DEVELOPMENT OF RFID DATABASE HANDLING SYSTEM

MOHD ZUL FAHMI BIN MOHD ZAWAWI

This report is submitted in partial fulfilment of requirement for the award of Bachelor of Electronic Engineering (Computer engineering) with honours.

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MOHAMAD ZOINOL ABIDIN B ABD AZIZ
Pensyarah
Fakulti Kej Elektronik dan Ko. Komputer (FKEKK),
Universiti Teknikal Malaysia Melaka (UTeM),
Karung Berkunci 1200,
Ayer Keroh 75450 Melaka

Tarikh: 9/05/07

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Signature : .....

Name : Mohd Zul Fahmi Mohd Zawawi

Date : 4th May 2007

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"I hereby declare that I have read this report and in my opinion this report is sufficient in terms of scope and quality for the award of Bachelor of Electronic Engineering (Computer Engineering) with honours."

Signature : .....

Supervisor's name : En. Mohamad Zoinol Abidin Abd. Aziz

Date : 4th May 2007

For my beloved parents, family and fellow friends…

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ABSTRACT

Radio Frequency Identification (RFID) is the latest phase in the decades-old trend of the miniaturization of computers. RFID system nowadays is widely used in various applications from simple tag application to advance tracking application. RFID tags are inductively powered by their external reading devices, called RFID readers. Once the RFID tag is activated, the tag decodes the incoming query and produces an appropriate response contain information or data to the RFID reader. A database running on **sql (sequence quote language)** or other data language is needed to store the tags information. This paper presents approach to develop RFID database handling system. This system is build for handling the data from RFID system to database storage and handover that useful information data for other system resources. This system can solve data handling problem and in the meantime user friendly, time saving, and organisable. Besides, the problems that occur in RFID system where the data that receive by the reader cannot be saved permanently can be solve. These database handling system that is generated by the MySQL as a database server is intended to enhance the efficiency and effectiveness of the RFID applications.

ABSTRAK

Radio Frequency Identification (RFID) merupakan fasa terbaru dalam teknologi terkini mengatasi kaedah lama sebagai peranti terkecil dalam sistem computer. Sistem RFID telah digunakan secara meluas dalam pelbagai bidang, dari satu bentuk aplikasi label yang mudah kepada aplikasi yang termaju seperti system pengesan. Label atau kad RFID terjana dari kuasa pada alat pembaca yang dipanggil pembaca RFID. Untuk meyimpan maklumat yang terkandung dalam label atau kad RFID, ia memerlukan satu sistem pengkalan data . Sistem pengkalan data ini akan beroperasi menggunakan ***sql (sequence quote language)***. Kertas kerja ini akan menerangkan kaedah-kaedah untuk membina Sistem Pengawalan Pengkalan Data RFID. Sistem ini dibina bertujuan untuk mengawal data dari sistem RFID ke pusat pengkalan data dan menghantar data yang berinformasi ini untuk dijadikan sebagai sumber kepada sistem aplikasi yang lain. Sistem ini boleh menyelesaikan masalah yang timbul dalam pengawalan data dan sistem ini mudah digunakan, menjimatkan masa, dan senang diurus. Selain itu, masalah yang timbul dalam sistem RFID dimana data yang diterima dari pembaca RFID akan hilang dan tidak boleh dismpan secara kekal akan dapat diatasi. Sistem Pengawalan Pengkalan Data yang dijana menggunakan MySQL sebagai pelayan diharapkan dapat menambahkan keberkesanan dan kecekapan bagi aplikasi dalam sistem RFID.

