

**RFID-ENABLED HEALTH DATA MANAGEMENT SYSTEM
IN POST NATAL WARDS**

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 Wards.....
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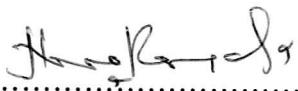
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To My Beloved Husband, En Ahmad Hafez Bin Hj Zaidi

My Parents, En Razali Bin Hj Mustapa & Pn Noor Aini Bt Abdullah

And Beloved Family

For Their Never Ending Support And Unconditional Love

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ABSTRACT

This Radio Frequency Identification (RFID)-enabled health data management system is a one stop centre data collection that is designed to use in post natal wards. The main objective of this project is to develop software that uses Graphical User Interface (GUI). Using this software, users will be able to save a relevant medical data for parents and their respective baby. The information of registration, bill payment and pharmacy prescription are integrated within the system for a better data management in hospital. For a start, pregnant women who had their routine prenatal inspection will be given one RFID card during registration. Whenever a newborn baby is born, all the related details will be saved into the system by reading the card to the reader to get the identification number that is co-related to the mother's detail that have been recorded beforehand. Every RFID card contains different unique identity to differentiate them. The card which carries only a string of unique number will be link to the system once it is touch to the reader that is connected to the computer port. So, whenever the card holder gives the medical staff the card that later on to be read upon the specific reader all related information will be display in the computer. These data will be available in the system for recording and viewing purpose. This project will help to create a better filing management system in a big organization such as hospital.

ABSTRAK

Projek ini adalah projek yang direka sebagai pusat pengumpulan data yang akan digunakan di sesebuah wad bersalin khususnya. Objektif utama projek ini adalah untuk membina satu sistem di mana satu perisian yang menggunakan pendekatan persemukaan grafik pengguna akan dibangunkan. Segala maklumat berkaitan mengenai ibu, bapa serta bayi akan dapat direkodkan ke dalam sistem. Maklumat-maklumat berkaitan pendaftaran, pembayaran bil dan preskripsi farmasi digabungkan di dalam satu sistem untuk memudahkan pentadbiran data di dalam hospital Sebagai permulaan, mana-mana wanita mengandung akan diberikan sekeping kad RFID ketika pendaftaran di hospital. Apabila wanita tersebut melahirkan bayinya, segala maklumat berkaitan kelahiran akan direkodkan. Setiap kad tersebut mempunyai identiti unik yang tersendiri. Kad RFID tersebut yang mempunyai gabungan sepuluh nombor identiti unik akan disambungkan kepada sistem apabila ia dibaca oleh alat khas yang mana telah disambungkan kepada sesebuah komputer. Jadi, pemegang kad hanya perlu memberi kad kepada staf hospital yang kemudiannya akan meletakkan kad tersebut kepada alat khas untuk mendapatkan paparan maklumat yang telah disimpan di dalam sistem pada komputer. Maklumat-maklumat baru juga boleh ditambah dan dilihat semula sebagai rekod di dalam sistem ini. Projek ini membantu mewujudkan sistem fail yang lebih baik terutamanya di sesebuah organisasi besar seperti hospital.

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LIST OF ACRONYMS

EEPROM		Electrically Erasable Programmable Read Only Memory
GUI	-	Graphic User Interface
HF		High Frequency
IC		Integrated Circuit
LF		Low Frequency
RFID		Radio Frequency Identification
SRAM		Static random Access Memory
SQL		Structured Query Language
UHF		Ultra High Frequency
USB		Universal Serial Bus
VB	-	Visual Basic

CHAPTER I

INTRODUCTION

Chapter I give an overview of RFID-enabled Health Data Management System. The objectives of the project are stated clearly. There are few problem statements that explain about the existing problems which is eventually lead to this project development. The methodology explains briefly about the project flow from the beginning which is the literature review, the hardware testing, the database and software development, the database testing, the system testing, the troubleshooting and finally the thesis writing and presentation. The scope of work which consisting of hardware and software development is being discussed in this chapter as well.

1.1 Introduction

Nowadays, post natal wards uses pieces of papers as for documentation purpose. When medical staffs are doing their routine, they recorded the details in the selected files. These piled papers will be kept in their old conservative way and will be extracted manually whenever needed. However, if the files were managed badly, the missing data from the file could causes medical negligence. Details of health information such as allergies and medications are critical for babies.

Therefore, this project's developed so that every detail changes are saved by the system and it is updated with the specific date and time. Thus, it will reduce error's probability by endorsing the right details of medical data into the system. Furthermore, the system integrates with the department within the hospitals.

