

PAPERLESS ASSETS TRACKING SYSTEM VIA RFID

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

PAPERLESS ASSETS TRACKING SYSTEM VIA RFID

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Specially..

To my beloved parents and sister

To my kind supervisor

And not forgetting to all friends

For their

Love, Sacrifice, Encouragements, and Best Wishes

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ABSTRAK

Projek ini adalah satu reka cipta yang baru tentang sistem pengurusan aset UTeM yang termasuk menjejaki dan menguruskan aset. Untuk UTeM sistem pengurusan aset yang sedia ada, kakitangan perlu menggunakan kertas untuk memohon pinjaman aset dan menunggu kelulusan. Selain itu, staf perlu mendapatkan tandatangan daripada pengawal sebelum mengambil aset daripada UTeM. Kakitangan perlu melakukan langkah-langkah yang sama sekali lagi apabila mereka kembalikan aset tersebut. Inilah sebabnya mengapa Sistem Pengurusan Aset Tanpa Kertas (PATS) diperkenalkan. PATS adalah satu sistem yang mesra alam sekitar yang berubah dari bentuk kertas kepada bentuk laman web permohonan. Staf hanya perlu login akaun mereka dan memohon pinjaman aset melalui laman web. Di samping itu, PATS juga menggunakan konsep RFID di UTeM pintu pengawal untuk membolehkan kakitangan tag RFID kad aset dan merekodkan data sebelum membawa keluar aset UTeM. PATS mengatasi masalah yang dihadapi oleh sistem UTeM pengurusan aset semasa.

ABSTRACT

This project is a new implement on the UTeM asset management system which are includes tracking and manage the assets. For the existing UTeM assets management system, staffs have to use paper to apply for asset borrowing and wait for approval. Then the staffs have to get the signature from the guard before taking the asset out of UTeM. Staffs have to do the same steps again when they are returning the asset. This is why Paperless Assets Tracking System (PATS) are introduced. PATS is an environmental friendly system that changed from paper form to website form application. Staffs just need to login their account and apply it through the webpage. Besides that, PATS also applied the RFID concept at UTeM guard gate in order to let staffs tag the asset tag and record down the data before bringing out the UTeM assets. PATS overcome the problem that faced by current UTeM assets management system.

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LIST OF ABBREVIATION

CSS	Cascading Style Sheets
ER	Entity Relationship
GPS	Global Positioning System
GUI	Graphic User Interface
HF	High Frequency
HTML	HyperText Markup Language
IFF	Identify Friend or Foe
LF	Low Frequency
PATS	Paperless Assets Tracking System
PDA	Personal Digital Assistant
RFID	Radio Frequency Identification
SQL	Structure Query Language
UHF	Ultra High Frequency
UTeM	Universiti Teknikal Malaysia Melaka
VB	Visual Basic
XHTML	Extensible HyperText Markup Language

Chapter 1

Introduction

1.1 Background

Nowadays, companies have started to use radio frequency identification (RFID) as a badge to record the workers' attendance. RFID is a technology that incorporates the use of electromagnetic or electrostatic coupling in the radio frequency portion of the electromagnetic spectrum to uniquely identify an object or person [1]. RFID technology is better in data collection, as compared to bar code technology. This is because RFID uses electromagnetic fields to transfer data by approaching the reader, whereas bar code technology has to adopt direct contact or line of sight scanning. The antenna of RFID uses radio frequency waves to transmit a signal that activates the transponder. There are two types of RFID which are active type and passive type. An active type RFID has an internal battery to provide the power source within the tag to its RF communication circuitry, whereas passive type RFID just relies on the RF energy from the reader to the tag.

The purpose of this project is to use the passive type RFID to record down all the UTeM assets, making the process of applying UTeM assets more time saving. This project has to design a webpage for those who need to apply UTeM assets as well as

a database to store all the UTeM asset data and borrowed list. These assets must be equipped with a passive type RFID tag. All details of the assets are recorded down before being lent out. Borrowers just need to tag the RFID tag before taking the assets out of UTeM once they get the approval from the assets officer. They have to do the same steps again in the security guard house when they bring back the asset.



Figure 1.0 Concept of the project PATS

1.2 Problem Statement

The current UTeM assets application process is troublesome as the staffs have to apply the assets through several relevant departments. Yet, staffs have to do the same steps again when they return the assets. For example, staff has to go to department A to get the application form in order to borrow out the UTeM asset. Next, the staff has to wait the approval of the assets officer through email or by phone; only then they can collect the approval form and get the assets from the relevant department. This is

only part of the process, without including the procedures that needed to be gone through at UTeM security department.

Staffs have to stop by at the UTeM security department to get the approval for bringing out UTeM assets as well as returning the UTeM assets. These processes make the application process more troublesome. Besides that, staffs have to park the car aside UTeM security department in order to get the approval. The parking lots is limited, and it also didn't have a roof to cover during raining day.

