RFID APPLICATION SYSTEM IN CHECKING PATIENT

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ABSTRACT

In this research, I will focus on the software design and database system model for RFID Application System in Checking Patient. This system builds to replace the manual process to register patient information and avoid medical mistake. The previous manual process had caused a lot of troubles and not systematic. IT is developed to provide a digitalizing form to help the administrator to perform their task in a more efficient way and also to avoid mistake in checking patients especially in ward. Based on the system, it provides data availability for read operations while supporting fault-tolerance and fast data transformation. Accurate, relevant and timely information required the use of sophisticated system, with the database management system, with usingMicrosoft Access.

ABSTRAK

Dalam kajian ini, saya akan fokus pada pembinaan sistem dan model sistem maklumat untuk Sistem Aplikasi RFID Memeriksa Pesakit. Ini dibina untuk menggantikan proses manual untuk mendaftarkan maklumat pesakit dan mengelakkan kesalahan perubatan. Proses manual sebelumnya telah menyebabkan banyak masalah dan tidak sistematik. System IT dibangunkan untuk memberikan bentuk digital untuk membantu pentadbir untuk melakukan tugas-tugas mereka dengan cara yang lebih cekap dan juga untuk mengelakkan kesalahan dalam menyemak pesakit terutama di wad. Berdasarkan sistem ini, ia menyediakan ketersediaan data untuk operasi baca smbil menyokong kesalahan-toleransi dan cepat transformasi data. Maklumat yang tepat, relevan dan tepat pada masa diperlukan penggunaan sistem yang canggih, dengan sistem pengurusan maklumat, dengan menggunakan Microsoft Access.

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CHAPTER1

INTRODUCTION

1.1 Introduction

The RFID system is one of the standard systems used for automatic identification or recognition (auto identification; Auto ID). By using radio waves to transmit recognized data and complete identify and content recognition, this system can carry out, exchange data, object tracing, classification, and statistical analysis and more quickly and without spatial limitations.

Radio frequency identification (RFID) technology uses radio waves to automatically identify physical objects which is either living being or inanimate items. Therefore, the range of objects identifiable using RFID includes virtually everything on this planet. For this RFID technology is likely automatic identification (Auto-ID) technology by

which a physical object can be identified automatically. Other examples of Auto-ID are bar code, biometric, voice identification and optical character recognition (OCR) systems.

1.1.1 RFID's characteristics

Figure 1 above show an RFID system, this system is an integrated collection of components that implement an RFID solution. An RFID system consists of the following components from an end-to-end perspective; which are tag, reader, reader antenna, controller, (sensor, actuator and annunciator), (host and software system) and communication infrastructure.

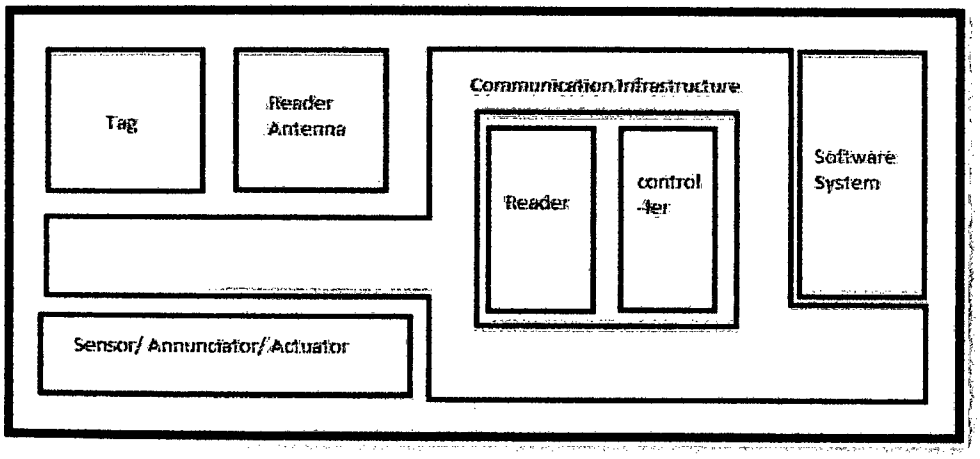

Figure 1.1 RFID System

An RFID tag can be classified in two different ways. First ways is based on whether the tag contains an on-board power supply and/or provides support for specialized tasks; passive, active, semi-active. And the other way is reader that also

called an interrogator, is a device that can read from and write data to compatible RFID tags.

RFID is a method for remotely storing and retrieving data using devices called RFID tags or transponders. An RFID tag is a small object, such as an adhesive sticker, that can be attached to or incorporated into a product. RFID tags are composed of an antenna connected to an electronic chip. These chips transform the energy of radio-frequency queries from an RFID reader or transceiver to respond by sending back information they enclose. Finally, a computer hosting a specific RFID application or middleware pilots the reader and processes the data it sends. RFID has great characteristics, which are it is possible to scan tags in motion and since it use radio waves, so it can pass through most solid objects, the tags don't need to be in direct line of sight of the RFID reader.

