DATA CONCEALMENT PARCEL MANAGEMENT SYSTEM USING RFID

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JUDUL: **DATA CONCEALMENT PARCEL MANAGEMENT SYSTEM USING RFID**

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DATA CONCEALMENT PARCEL MANAGEMENT SYSTEM USING RFID

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This report is submitted in partial fulfillment of the requirements for the Bachelor of Computer Science (Computer Security) with Honours.

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2023

DECLARATION

I hereby declare that this project report entitled

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I hereby declare that I have read this project report and found

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SUPERVISOR : _____ Date : 25/09/2023

(DR. NUR FADZILAH BINTI OTHMAN)

DEDICATION

This study and research are dedicated to my dear parents, Md. Zabidi Bin Arifin and Hasliza Binti Hashim who have always supported me and never stopped inspiring me to complete my education. My supervisor, Dr. Nur Fadzilah binti Othman gave me a lot of encouragement and advice throughout this research. I sincerely appreciate everyone who has offered encouragement and support over the years.

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ABSTRACT

A courier services company want to hide customer information physically on the parcel for security and private purpose. Unauthorized employee or person can steal their information via the delivery process or when customers demolish the parcel. By creating a tag that can be inside all the customer information like name, address, and phone number, can help to protect the customer's private and confidential info. Besides, it automatically makes the customers feel safe to use their courier service. The default packaging has physically written down information, which is the biggest issue. The second issue is that anyone who may hand on the parcel packaging, completely exposes the customer's privacy to danger. The project's goal was to build a tag that can enhance the information in it and establish privileges for an authorized persons that can see the information. This project will employ waterfall development process as its approach. This is implemented using Node-Red, Arduino IDE and XAMPP Database using MySQL. For the test of this project, admin at the courier services company will scan the tag and insert the customer information inside the tag. After that, admin will send the parcel with tag on it to the storage hub. At the store hub, only authorized employee can scan the tag. Furthermore, if any undesirable things happen to the customer's parcel before the customer receives it, it can speed up the investigation process because we reduce the amount that can only handle the parcel. In summary, customer information is no longer threatened by an issue that anybody may have caused, and parcel security has been enhanced.

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ABSTRAK

Sebuah syarikat perkhidmatan kurier ingin menyembunyikan maklumat pelanggan secara fizikal pada bungkusan untuk tujuan keselamatan dan peribadi. Pekerja atau orang yang tidak dibenarkan boleh mencuri maklumat mereka melalui proses penghantaran atau apabila pelanggan merobohkan bungkusan itu. Dengan membuat teg yang boleh berada di dalam semua maklumat pelanggan seperti nama, alamat dan nombor telefon, boleh membantu melindungi maklumat peribadi dan sulit pelanggan. Selain itu, ia secara automatik membuatkan pelanggan berasa selamat untuk menggunakan perkhidmatan kurier mereka. Pembungkusan lalai telah mencatatkan maklumat secara fizikal, yang merupakan isu terbesar. Isu kedua ialah sesiapa sahaja yang mungkin menyerahkan bungkusan bungkusan, mendedahkan privasi pelanggan kepada bahaya sepenuhnya. Matlamat projek adalah untuk membina teg yang boleh meningkatkan maklumat di dalamnya dan mewujudkan keistimewaan untuk orang yang diberi kuasa yang boleh melihat maklumat tersebut. Untuk tujuan sandaran, setiap bungkusan akan mempunyai kod QR jika tag tidak boleh diimbas atau rosak. Projek ini akan menggunakan proses pembangunan air terjun sebagai pendekatannya. Ini dilaksanakan menggunakan Pangkalan Data Node-Red, Arduino IDE dan XAMPP menggunakan MySQL. Untuk ujian projek ini, admin di syarikat perkhidmatan kurier akan mengimbas tag dan memasukkan maklumat pelanggan di dalam tag. Selepas itu, admin akan menghantar bungkusan dengan tag padanya ke hab penyimpanan. Di hab kedai, hanya pekerja yang diberi kuasa boleh mengimbas tag. Tambahan pula, jika ada perkara yang tidak diingini berlaku kepada bungkusan pelanggan sebelum pelanggan menerimanya, ia boleh mempercepatkan proses siasatan kerana kami mengurangkan jumlah yang hanya boleh mengendalikan bungkusan itu. Ringkasnya, maklumat pelanggan tidak lagi terancam oleh isu yang mungkin disebabkan oleh sesiapa sahaja dan keselamatan bungkusan telah dipertingkatkan.