For this project implementation, each parent is required to register and they will get a unique card for them to keep. So, whenever a mother delivers a baby and warded, all the details will be kept in the system. However, the card does not store information as it only carries a unique identity that can be link to the system later on.

This particular RFID card represents their file during the check ups. To start a registration, the nurse must flashes the RFID card to the reader, where a unique identity is extracted from the RFID card at this point. Each card carries a unique identity that is assigned to a particular baby upon registration. When the card flashes, an event log is uploaded. Nurses will start to fill in the required information via a computer that is connected to the reader.

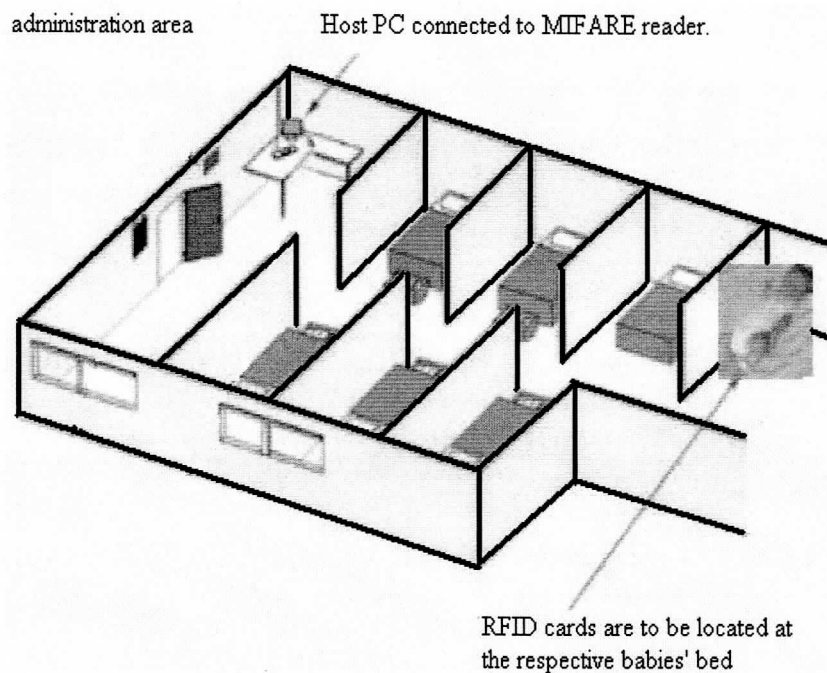


Figure 1.1: System Overview

This event log about the baby will be display on the PC and can be changed/update by the authorized person only. This is to prevent any unauthorized person access the event log and might accidentally adjust or edit any information without permission. By having only restricted staff access, the confidentiality of data maintain as private viewing and only for medical purpose.

Once registered, all changes in health history from the moment the baby was born is recorded to the software system and saved. Later, any authorized person will have an access (password for security purpose) to get a view of an updated medical information such as baby's parents' details, allergies, medications, immunizations and all related information when a particular card is flashes to its reader. This event log may be uploaded with babies and mothers' pictures as well for recognition purpose. However the saved information cannot be changed to protect the originality of the record and for viewing purpose only.

If the infant require moving to another part of the hospital, the system may benefit for medical tests, discharge or billing purpose. This is a simple procedure and can be completed at one of the PC's where a nurse or administrator passes the baby's card to the reader to get access to the data base/ administration software. Shift changing nurse or doctors should be able to get access the information for monitoring purpose by passing the card of which baby they are inspecting to the reader. These event logs are printable, as a backup hard copy.

1.2 Objective

The objectives of this project are:

- i) To provide a RFID-enabled one stop data centre using a single RFID card via a matching reader.
- ii) To develop a software using Graphic User Interface (GUI) to be link to the reader (hardware).
- iii) To develop the user friendly software that minimizes paper usage.

- iv) To create a better file management system in a post natal wards where information about infants and respective mothers are critical.
- v) To integrate hardware and software and ensure both of it are working properly as planned.
- vi) To create a standard of data security whereas only an authorized medical staff are allowed to access the patients medical record, which is very private and confidential information

1.3 Problem Statement

- i) Mishandling medical documentation in hospital. Reduce errors in information of medical and registration records.
- ii) Set up certain security purpose for critical medical information, thus the information could be well kept for monitoring purpose and medication schedule. This will also protect the privacy of the patient as medical record is private and confidential.
- iii) Compile all health information about parents with their respective child altogether which can be access via a single card. The medical records will be tally with the appointment as well as other hospital department such as registration, payment and pharmacy.
- iv) The medical staff would have been able to extract and saved the relevant details in system via a personal computer that linked to the RFID reader. The log may link to another log that contains graph or chart for medical record such as body temperature or immunization numbers.
- v) Data error is serious especially when it comes to deal with health information and decision whereas newborn babies are very sensitive at this critical stage.

