

**STOCK AND INVENTORY CONTROL SYSTEM USING RADIO
FREQUENCY IDENTIFICATION (RFID)**

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To My Beloved Father and Mother

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ABSTRACT

Stock and Inventory Control System Using RFID is an electronic and real-time stock and inventory control system. This system is using radio frequency as a medium for data networking to communicate between control centre and the stock itself. The stock will be equipped with RFID tag that stored current data and information about the stock in the database. This system can updated the inventory database such as the balance stock in the supermarket. This system also works in real-time, which will monitor each stock that stored and the data will be shown on control center computer. This is happen when the RFID reader transmitted its signal to the RFID tag. This RFID tag detects the signal that was transmitted and this tag will send the data to the RFID reader. The RFID reader scan the RFID tags ID and link to software using serial RS232 and developing data to get what kind of item that have scan when the Visual Basic 6.0 data was read. Then, control computer center will show the information and status that obtained from each tags.

ABSTRAK

Sistem Pengurusan Barang dan Senarai Barangan Dengan Aplikasi RFID (Stock and Inventory Control System Using Radio Frequency Identification) merupakan sebuah sistem pengurusan barang dan senarai barangan secara elektronik dan masa nyata. Sistem ini menggunakan frekuensi radio sebagai medium hubungan rangkaian data untuk komunikasi antara pusat kawalan dan juga barang yang terdapat dalam simpanan sesebuah tempat. Barang tersebut dilengkapi dengan tag RFID yang berfungsi menyimpan data dan maklumat ke dalam pengkalan data. Sistem kawalan ini juga akan mengemaskinikan maklumat senarai barang di dalam sistem pengkalan data seperti baki sesuatu barang dalam pasaraya. Sistem ini juga berfungsi secara masa nyata iaitu memantau setiap barang yang disimpan secara langsung dan data tersebut dipamerkan pada komputer kawalan. Ini berlaku apabila penerima RFID, memancarkan isyarat pada sela masa tertentu kepada setiap tag RFID yang terdapat pada barang tersebut. Tag RFID ini mengesan isyarat yang dipancarkan oleh RFID reader dan menghubungkan kepada program komputer dengan menggunakan serial RS232 dan seterusnya memaparkan jenis barang yang telah dikesan apabila program yang digunakan iaitu Visual Basic 6.0 dibaca. Kemudian, komputer kawalan akan mempamerkan maklumat dan status yang diperolehi dari setiap tag yang terdapat pada barang tersebut.

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LIST OF ABBREVIATION

AIDC	-	Automatic Identification and Data Capture
EEPROM	-	Electrically Erasable Programmable Read Only Memory
EPC	-	Electronic Product Code
FIFO	-	First-in-first-out
GUI	-	Graphical User Interface
HF	-	High Frequency
ID	-	Identification
IFF	-	Identify Friend or Foe
ITV	-	In-transit Visibility
LAN	-	Local Area Network
LF	-	Low Frequency
LIFO	-	Last-in-last-out
NLIS	-	National Livestock Identification System
ODBC	-	Open Database Connectivity
RAM	-	Random Access Memory
ROM	-	Read Only Memory
RF	-	Radio Frequency
RFID	-	Radio Frequency Identification
SCIS	-	Stock & Inventory Control System
UHF	-	Ultra High Frequency
USB	-	Universal Serial Bus
VB	-	Visual Basic
WAN	-	Wide Area network

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CHAPTER I

INTRODUCTION

RFID is a valuable business and technology tool. It holds the promise of replacing existing identification technologies like the barcode [1]. The technology started with barcode labels which then triggered a revolution in identification systems. Those barcodes technology just perfectly used for quite some time ago, but in this globalization world today, barcodes are being found to be inadequate as the factor of increasing number of cases. The cost of using barcodes may be extremely cheap, but their stumbling block is their low storage capacity and the fact that they cannot be reprogrammed. RFID offers strategies advantages for businesses because it can track inventory in the supply chain more efficiently, provide real-time in-transit visibility (ITV), and monitor general enterprise assets [1]. The more RFID is in the news, the more creative people are about its potential applications [1].

1.1 Project Introduction

A Radio Frequency Identification (RFID) system is an identification system that uses radio waves to retrieve data from a device called a tag or transponder. RFID surrounds us in our daily lives such as in libraries, bookstores and etc. RFID provides a quick and efficient way to collect information such as tracking stock in a warehouse, as well as tracking the whereabouts of items.

As for the practical usage in this project, a prototype will be developing by using the technology of RFID. Stock and Inventory Control System Using RFID or the abbreviation commercial name GO SUPERMARKET is an electronic and real-time stock and inventory control system. This system is using radio frequency as data networking medium to communicate between control centre and the stock. The stock will be equipped with RFID tag that stored current data and information about the stock.