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LIST OF ABREVIATION

RFID	-	Radio Frequency Identification
ID	-	Identification
VB.Net	-	Visual Basic .Net
SQL	-	Structured Query Language
LF	-	Low Frequency
HF	-	High Frequency
UHF	-	Ultra High Frequency
ISO	-	International Organization for Standardization
MHz	-	Megahertz
EPC	-	Electronic Product Code
ISM band	-	Industrial, Scientific and Medical radio bands
CODSYL	-	Conference on Data Systems Languages
ODMG	-	Object Data Management Group
API	-	Application Programming Interface
JDBC	-	Java Database Connectivity
ODBC	-	Open Database Connectivity
UNIX	-	Computer operating system
IBM	-	International Business Machines Corporation
DBMS	-	Database Management System
RDBMS	-	Relational Database Management System
ANSI	-	American National Standards Institute
PHP	-	Hypertext Preprocessor

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CHAPTER 1

INTRODUCTION

1.1 PROJECT BACKGROUND

This project is proposed to develop RFID database handling system using RFID study kit from 3ALogics and Mifare Corp. This system is mainly to handle data information from RFID reader and store it in one database system. This system also can be used to manipulate the data that store in database to be used by other application that incorporated with RFID such as smart attendance, smart tracking system and other applications.

For this system sequence, it will be started with on the RFID kit from Mifare. RFID transponders are tiny resource-limited computers that do not have a battery that needs periodic replacement. RFID tags are inductively powered by their external reading devices, called RFID readers [1]. Once the RFID tag is activated, the tag decodes the incoming query and produces an appropriate response by using the energy of the incoming radio wave to power the chip long enough to respond. RFID tags can do a limited amount of processing, and have a small amount (<1024 bits) of storage [1]. When this RFID reader have response with it tags, the information that carried by the

tag will be store in a database. This database system that has been constructed can handle data information from disappeared without a trace. One of the major problems of this RFID is the data storage. With this system, it can solve the tribulations that occur in RFID system where the data that receive by the reader cannot be saved permanently.

1.2 OBJECTIVES

The main objectives of this project is to develop RFID Database Handling System by implementing RFID study kit from 3Alogic and Mifare. This system can be able to extract data from RFID reader, and stored the data or unique information into a database appropriately and simultaneously. The data which is store in database can be manipulated and can be used to other system application such Smart Attendance System and Smart Tracking System.

1.3 SCOPE OF WORKS

This project covers several scopes in accomplishing the project's objectives. Basically this project is about implemented the usage of RFID technology into database system, in controlling and monitoring data or unique information from RFID reader tags. In order to develop the system , the understanding of the RFID architecture is vital to make this system successful. It can be achieved through analysis and understand the related documentation of structured design given by the RFID manufacture, which is 3ALogics and Mifare. Besides, understanding of the Visual Basic Environment also important with the purpose of develop the main host system that will handle Graphical User Interface (GUI) for the whole system development. This database system will be design using sequential quote language (sql) environment with MySQL platform.

1.4 PROBLEM STATEMENT

RFID system nowadays is widely used in various applications from simple tag application to advance tracking application. This project used a RFID study kit that not contain a database system to store and manage data and information from reader. Thus, the information from reader that contains unique ID will lose without a trace.

This system is build for handling the data from RFID system to database storage and pass that useful information data for other system resources. This system can solved data handling problems with user friendly environment, time saving, and organisable.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

In order to execute this project, literature review must be done to comprehend the whole system and to decide the best inputs, outputs and used devices. From literature review, there will be an analysis regarding the advantages and disadvantages for each phase of this project. Equipment data sheets and manuals provided information such as dimension, operation and specification of the RFID reader. There are two main parts which is review on RFID and review on Database that wrap up the main title 'Development of RFID Database Handling System'.

2.2 LITERATURE REVIEW OF RFID

2.2.1 Overview of RFID

Radio Frequency Identification (RFID) is the latest phase in the decades-old trend of the miniaturization of computers. RFID transponders are tiny resource-limited computers that do not have a battery that needs periodic replacement. RFID tags are inductively powered by their external reading devices, called RFID readers [1]. Once the RFID tag is activated, the tag decodes the incoming query and produces an appropriate response by using the energy of the incoming radio wave to power the chip long enough to respond. RFID tags can do a limited amount of processing, and have a small amount (<1024 bits) of storage.[1]