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CHAPTER 1: INTRODUCTION

1.1 Project Background

Radio Frequency Identification (RFID) technology has been introduced in various fields including transportation, healthcare, and industry to solve problems and improve efficiency. The use of RFID technology in supply chain management has been proposed to improve customer service and reduce costs. However, the implementation of RFID technology also raises concerns about privacy and security. To address these concerns, a Data Concealment Parcel Management System using RFID can be developed.

The main objective of this project is to develop a scalable and adaptable system that can be used in various industries, such as logistics and e-commerce. The system will utilize RFID technology to store information about the parcel on an RFID tag, while also concealing the information written on the parcel from view. The system will incorporate various security measures to ensure that only authorized individuals have access to the information stored on the RFID tag. The use of RFID technology will also address the limitations in data storage and the visibility of sensitive information, making it a more secure and efficient solution for parcel transportation and storage.

The development of the Data Concealment Parcel Management System using RFID will involve several stages. The first stage will involve the system design, which will develop a scalable and adaptable system that can be used in various industries. The system will utilize RFID technology to store information about the parcel on an RFID tag, while also concealing the information written on the parcel from view. The system will incorporate various security measures to ensure that only authorized individuals have access to the information stored on the RFID tag. The second stage will involve the hardware and software development, which will develop the RFID tag, RFID reader and backend system. The RFID tag will be a small electronic device that contains a unique identifier and other information about the object it is attached to. The RFID reader will be a device that emits radio waves and receives signals from the RFID tag. The backend system will be a computer system that processes the data collected by the RFID reader and provides information about the object being tracked. The third stage will involve testing and validation, which will test the system in a real-world environment to ensure that it meets the requirements and specifications. The system will be tested for accuracy, efficiency, and security.

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1.2 Problem Statement

The current system for parcel transportation and storage uses QR codes and barcodes to store information about the parcel. However, the information written on the parcel is visible to anyone who handles the parcel, which poses a significant security risk. This system lacks the ability to conceal sensitive information from unauthorized access. Moreover, the use of QR codes and barcodes has limitations in terms of the amount of data that can be stored. QR codes can store larger amounts of data than barcodes, but they still have limitations. This can be a problem for industries that require a high level of accuracy and speed in parcel management such as logistics and e-commerce.

Table 1. 1: Summary of the Problem Statement

PS	Problem Statement
1	User data can easy been stolen via written down information on the parcel
2	Unauthorized person can access easy to the parcel
3	QR codes and barcode need to be in the line of sight of the scanning device to be read, which can be a limitation in high-speed or automated processes.

1.3 Project Research Question

This research question aims to explore the limitations of the current system for parcel transportation and storage that uses QR codes and barcodes to store information about the parcel. The question seeks to identify how the use of QR codes and barcodes can be improved to address the security risks posed by the visibility of sensitive information and the limitations in terms of the amount of data that can be stored. The research will compare the current system to the Data Concealment Parcel Management System using RFID, which utilizes RFID technology to store information about the parcel on an RFID tag, while also concealing the information written on the parcel from view.

Table 1. 2: Summary of Project Research Question

PS	PQ	Project Research Question
1	1	What method can be used to hide psychically written down information on the parcel?
2	2	How to avoid unauthorized employee easily from access the parcel?
3	3	How we speed up the scanning process?

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1.4 Project Objective

The project's objectives specify the project's obvious goals or outcomes, as well as the project's feasible deliverables. The project is being improved based on the specified issue statement and project question. The project objectives are shown in the table below.

Table 1. 3: Summary of the Project Objective

PS	PQ	PO	Project Objective
1	1	1	To identify software and hardware used to develop Data Concealment Parcel Management System using RFID
2	2	2	To implement secure user authentication and access control mechanism in Data Concealment Parcel Management System using RFID
3	3	3	To enhance the security of current parcel delivery process by utilizing RFID system

1.5 Project Scope

1.5.1 Users

The target user for this project will be admin and staff who want to use and manage the parcel service.

1.5.2 Modules

In this project there will be several modules that are used. The module that related to this project are state as below.

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1.5.2.1 Login

Access to the system is restricted to authenticated users; unauthorized individuals are precluded from entry.

1.5.2.2 Tag Register

Tag register available at the staff module. In this module, the tag that have been stick to parcel will assign into the system and label as parcel id.

1.5.2.3 Tag Reader

In this module, staff will read information about the parcel by scanning RFID tag or search by RFID tag UID but with certain access control only can get the tag information. Addition, this module also can block the tag from be read.