This system works in real-time, which will monitor each stock that stored and the data will be shown on control center computer. This is happen when the RFID reader transmitted its signal to the RFID tag. This RFID tag detects the signal that was transmitted and this tag will send the data to the RFID reader. The RFID reader scan the RFID tags ID and link to software and developing data to get what kind of item that have scan. Then, control computer center will show the information and status that obtained from each tags.

1.2 Objectives of Project

The main goal of this Stock and Inventory Control System Using RFID is:

- To develop software that controlling, managing and monitoring of stock and inventory control system by using RFID technology in real-time.
- To provide an electronically stock and inventory system that used the RFID technology concept in real-time.
- To develop database that can link to RFID tag ID with stock and inventory control system.

1.3 Problem Statement

The optical nature of barcode requires labels to be "seen" by lasers. That line-of-sight between label and reader is often difficult, impractical, or even impossible to achieve in industrial environments. In order to function properly, a barcode reader must have

clean, clear optics, the label must be clean and free of abrasion, and the reader and label must be properly oriented with respect to each other. RFID technology enables tag reading from a greater distance, even in harsh environments.

In addition, the information imprinted on a barcode is fixed and cannot be changed. ActiveWave RFID tags, on the other hand, have electronic memory similar to what is in your computer or digital camera to store information about the inventory or equipment. This information can be dynamically updated. In places like supermarket, RFID readers can track goods over bar code such as in table below:

	RFID	BARCODE
VISIBILITY	Works in any direction, does not require line of sight.	Directional, requires line of sight.
READ RANGE	Between 4 and 80cm (1.5 - 3.1 inches) using passive tags, up to 100 metres (328 feet) using active tags.	Typically 15 – 30cm (6 – 12 inches).
READ RATE	Up to 200 tags per second.	Limited to rate at which objects can be physically located in front of scanner.
DATA STORAGE	Up to 4KB using passive tags and 32KB using active tags.	None.
DURABILITY	Withstands harsh environments (snow, rain, sunlight), and dirty environments (dirt, dust, moisture and oil) and will last for decades.	Prone to scratching and tearing.
FLEXIBILITY	Tags can be packaged for a wide variety of applications (consumer goods, animal tracking, vehicle tracking).	Must be located on outside of package, on a relatively flat surface.
ENVIRONMENT	Low frequency technology can read tags located underground.	Cannot read without line of sight.
SECURITY	Near impossible to replicate.	Simple to replicate.

Table 1.1 : RFID vs BARCODE



Figure 1.1 : Barcode example

1.4 Scope of Project

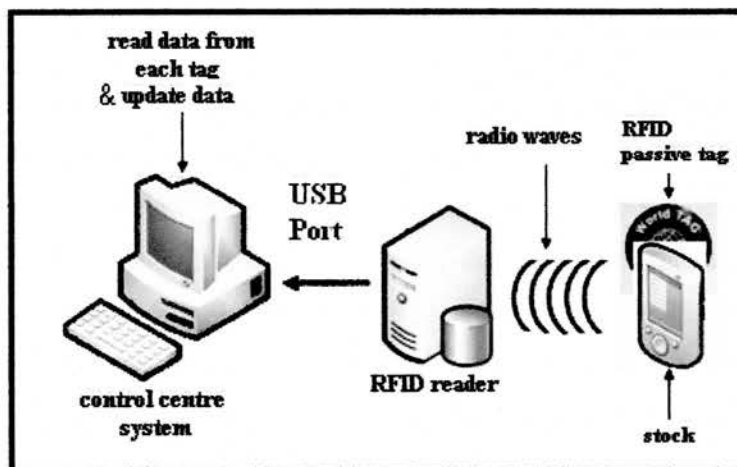


Figure 1.2 : Stock and Inventory Control System Using RFID

This project covers several scopes in accomplishing the projects objectives. Basically this project is about implemented the usage of RFID technology into database system, in controlling, managing and monitoring data from RFID reader tags. In order to develop the system, the understanding of the RFID architecture is vital to make this system successfully.

This project will be implemented RFID technology as a communication medium between tags which are attached together with the stock and to the RFID reader. The stock will be equipped with RFID tag that stored current data and information about the stock. This system works in real-time, which will monitor each stock that stored in the warehouse and the data, will be shown on control center computer. This is happen when the RFID reader transmitted its signal to the RFID tag which was stick together with the stock. This RFID tag detects the signal that was transmitted and this tag will send the data to the RFID reader. Control computer center will shown the information and status that obtained from each tags from the stock.

Besides, for the control system, the software (graphical user interface (GUI)) was using to developing as a control centre for the computer to access, monitor and control this stock and inventory control system. The GUI will be developing by using Microsoft Visual Basic 6.0 as a method to control the entire system. The software built will be integrated with the RFID reader to receive and perform the command sent by the user. Then, the control system also can update an inventory data.

