow bosses and my colleagues

Thank you for all your care, support and believe in me.

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ABSTRACT

Radio Frequency Identification (RFID) is coming, and it's bringing a streamlined revolution. When dealing with the tracking device, Radio Frequency Identification (RFID) is the latest phase in the decades-old trend of the miniaturization of computers that can be used as an efficient tracker. The tracking system actually based on external database system that will provide the recorded information about the rider. Since the reader detected by the database, then the tracking system will process the data and will show the result of subject tracking. A synchronize combination between RFID reader, database and the tracking system will come out as an efficient tracker. The tracking system was developed using Microsoft Visual Basic (VB) that offered graphical user interface (GUI) application. The visual graphic interface provides the graphical mapping that shows the result of tracking. The visual graphical interface development is more on software programming syntax coding. The part of the system is database. The database is handled by Microsoft Access 2010 database. Microsoft Access 2010 database software was used to construct the database for whole tracking system. The purpose of this database is to be the reference of any related stored data and information.

ABSTRAK

Radio Frequency Identification (RFID) telah muncul dan ianya telah membawa revolusi jalur aliran . Apabila berbincang tentang peranti penjejak, Radio Frequency Identification (RFID) merupakan fasa terkini dalam gaya lama pengecilan saiz computer yang boleh digunakan sebagai peranti penjejak yang efisien. Pembangunan sistem penjejak menggunakan teknologi Radio Frequency Identification (RFID) adalah sedikit baru tetapi menjanjikan masa depan yang luas. Sistem pengesanan sebenarnya berdasarkan sistem pangkalan data luaran yang akan memberikan maklumat yang direkodkan mengenai pembaca. Apabila pembaca dikesan oleh pangkalan data, sistem daya jejak akan memproses data dan akan menunjukkan hasil daripada pengesanan lokasi subjek jejakan. Gabungan menyegerakkan antara pembaca RFID, pangkalan data dan sistem pengesanan yang akan keluar sebagai penjejak yang cekap. Sistem pengesanan telah dibangunkan menggunakan Microsoft Visual Basic (VB) yang ditawarkan antara muka pengguna grafik (GUI) permohonan. Antara muka grafik visual menyediakan pemetaan grafik yang menunjukkan hasil daripada pengesanan. Visual pembangunan antara muka grafik adalah lebih kepada perisian pengaturcaraan sintaks pengkodan. Terdapat bahagian lain dalam sistem pangkalan data. Pangkalan data ini dikendalikan oleh Microsoft Access 2010 pangkalan data. Microsoft Access 2010 pangkalan data perisian telah digunakan untuk membina pangkalan data bagi sistem pengesanan keseluruhan. Tujuan pangkalan data ini adalah untuk menjadi rujukan mana-mana data yang disimpan berkaitan dan maklumat.

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CHAPTER I

INTRODUCTION

1.1 BACKGROUND

Tracking system is generally defined as a system capable of rendering virtual space to a human observer while tracking the observer's body coordinates. For instance, in dynamic virtual auditory space simulations, a real-time head tracker provides feedback to the central processor, allowing for selection of appropriate head-related transfer functions at the estimated current position of the observer relative to the environment. There are a myriad of tracking systems. Some are lag time indicators, that is, the data is collected after an item has passed a point for example a bar code or choke point or gate. Others are real-time or near real-time like Global Positioning Systems depending on how often the data is refreshed. There are bar-code systems which require a person to scan items and automatic identification such as radio frequency identification (RFID)[1].

Radio Frequency Identification (RFID) is a system that facilitates the tracking of objects, primarily for inventory tracking, via a three part technology comprised of a reader, a transceiver with decoder and a transponder (RF tag). RFID is a wireless system that works in conjunction with an organization's information technology infrastructure to improve business processes such as inventory management and efficiency in supply chain management [2]. Radio Frequency Identification (RFID) Systems are not nano-technological devices, but the current controversy over using

electronic tracking systems provides an indication of how local communities may respond to nano-devices that similarly, though invisibly, track human bodies. RFID systems fundamentally consist of four elements: the RFID tags themselves, the readers, the antennas and choice of radio characteristics, and the computer network that is used to connect the readers.