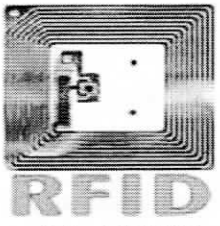

Figure 2.1 : RFID Symbol

RFID tags are useful for a huge variety of applications. Some of these applications include: supply chain management, automated payment, physical access control, counterfeit prevention, airline baggage management, and smart homes and offices. RFID tags are also implanted in all kinds of personal and consumer goods, for example, passports, partially assembled cars, frozen dinners, ski-lift passes, clothing, EZ-Pass toll collection devices, and public transportation tickets. Implantable RFID tags for animals allow concerned owners to label their pets and livestock. Verichip Corp. has also created a slightly adapted implantable RFID chip, the size of a grain of rice, for use in humans. Since its introduction, the Verichip was approved by the U.S. Food and Drug Administration, and this tiny chip is currently deployed in both commercial and medical systems. A great deal of information is available on RFID technology [2] .

Many applications are now using radio frequency (RF) chip technology to automatically identify objects or people. These applications range from tracking animals and tagging goods for inventory control to enabling fast payment and securely identifying people. While these applications all use radio waves to communicate information, the RF chip technology used for each is quite different, addressing the application's unique storage, range and security requirements. As a general definition, radio frequency identification (RFID) tag technology is used in applications that identify or track objects and contactless smart card technology is used in applications that identify people or store financial or personal information [2]

2.2.2 RFID Concept

The main component of RFID technology is the transponder/tag , which in most cases comprises of a chip and antenna mounted onto a substrate or an enclosure. The chip consists of a processor, memory and radio transmitter. These transponders communicate via radio frequency to a reader, which has its own antennas. The readers can interface through wired or wireless medium to a main computer. Transponders are also known as smart or radio tags. The memory will vary, depending on the manufacturer, from just a few characters to kilobytes.

Transponders can either be Read Only (R/O) which are pre-programmed with a unique identification or they can be Read Write (R/W) for applications that require data to be stored in the transponder and can be updated dynamically. Another form of transponder is Write Once Read Many times (WORM). This will allow for an identification number to be written to the transponder once. The information is stored in the memory, it cannot be changed but the transponder can be read many times.[1] The two most common types of RFID technologies are Active and Passive. Active RFID transponders are self powered and tend to be more expensive than Passive. Having power on board allows the tag to have greater communication distance and usually larger memory capacity.

2.2.3 Active RFID Systems

Active tags are used on large assets, such as cargo containers, rail cars and large reusable containers, which need to be tracked over long distances such as in a distribution yard, for example [4]. They usually operate at 455 MHz, 2.45 GHz, or 5.8 GHz, and they typically have a read range of 60 feet to 300 feet (20 meters to 100 meters).

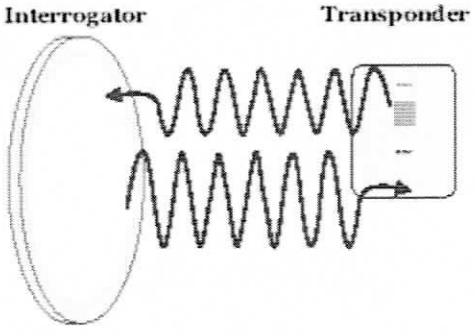

Figure 2.2: Active RFID System

There are two types of active tags which is a transponders and a beacons. Active transponders are woken up when they receive a signal from a reader. These are used in toll payment collection, checkpoint control and other systems. When a car with an active transponder approaches a tollbooth, a reader at the booth sends out a signal that wakes up the transponder on the car windshield. The transponder then broadcasts its unique ID to the reader. Transponders conserved battery life by having the tag broadcast its signal only when it is within range of a reader.

Beacons are used in most real-time locating systems (RTLS), where the precise location of an asset needs to be tracked. In an RTLS, a beacon emits a signal with its unique identifier at pre-set intervals which it could be every three seconds or once a day, depending on how important it is to know the location of an asset at a particular moment in time. The beacon's signal is picked up by at least three reader antennas positioned around the perimeter of the area where assets are being tracked.