1.5 Methodology of Project

Firstly, the study of the theory about the overall of this project is done. The theory part will consist about the history, working concepts, its main parts and the examples of RFID application's product. Next, software development part and hardware installation part respectively. For the software part, a system that consist of database program and graphical user interface (GUI) will be develop by using Microsoft Visual Basic 6.0 as a method to control the entire system. For the hardware part, it will involve the usage of RFID module component that contains the transmitter and passive tags. This part will also include the method of connecting the module with the computer using universal serial bus (USB) port. The main goal for this prototype is to integrate the software and hardware part that will make the data can be access through the graphical user interface.

Designing a flowchart is a method of earliest sketches that are used to show the operation of the program. Flowchart can help designer to develop a program and working plan because it will show the flows of the programs that are going to implement. Figure 1.3 below shows the overall project flowchart for the Stock and Inventory Control System.

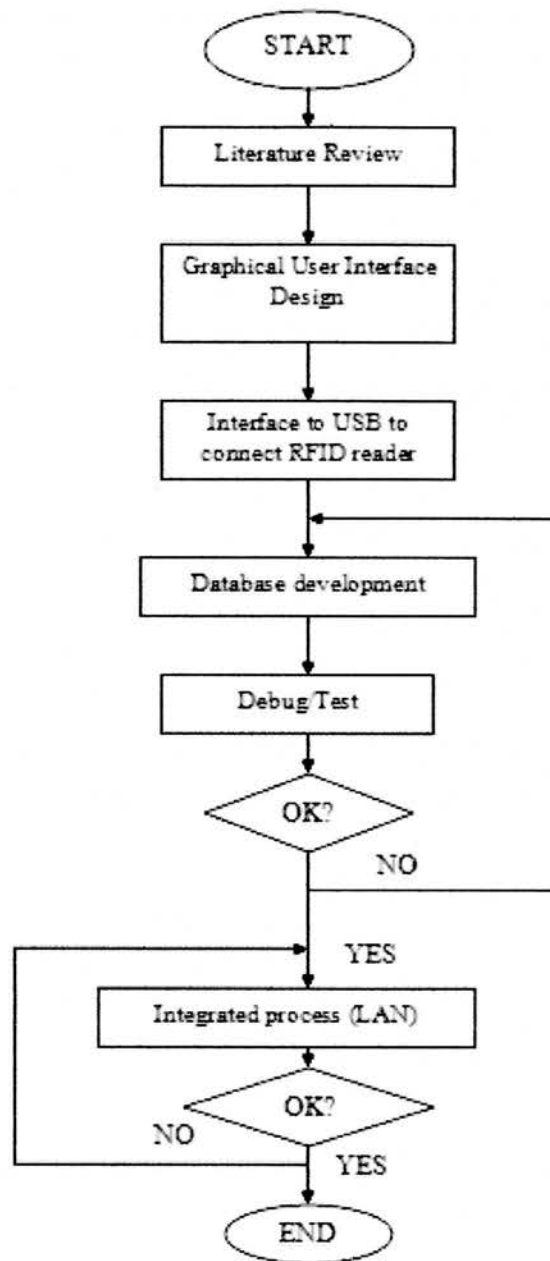


Figure 1.3 : Overall project flowchart

1.6 Thesis Structure

This part will be discussed about the summary for each chapter that contains in this report. Chapter I will be discussed about the introduction of the project. In this chapter also included objectives of project, problem statement, scope of project and finally is methodology of project.

Then, chapter II will be discussing about literature review. This chapter will cover the introduction to the RFID, the history, the basic and the benefit of the RFID. To provide more information about RFID, this chapter also cover the working concept of RFID, the RFID tags, passive vs. active RFID tags, the reader and others.

For Chapter III, the methodology of the project will be discussed. This chapter are covered the flowchart of project methodology which will summarize the overall application of the prototype. The subtopics are also will be cover which are the hardware parts and software parts.

The Result and discussion of the project will be cover in Chapter IV. This chapter are discuss the result that I got. The subtopics are also will be cover which are the project analysis and expected result.

Finally, in Chapter V the conclusion for the project is made and suggestion for future plan are discuss for further implementation and upgrading the prototype itself.

CHAPTER II

LITERATURE REVIEW

2.1 Introduction

Radio-frequency identification (RFID) is an automatic identification method, relying on storing and remotely retrieving data using devices called RFID tags or transponders [2]. RFID tag is an object that can be applied to or incorporated into a product, animal, or person for the purpose of identification using radio waves. Some tags can be read from several meters away and beyond the line of sight of the reader.

Most RFID tags contain at least two parts. One is an integrated circuit for storing and processing information, modulating and demodulating a (RF) signal and can also be used for other specialized functions. The second is an antenna for receiving and transmitting the signal. A technology called chip less RFID allows for discrete identification of tags without an integrated circuit, thereby allowing tags to be printed directly onto assets at lower cost than traditional tags [3].

Today, a significant thrust in RFID use is in enterprise supply chain management, improving the efficiency of inventory tracking and management. However, a threat is looming that the current growth and adoption in enterprise supply chain market will not be sustainable. A fair cost-sharing mechanism, rational motives and justified returns from RFID technology investments are the key ingredients to achieve long-term and sustainable RFID technology adoption.