This project will use ID card as RFID tag. The identification number on the card will indicate the information of user. Each ID number has pre assigned in the database. The data in this context consists of the child name, guardians name, the ID number and guardian's phone number. When a passive RFID tag, physically attached on a child, approaches an RFID reader, the reader will process the tag information, and then forward the information to a data base. Later, when locating a lost child is requested, the system is able to track the missing child by querying the tag information stored in data base[3]. The performance of proposed RFID base child tracking increases which directly improves the efficiency for locating lost children.

Smart Anti-Abduct System (Theme Park) Using Radio Frequency Identification (RFID) is data based system that using a Visual Studio 2006 script as the programming language that will process the data given by Microsoft access 2010.

1.2 PROBLEM STATEMENT

This is a major safety issue that is important to both the theme park operators and visitors. Unfortunately, currently there are no systems in place to aid in the tracking of missing children in larger close area. Most searches for missing children cases are performed by reviewing recorded security surveillance tapes and requesting the help of bystanders and witnesses. Although there have been some success with this approach, any further methods to increase the success rate should be welcomed by the general public. Nowadays there are many existing location technologies such as GPS, which can be used to keep track of the location of a child. However, with these technologies, the children being tracked must carry a GPS receiver or cellular phone. GPS receivers and cellular phones are moderately sized electronic devices that require extra care and protection to prevent damage to the components. As a

result, these devices become very inconvenient to the children when playing in theme park, particularly, when they play water-related activities. To protect children in larger close area.

1.3 OBJECTIVE

Recently, RFID technology has been emerging as a promising method for the purpose of identification and tracking using radio waves due to its low cost and its broad applicability. Among the main objectives to create a design model RFID base child tracking are:

- i. Develop the cost effective tracking system using RFID
- ii. To utilize RFID tags placed on children
- iii. To create the based system which can integrate with RFID

1.4 SCOPE

The main goal of this project is to develop a student attendance using RFID technology. There is 2 scope will be covered in this project. Firstly is to use appropriate RFID Tag & Reader for this application. Secondly is to design GUI to integrate with RFID technology.



Figure 1.1 Scope of Smart Anti-Abduct System (Theme Park) Using Radio Frequency Identification (RFID)

1.4.1 Use appropriate RFID Tag & Reader for this application

There are lots of RFID reader and tag sold at market. Not only brand, but also frequencies of the RFID itself need to be considered. Since this system will be applied to a theme park, the RFID reader must use same frequencies as parents and children ID tag. For this system, the type of tag is MIFARE type and its frequency is 13.65MHz.

1.4.2 Design and implement a system in student attendance using RFID

The RFID reader will use to detect the parents and children ID card code. The code will use to compare with Access database and the information in database will be display and store by using interface on Visual Basic 6.

1.5 THESIS OVERVIEW

This Smart Anti–Abduct System (Theme Park) Using Radio Frequency Identification (RFID) final thesis is a combination of 5 chapters that contains and elaborates specific topics such as the Introduction, Literature Review, Software Development, Result, Discussion, Conclusion and Further Development that can be applied in this project.

Chapter 1 basically is an introduction of the project. In this chapter, the Discussion is all about the background and objectives of the project. The overall Overview of the entire project also will be discussed in this chapter.

Chapter 2 will be discussed about the literature review for the development of the Smart Anti–Abduct System (Theme Park) Using Radio Frequency Identification (RFID). Everything related to the project will be described generally in this chapter.

Chapter 3 will be discussed about methodology on this project and the software development of the Graphical User Interface (GUI) using Visual Basic 6

CHAPTER II

LITERATURE REVIEW

2.1 INTRODUCTION

The purpose of this literature review is to discuss all the research that has been completed to date. This chapter will summarize and then critically analyze the research found. From literature review, there will be an analysis regarding the advantage and disadvantage for each phase of this project.