Having labeled or tagged objects being identifiable in a ubiquitous and flexible manner is already a good start. With using unique number one can easily retrieve data about them. Especially in healthcare, it van improves patients safety by reducing medication errors.

1.1.2 RFID in Healthcare

Technologies of identification by radio frequencies (RFID) experience a fast development and healthcare to be one of its major growth areas. The application of Radio Frequency Identification (RFID) to patient care in hospitals and healthcare facilities has only just begun to be accepted. It's because with using this application, it will give many benefits to patient care and hospital operations.

It examines how patients are processed from admission to discharge, and consider where RFID can be applied. From a time-and-motion perspective, it shows how hospitals can apply RFID in 3 ways; which is fixed RFID readers interrogate mobile objects; mobile, handheld reader interrogates fixed objects; and mobile, handheld readers interrogate mobile objects.

Implemented properly, RFID can significantly aid the medical staff in performing their duties. It can greatly reduce the need for manual entry records, increase security for both patient and hospital, and reduce errors in administering medication. Hospital is likely to encounter challenges, however, when integrating the technology into their day-to-day operations. What we can help hospital administrators determine where RFID can be deployed to add the most value.

The application of Radio Frequency Identification (RFID) to patient care in hospitals and healthcare facilities is just beginning to be accepted. The technology offers great potential benefits and is the next big step in identifying and tracking patients, objects and assets; and also speeds up or eliminates many manual operations in checking and processing patients. To reduce such errors, some hospitals have started utilizing wristbands embedded with RFID chips for identifying patients electronically and matching those patients to necessary surgical procedures.

1.2 Problem Statements

The registration of patients in the hospitality is increasing tremendously throughout the year. At the same time, the information of medicine and patients are also increasing which make the administrators of the pharmacy find it difficult to search for

the information they want. As the current system used by most medical place are the manual recorded mean into log book, searching and any update of information; and some places like main hospital has using a digital system without RFID application to manage patient data. However, the medical staffs also have difficulties in checking patients' information because there is a lot data to be identified in file or system. Therefore, they may face problems in checking patients and can cause mistaken data and problem in time management.

Many health professionals are concerned about the growing number of patients who are misidentified before, during or after medical treatment. Indeed, patient identification error may lead to improve dosage of medication to patient, as well as having invasive procedure done. Other related patient identification errors could lead to inaccurate lab work and results reported for the wrong person, having effects such as misdiagnosis and serious medication errors.

1.3 Objectives

The objectives of this project are:

1. To implement a RFID application system to improve the checking patient system from manual application to digital application.
2. To deduct the maintenance of a long periodtime in management; thus make easier workflow to medical staffs.
3. Help avoiding several mistakes/error, such as patients' misidentification.

1.4 Scopes

The scopes of this project are:

Scope System

1. Prototype focus in RFID application.
2. To prevent data misidentification.

Scope User

1. The prototype is use for medical staff:
   - **Doctor and Nurse**: checking patient and update medication data.
   - **Other Medical Staff**: register patient information & update patient information.
2. The prototype is use to **patients that stay in ward only.**
   - Using wristband tag as patient identification.

1.5 Thesis Organization

The thesis is organized in five chapters. Chapter 1 presents a general background of the research focus, problem statement, and research objectives and scopes.

Chapter 2 covers the literature review. First, an introduction to highlight the point discussed in this chapter. An overview of RFID's characteristics, practical application in medical, advantages and disadvantages of using RFID and benefit of

RFID's system is presented. Besides that, this chapter will analyze and overview in particular the existing systems in Leveraging RFID in Hospitals, Handheld RFID Patient Safety Improvement and Building & Smart Hospital using RFID technology in what techniques that they used. And also make comparison between those 3 RFID existing systems.

In chapter 3, the research methodology is presented. The development phases are presented. The phases are including analysis about the system; designing of system needed, flow process of the system, list the entire requirement needed and also testing the system. This chapter is intended to provide sufficient details on the method used, procedures followed, and overall development process.

In chapter 4, all the results and discussions are presented based on the experimental results. Finally, conclusion and contribution of the thesis are presented in chapter 5, along with the suggestion for future works based on the analysis and evaluation proposed method.

CHAPTER2

LITERATURE REVIEW

2.1 Introduction

This section for discuss about RFID's characteristics, practical application in medical, advantages and disadvantages of using RFID. Besides that, this chapter will analyze and overview of benefit of RFID's system, existing systems and techniques that they used. And also make comparison between RFID existing systems which is consisting of what of category manufacture that they make system, their application, tools, functions, security, issues and solutions.