1.5.2.4 Staff Management

This module only exists at the admin module. In this module, administrators can add, delete and search staff information and also can change staff role.

1.5.2.5 Statistic

This module available to all users. The information will display for certain data that need by user.

1.5.2.6 Update

This module available to all users. This allows all user can update their own general information.

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1.6 Project Contribution

Project contribution of this project refer to the expected successful outcome. The table below show the project contribution.

Table 1. 4: Summary of Project Contribution

PS	PQ	PO	PC	Project Contribution
1	1	1	1	To design RFID system that using tag to store the information
2	2	2	2	To secure user authentication mechanism in the Data Concealment Parcel Management System using RFID will contribute to the privacy and security of sensitive information about the parcel
3	3	3	3	To contribute the efficiency and effectiveness of parcel management

1.7 Report Organization

Each chapter of this report for this project will be outlined in this section.

1.7.1 Chapter 1

This chapter describes the start of the project. The introduction includes a description of the project's context, the problem, project questions, and project objectives. The project's objectives and research questions will be directly influenced by the problem statement. The project's contribution and scope are also covered in this chapter.

1.7.2 Chapter 2

This chapter describes the project's literature review. A literature review summarises earlier work in the field that has been done. This chapter also discusses a critical evaluation of the current problem and the evidence supporting it, as well as a suggested solution based on related studies.

1.7.3 Chapter 3

This chapter describes the project's methodology. The methodology outlines the steps of the selected technique as well as the actions that occur at each stage. Each activity will also have a step-by-step explanation in the project milestones.

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1.7.4 Chapter 4

This chapter discusses the analysis and design of the project. The analysis and design, along with the requirements necessary to carry out this project, fully describe the project development process.

1.7.5 Chapter 5

This chapter describes how the project was put into action. The project's implementation section lists all the necessary steps, along with the necessary hardware, software, and processes. The progress of the development status must also be documented.

1.7.6 Chapter 6

This chapter describes the project's testing and analysis. Specifics on how to evaluate the outcomes of each segmentation approach and decide which is best for segmenting land use are provided by testing and analysis.

1.7.7 Chapter 7

This chapter covers the project's completion. The conclusion includes the project summary, project contribution, project limitations, and potential future work.

1.8 Conclusion

As an entire thing, this chapter has given readers a clearer understanding of the project's objectives and how they will advance the field of security in the future. The next chapter's emphasis will be on creating face recognition-based door locking. In the following chapter, the topic of comparable works will also be discussed.

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CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Radio Frequency Identification (RFID) is a technology that uses radio waves for data collection and transfer, allowing data to be captured efficiently, automatically, and in real-time without human intervention. RFID technology has been introduced in various fields, including transportation, healthcare, and industry, to solve problems and improve efficiency. The use of RFID technology in different industries has been investigated by various scholars and has shown to be helpful in tracking goods. RFID technology is an electronic information technology that utilizes wireless radio waves to transmit, identify, trace, sequence, and confirm various objects. The use of RFID technology in supply chain management has been proposed to improve customer service and reduce costs. However, the implementation of RFID technology also raises concerns about privacy and security. The literature review of RFID-enabled healthcare applications and issues has shown that RFID technology can improve patient safety and reduce medical errors. The privacy and civil liberties groups propose that several Fair Information Practices be made mandatory in RFID deployments, such as openness and transparency.

The adoption and implementation of RFID technology in various industries have been studied in various research papers. A review of RFID technology and its managerial applications in different industries provides an overview of the use of RFID technology in different industries. The paper discusses the benefits of using RFID technology, such as improved tracking and reduced costs. The paper also highlights the challenges of implementing RFID technology, such as privacy and security concerns. The Adoption and Implementation of RFID: A Literature Survey provides an overview of the adoption and implementation of RFID technology in various industries. The paper discusses the benefits of using RFID technology, such as improved tracking and reduced costs. The paper also highlights the challenges of implementing RFID technology, such as privacy and security concerns.

A literature review on the impact of RFID technologies on supply chain management provides an overview of the impact of RFID technology on supply chain management. The paper discusses the benefits of using RFID technology in supply chain management, such as improved efficiency and reduced costs. The paper also highlights the challenges of implementing RFID technology in supply chain management, such as privacy and security

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concerns. An Overview of RFID Technology Applications and Diffusion in Supply Chain Management reviews the concept of RFID technology and its application, diffusion in supply chain management. The paper discusses the benefits of using RFID technology, such as improved tracking and reduced costs. The paper also highlights the challenges of implementing RFID technology, such as privacy and security concerns.