In this part, this project will explain about the detail of system that intergrades with RFID in various aspects. All the information will be collected from the related thesis, journal, book and also website from the internet. There are two main parts which are review on RFID and review on database that wrap up the main title Smart Anti-Abduct System (Theme Park) Using Radio Frequency Identification (RFID). This is important to give an understanding on RFID functions and the system itself. In the other hands this part will help in order to get as much as information before the project can continue to the next part.

2.2 RFID TECHNOLOGY APPLICATIONS

Radio Frequency Identification (RFID) is one of the hottest emerging technologies today. Its use has the potential to affect an extremely wide spectrum of

the population (from the technology adopters, to vendors, to integrators, to users). A variety of established RFID application types have already been deployed successfully in real-world environment [4]. An application type consists of several different application members that share the same characteristics of the application type. Lacking standards have been mentioned to be a problem, because globally agreed standards in RFID are a relatively new phenomenon [5]. An issue slightly related to standards is the different frequencies, which are used around the world [2]. Another technological challenge often mentioned is a tag reading problem. The poor reading can be caused by radio waves absorbing materials around or under the tags [3]. The other reasons for poor reading can be wrong position of antennas comparing to the direction of the reader or radio transmitting collisions caused by too many RFID tags, or just varying quality of tags [4].

RFID is expected to become persistent and universal, as it can be embedded into everyday items as smart labels. A typical RFID system comprises of a base radio transmitter/receiver, or reader, RF transponders or tags and the back-end database that associates records with tag data collected by readers. The RFID reader consists of an antenna, a radio interface, and a control unit that has an ability to interrogate and display electronic code held in a remote device, transponder and thus identify any item with which the transponder is associated. The reader control unit will execute the communication protocol with the tags and then interprets the data received from the tags. While the radio interface will perform detection, modulation and demodulation of the reader's signal and the tags replies. The readers communicate wirelessly with the tags to obtain the information stored on them. The data sent by the reader is modulated and backscattered from a number of tags.

2.2.1 Cost of The Technology and Technology Adoption

The cost of the technology is also mentioned as a major problem concerning RFID technology adoption. The cost of the tags is the most obvious expense, and even if the cost of the RFID tags is decreasing all the time. Also attaching the RFID tag might need special arrangements, which increases the cost directly related to tags [5]. However, before an RFID system is implemented, there are also many other

expenditure types. An RFID system requires also other hardware than. Software adjustment is usually needed when integrating RFID system to the existing ERP and other systems even if most of the current systems in market already have RFID connection ability. In addition to the system integration requirements, the amount of data that information systems handle increases significantly, when RFID technology is in use [1]. This data processing may need additional investments to software, hardware and telecommunication. Implementation also requires the resources of technology experts, and resources for training of current employers to use the system and perhaps even to a new task, when the old duties are changed as a result of RFID-enabled automation [4].

The different cost factors cause uncertainties when estimating the exact costs of RFID technology adoption. As there are also doubts of the exact benefits that the transition to the RFID technology offers, several authors point out the difficulties to evaluate the usefulness of RFID technology investment comparing to the other potential development possibilities [6] The combination of the high implementation costs with unsecure payback time can also pose financing problems especially for smaller companies [7]

2.2.2. Security and Data Sharing Problems

A slightly related issue with privacy is the concern of security. If the tags have a lot of information about the product handling history, the other supply chain partners may obtain confidential information about competitors' supply chain practices, such as shares of different suppliers and delivery time of the product .In theory, it is possible that some outsider could break the code and read the information of the tag by using his own RFID reader in distance without authorized physical access to the item [5]. Another more severe fear is that someone could change the information of the RFID tag by using his own RFID reader [3] To work effectively, supply chain wide RFID tracking system requires information sharing, which creates indirect security concern, when the companies might hesitate to share with other companies all the information needed to obtain full benefits of supply chain visibility. But even if companies are willing to share all the information obtained by RFID-readers, Asif and Mandiviwalla [5] also point out the reverse

problem that too much information cause problems for the information systems' handling and storing capacity, if the companies have not agreed, how to restrict the amount of data.