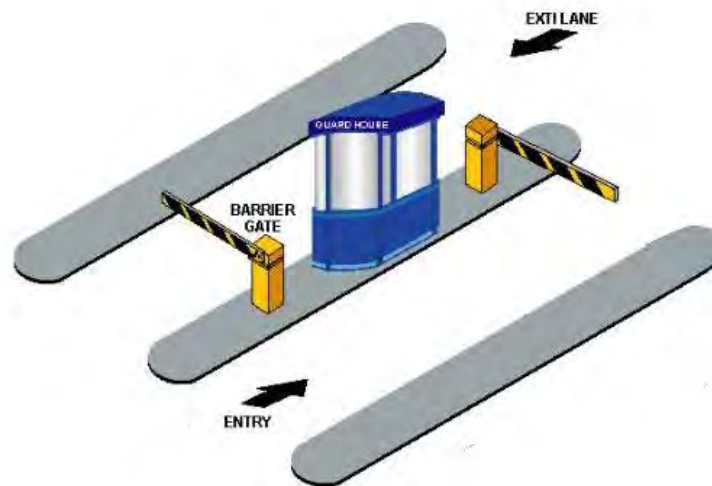


Figure 1.1: Example of guard house system

Besides that, a lot of application papers have to be kept in order to save the record of borrowed list. The amount of papers will keep on increasing and it will be more difficult to find the record when asset officer needs it. Due to the record is kept in paper form, it is easily damaged or lost. Therefore, this finding process is time consuming, apart from space consuming in order to keep the record.



Figure 1.2 Time consuming



Figure 1.3 Stacks of record file

1.3 Objectives

The main goal of this project is to reduce the time taken in applying as well as returning the UTeM assets. The objectives are:

- I. To develop a system that can replace the manual asset borrowing procedure.
- II. To reduce paper usage.
- III. To reduce waiting time for approval.

1.4 Scope of Work

The scope of this project PATS is to design a website for users to login and fill up the application form. A database also has to be created to store all the details of assets, including assets details, staff details and borrowed details. The RFID tag will be given once the application is approved by the assets officer. The tag is used to tag the RFID reader, which is located before go-out or go-in UTeM guard gate. Once the beep sound is heard, that means the RFID reader already read the tag number. The data will be saved by manually into record folder. Each staff ID can only apply for one asset to borrow through the website.

1.5 Report Structure

This thesis is a combination of five chapters which include the introduction, literature review, methodology, result & discussion and conclusion & recommendation of the project.

Chapter 1 is an introduction to the project. This chapter explained the background and the objectives of the project. Besides that, it also included the concept behind this project and overview of the project. Chapter 2 is the literature review of the Radio Frequency Identification (RFID) upon previous research done.

Chapter 3 is about the project methodology which will show the steps and flow for the problem solving in designing the interface of the project to combine with RFID system. Chapter 4 describes the expected result from this project and ensure the objectives of the project is achieved. Chapter 5 is the conclusion of the whole project and propose for the future add on in this project.

Chapter 2

Literature Review

This chapter discusses about the literature review which is related to the project PAPERLESS ASSETS TRACKING SYSTEM VIA RFID as well as the research on RFID types, website design, database design and existing RFID projects.

2.1 Research on RFID

Radio Frequency Identification (RFID) refers to small electronic devices that consist of a small chip and an antenna. The RFID system function is similar to bar code system or magnetic strip on the back of a credit card or ATM card. The function is to provide a unique identifier for that object and also the information. The advantage of RFID system compares to others is it does not need to be positioned precisely relative to the scanner. Besides that, RFID devices manage to scan from a few cm up to 100m by depending on the frequency of the RFID [3].

RFID technology already exists more than fifty years ago, but only been used commonly in these decades. This is due to the lack of the knowledge in the industry. Two different types of RFID tag which are active RFID tags and passive RFID tags.

Active RFID tags require a power source in order to operate and the advantage of these tags is the reader can read the signal from far away. The antenna frequency inside of an active RFID tag determine the range of the distance to scan it. The higher the frequency, the further the RFID tag can be read. Meanwhile, passive RFID tags do not require any power source to supply.

2.1.1 RFID History

RFID technology already exists in world war II which discovered by Scottish physicist Sir Robert Alexander Watson-Watt in 1935. He figures out the way to warn for the approaching planes while they still far distance away. The only problem is, it cannot identify the plane belong to ally or enemy. The first passive RFID system is discovered by the Germans. They figure out that if pilots rolled their planes when returning to the base would change the radio signal and alert the radar crew on ground as German planes.

The British secret project by Watson-Watt had developed the first active type of identify friend or foe (IFF) system. Just put a transmitter on each British plane, then it will receive the signal from radar stations to identify the aircraft as friendly. RFID concept is exactly the same by sending a signal to a transponder and reflects back a signal.

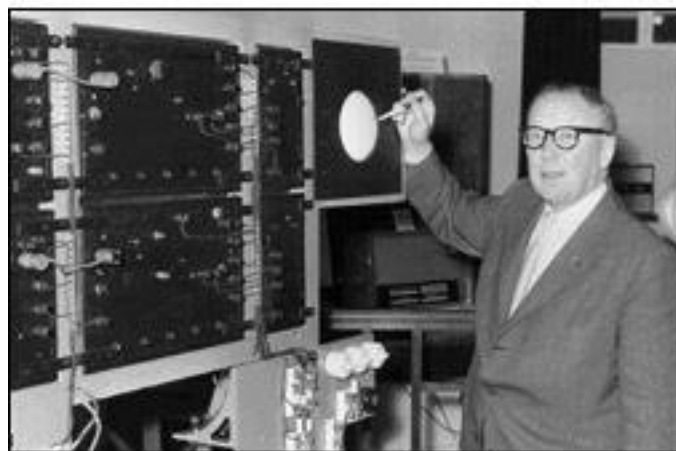


Figure 2.0: Watson-Watt with the first radar apparatus