2.1.1 RFID's practical application in medical.

Apart from its basic fast recognition feature, the RFID technology has other features, such as:

Table 2.1 Common RFID Technology Application

Application	Description
1. Radio reader	It directly reads information and inputs this into databases through RFID Readers.
2. Large reading quantity	It allows the processing of many tags at one time and records the treated conditions on the tags for future reading.
3. Mobile reading	It allows reading at high-speed movement.
4. Ease of miniaturization and diversification	It possesses characteristics that fit different applications, thereby providing a broad scope of application with a tendency for gradual expansion.
5. Environment resistance	It is unlike the traditional ID data dominated by the bar code or the manufacture's number, which does not resist dirt, needs a long time to be recognized under inclement weather or from which data cannot be continuously traced. In comparison RFID is heat-, water-, and impact–resistance; in fact, the tag can be maintained for more than ten years and can be accept writing for more than hundreds of thousands and even millions of time.
6. Repeated usability	Since it stores electronic data, RFID can be rewritten repeatedly.
7. Penetrability	Even if envelop with nonmetal or opaque material such as paper, lumber or plastic, RFID can process information, except when wrapped with material of

	metallic quality.
8. Large data memory capacity	It can accommodate increasing volume capacity; therefore RFID information will not be limited to be capacity of bar code (Cheng et al, 2007). Owing to its advantage of automatically recognizing and capturing information, facilitating the safe reading of much data at one time and its ability to be used repeatedly, RFID demonstrates remarkable application potential.

2.1.2 Benefit of RFID system

Table 2.2 Benefit of RFID from existing system

Structure	Explanation
Operational benefits	1. Increased patient recognition 2. Reduction of medical mistake 3. Statistical information produced 4. Reduced preparation time (supports the work of the medical staff) 5. More affective data processing 6. Improved work efficiency among medical care personnel and the administrator, thereby saving human resources. 7. Reduced costs due to improper treatment 8. Effective management and application of medical resources. 9. Work schedule and time frame analysis of medical personnel provided, which helps calculate cost and

	efficiency.
Users' benefits	1. Real-time access to key health information 2. Increased information regarding patients hospitalized and transferred. 3. Faster and more convenient method for patient enquiries. 4. Enhanced tracking of patient services, thereby increasing rate of return. 5. Increased convenience in the hospitalization process and shortened hospitalization period. 6. Improved safety
Organizational and environmental benefits	1. Improved establishment of national medical information (which gives the impetus for the development of the Emergency Operation Center (EOC) policy) 2. Hospital publicity 3. Integrated medical industry services 4. Promotion of electronic case history development as standard practice 5. Improved internal communication within hospitals and enhanced service capabilities 6. Expanded scope of medical service, faster first aid treatment and increased business income. 7. More efficient management of waste, materials and biopsy material.

2.1.3 Advantage and Disadvantage of Using RFID

Table 2.3 Advantage and Disadvantage RFID in existing system

Advantage	Disadvantage
1. RFID tags are very simple to install/inject inside the body of animals, thus helping to keep a track on them. This is useful in animal husbandry and on poultry farms. The installed RFID tags give information about the age, vaccinations and health of the animals. 2. RFID technology is better than bar codes as it cannot be easily replicated and therefore, it increases the security of the product. 3. Supply chain management forms the major part of retail business and RFID systems play a key role by managing updates of stocks, transportation and logistics of the product. 4. Barcode scanners have repeatedly failed in providing security to gems and jewelries in shops. But nowadays, RFID tags are placed inside jewelry items and an alarm is installed at the exit doors. 5. The RFID tags can store data up to 2 KB whereas; the bar code has the	1. The RFID technology, though very beneficial, is expensive to install. Small and medium scale enterprises find it costly to use it in their firms and offices. 2. It is difficult for an RFID reader to read the information in case of RFID tags installed in liquids and metal products. The problem is that the liquid and metal surfaces tend to reflect the radio waves, which makes the tags unreadable. The tags have to be placed in various alignments and angles for taking proper reading. This is a tedious task when the work involves big firms. 3. Interference has been observed if devices such as forklifts and walkie-talkies are in the vicinity of the distribution centers. The presence of mobile phone towers has been found to interfere with RFID radio waves. Wal-Mart, the retail sector giant, has installed billions of RFID tags in their

ability to read just 10-12 digits.	products throughout the world and they have encountered such problems. 4. The USA and Europe, for instance, have different range of frequencies that allow RFID tags to function. This makes it mandatory for international shipping companies and other organizations to be aware of the working pattern of other nations also, which can be very time-consuming. 5. RFID technology has been referred to as invasive technology. Consumers are apprehensive about their privacy when they purchase products with RFID tags. Once the radio chips are installed in the product, the customer can be tracked and his personal information can be collected by the RFID reader. However, many stores have a facility that deactivates the RFID tags after the product has been purchased.