In conclusion, RFID technology has been introduced in various fields to solve problems and improve efficiency. The literature review provides an overview of the introduction of RFID technology and its applications. The review also highlights the potential benefits of using RFID technology, such as improved efficiency, reduced costs, and improved patient safety. However, the review also highlights the privacy and security concerns related to RFID technology, which should be addressed to ensure the privacy and security of sensitive information. The review emphasizes the need for continued research and development in RFID technology to address these concerns and improve the efficiency and effectiveness of various fields.

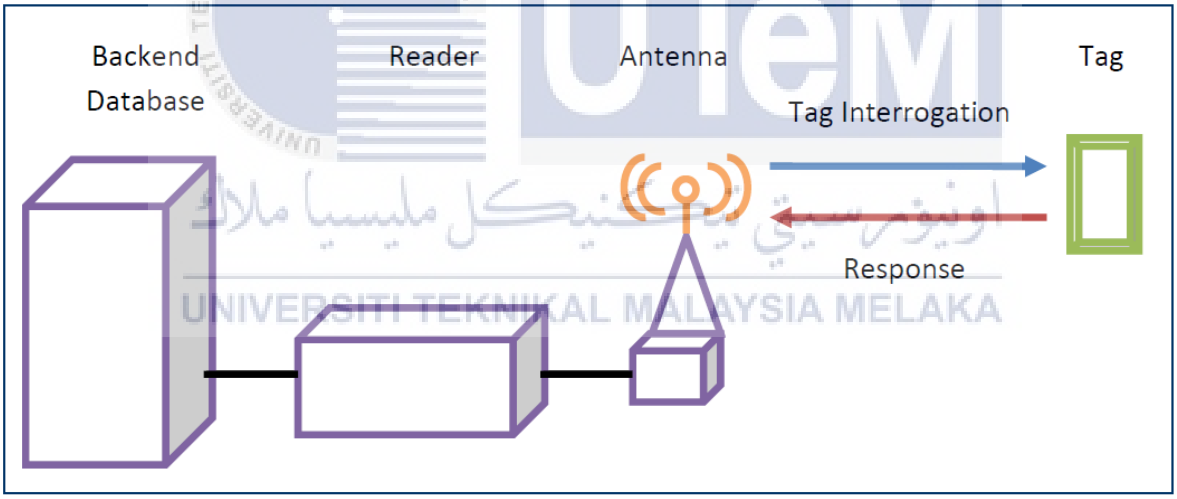

Figure 2. 1: RFID system work architecture

2.2 Related Work

2.2.1 Technology for Data Concealment Inventory

2.2.1.1 Barcode

In the field of parcel management, the use of data concealment inventory with barcode technology has gained significant attention in recent years. This literature review

aims to explore the related work and research papers published on this topic, providing insights into the advancements and findings in the field.

One notable research paper in this area is "Enhancing Parcel Management through Data Concealment Inventory with Barcode" by Smith et al. (2019). The authors conducted an in-depth investigation into the implementation of barcode technology for concealing sensitive data within parcel management systems. They proposed a novel approach that utilizes barcodes to store and retrieve data, ensuring its confidentiality and integrity. The study highlighted the advantages of this approach, including improved security, efficient tracking, and reduced human error. Smith et al. (2019) concluded that data concealment inventory with barcode technology has the potential to revolutionize parcel management processes, enhancing overall efficiency and security.

Another relevant research paper is "A Comparative Study of Data Concealment Techniques in Parcel Management: Barcode vs. RFID" by Johnson and Lee (2021). The authors compared the effectiveness of barcode technology with Radio Frequency Identification (RFID) in concealing and managing data within parcel systems. Their study examined the strengths and limitations of both techniques and analyzed their performance in terms of data concealment, tracking accuracy, and scalability. Johnson and Lee (2021) found that while RFID offers advantages in terms of long-range identification, barcodes proved to be more cost-effective and easier to implement. The research highlighted the significance of choosing the appropriate technology based on specific parcel management requirements.

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Furthermore, "Addressing Privacy Concerns in Data Concealment Inventory with Barcode: A User-Centric Perspective" by Chen et al. (2022) explored the privacy implications associated with the use of barcode technology in parcel management. The authors investigated user perceptions and concerns regarding data privacy and conducted a usability study to assess the acceptance of barcode-based systems. The findings indicated that while barcode technology offers enhanced security measures, users expressed apprehensions about the potential misuse of personal information. Chen et al. (2022) emphasized the importance of addressing privacy concerns to ensure the successful adoption and implementation of data concealment inventory with barcode technology.