1.4. Scope Of Work

This RFID-enabled health data management project purpose is to integrate the reader as hardware device to the software that will be fully-developed by me. The hardware part consisting of MIFARE card and its matching reader while the software part will be develops throughout this PSM project. The software will be displaying an event log of health information when a MIFARE card is touch to its reader that is connected to a PC in a post natal ward.

The system consists of registration for mother and father, registration for the newborn baby, pay the bill or view the payment record, prescribe new medication or view the medication prescribed before. The system is to be accessed by the medical staff only as they had the right username and password to access the system.

1.4.1.1 Hardware

As Mentioned before, during the project development the hardware that will be used had been loaned from IBS Technology Sdn Bhd in Kuala Lumpur. The desktop reader will detect unique identity from a MIFARE card and send that particular number to the system. When a system detected the particular identity, the system will be display information via the developed software.

1.4.1.2 Software Development

For the whole software development, I will use a Graphical User Interface via a Visual Basic version 6.0. This software are expected to be a user friendly programming as the user varies from nurses to medical doctor which had minimum exposure on the programming-based software. This programming language is used to integrate with the reader, which act as an input. The medical staff would have basic understanding of the event log and how to make use of it when they put particular card to the assigned reader that is allocated and linked to the host computer via a RS 232C port. A fewer steps taken in a simpler task needed for executing to the next stage of data record is desired.

Firstly, I created the data storage system in Microsoft Access. There are certain tables with specific names identification that will be link to Visual Basic Whenever a 'SAVE' command button is clicked on the event log by a medical staff, all related data and information will be exported to Microsoft Access and saved as data information. These details of information are saved in the system and may be extracted and being displayed in Visual Basic graphic user interface whenever it will be needed later on by user.

Once the database has been created, the software development were mainly focus on the software flow in order to produce a user friendly output. The steps taken should be very minimal but effective in a way that users with minimal skill of technology could handle this system well. The system display uses a friendly user approach as its main strength as it will reduce hassle thus keep the time efficiency at top without compromising on the data efficiency as the objectives' priority.

1.5 Methodology

- 1) Literature reviews
 - Collect information on hardware, GUI and database..
- 2) The Hardware testing
 - Check the functionality of the reader to extract the unique identity number of the card.
- 3) The Database & Software Development
 - The database is designed according to the data required
 - The appropriate GUI for the system is also developed
- 4) The Database Testing
 - Once the database development work completed, the system is tested whether it is working successfully
- 5) The System Testing
 - The entire system is then tested
 - Any errors will be modified and tested to ensure the system functions well.

- 6) Troubleshooting
 - If the system does not work, the troubleshooting has to be done to identify the problem.
 - Check the flow control of the software to have a user friendly system.
- 7) Thesis Writing and Presentation
 - Prepare the thesis and present the project output for seminar.

1.6 Thesis Layout

Chapter I give an overview of RFID-enabled Health Data Management System. The objectives of the project are stated clearly. There are few problem statements that explain about the existing problems which is eventually lead to this project development. The methodology explains briefly about the project flow from the beginning which is the literature review, hardware testing, the database and software development, the database testing, the system testing, the troubleshooting and finally the thesis writing and presentation. The scope of work which consisting of hardware and software development is being discussed in this chapter as well.

Chapter II consists of theories and background study on RFID reader and RFID tags as the hardware. This is followed by a brief explanation about Visual Basic and Microsoft Access which is the parts of the system, respectively the database software. The RFID application in the daily routine is being discussed. The facts about RFID versus Barcode implementation and how the RFID may overcomes the barcode deficiency is discussed in this chapter too.

The overview of the methodology used in this project is described in Chapter III. Details from the beginning of the project until the end of this project explained in this chapter. Project is started with literature review about hardware and software. Once the RFID readers are able to extract the unique identity number from the card, the software development started. After the software completed, the integration between both the hardware and software is done to ensure the system capability.

The output results are discussed in Chapter IV. The result is dividing into 2 parts. The first part is hardware testing. The reader is being check to make sure its functionality with the RFID card. This is important as the defect reader would not be able to read the unique identity number of the card and thus the system fails. For the second part is the software development. The flow control of the development is also crucial as it will know which forms to display; aside from all the related forms that had been created.

Chapter V consists of the discussion and conclusion of the project. The suggestion for future work is also mentioned in this chapter.