Radio Frequency Identification (RFID) is a new technology for automated object identification. An RFID tag is an electronic device that consists of an antenna and an inexpensive chip, often smaller than a grain of rice that can be read from distance by a nearby reader. This device is typically attached to an object and upon request it can return information related to the tagged item, such as product characteristics, date of manufacture, date of purchase, and so on. RFID tag can be passive or active. Passive or semi active tags get their power directly from the signal broadcasted by a reader. This ability to draw power from a nearby is what makes passive tags attractive; they do not need batteries, so they can be smaller and cheaper opening a new way of interesting applications. Active tags, on the other hand, have their own power source but are typically more expensive and are used only in specialized applications [4].

Tags, of the “passive” variety, are often envisioned as a next-generation bar code technology, automating inventory procedures, thus cutting costs for manufacturers and retailers [8]. Their two most important characteristics are small size, which allows them to be implemented within objects, and their ability to be read inside boxes, pallets, etc. which does not require line of sight. Passive tags are consequently less expensive and offer an unlimited operational lifetime. The trade-off is that they have shorter read ranges and memory capable of holding a very small amount of information.

2.3 RFID READER

The RFID reader sends a pulse of radio energy to the tag and listens for the tag's response. The tag detects this energy and sends back a response that contains the tag's serial number and possibly other information as well.

In simple RFID systems, the reader's pulse of energy functioned as an on-off switch; in more sophisticated systems, the reader's RF signal can contain commands to the tag, instructions to read or write memory that the tag contains, and even passwords.

Historically, RFID reader were designed to read only a particular kind of tag, but so-called multimode readers that can read many different kinds of tags are becoming increasingly popular.

RFID readers are usually on, continually transmitting radio energy and awaiting any tags that enter their field of operation. However, for some applications, this is unnecessary and could be undesirable in battery-powered devices that need to conserve energy. Thus, It is possible to configure an RFID reader so that it sends the radio pulse only in response to an external event. For example, most electronic toll collection systems have the reader constantly powered up so that every passing car will be recorded. On the other hand, RFID scanners used in veterinarian's offices are frequently equipped with triggers and power up the only when the trigger is pulled.

Like the tag themselves, RFID readers come in many size. The largest readers might consist of a desktop personal computer with a special card through shielded cable. Such A reader would typically have a network connection as well so that it could report tags that it reads to other computers. The smallest readers are the size of a postage stamp and are designed to be embedded in mobile telephones. [4]

Nowadays lot of RFID reader sold with multiple brands such as Mifare, Hitachi, and Philip. Because of the major application used in worldwide, many systems require the simultaneous use of more than one operating frequency. Most systems available on the world market at present operate at one of the following frequencies or frequency ranges: below 135 kHz (125 kHz, 134.2kHz for example), 13.56MHz, UHF (860/960 MHz), 2.45GHz and 5.8GHz. The operating and control characteristics are different for each of these frequencies, and therefore each of them is more appropriate for certain types of application or certain countries.



Figure 2.1: Passive RFID reader

2.4 RFID TAG

An RFID tag is a device that can store and transmit data to a reader in contactless manner using radio waves. RFID tags can be classification, which is based on whether the tag contains an on-board power supply and/or provides support for specialized tasks as shown below and the type of RFID tag that will be used for this project is passive RFID tag [5]. There are some of the RFID tag that have in market :

- I. Passive
- II. Active
- III. Semi-active (also known as semi-passive)

2.4.1 Passive RFID Tag

This type of RFID tag does not have an on-board power source (for example, a battery), and instead uses the power emitted from the reader to energize itself and transmit its stored data to the reader. A passive tag is simple in its construction and has no moving parts [5]. As a result, such a tag has a long life and is generally resistant to harsh environmental conditions. In tag-to-reader communication for this type of tag, a reader always communicates first, followed by the tag. The presence of a reader is mandatory for such a tag to transmit its data. A passive tag is typically smaller than an active or semi-active tag. It has a variety of read ranges starting with less than 1 inch to 30 feet (9 meters approximately). A passive tag consists of main