RFID SMART KEY DETECTOR

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Special dedicated to

my beloved parents and siblings, who encouraged, guided and supported me throughout my study life

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ABSTRACT

This project is about designing a RFID Smart Key Detector. The objective of build this project is to build up security system base on the RFID application and to avoid and reduce duplication key. There are two major scopes of work that will be covered along this project which are research and find information about RFID and development of PIC16F876A and a RFID reader IDR-232 to control LCD (2x16 character), LED, buzzer and relay. According to the problems statement, there are a lot of security products to strengthen the security but RFID Smart Key Detector is the best way as a guardian of our properties and avoids key duplication. RFID Smart Key Detector is a system to make security more efficient and safety compared to traditional security. This system consists of a RFID tag that will locate at the card and RFID reader IDR-232 as a main of RFID system to detect the tag. This system is combination of two types of switches; motorcycle ignition switch and RFID system as second layer. In the future, this system can be applied for home and office security which using our identification card (IC) to overcome the counterfeit of the RFID.

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ABSTRAK

Projek ini dibina dengan tujuan untuk mengaplikasikan sistem RFID dalam kehidupan seharian. Pengesan Kunci Pintar RFID ini merupakan salah satu aplikasi yang boleh digunapakai. Tujuan utama membangunkan projek ini adalah untuk membina sistem keselamatan berasaskan RFID dan disamping itu untuk mengurangkan kadar penggunaan kunci pendua. Skop projek ini tertumpu kepada dua bidang utama iaitu melakukan kajian terperinci tentang system RFID dan melakukan pembangunan sistem RFID berdasarkan PIC16F876A dan pengesan RFID IDR-232 untuk mengawal skrin LCD (2x16 patah perkataaan), LED, penguat bunyi dan geganti. Berdasarkan penyataan masalah projek, kini terdapat banyak pengeluar yang telah menghasilkan sistem keselamatan ini namun setiap sistem yang dihasilkan mempunyai kelemahan-kelemahan yang tersendiri. Pengesan Kunci Pintar RFID adalah salah satu konsep di mana bukan sahaja bertindak sebagai sistem keselamatan, namun dapat mengelakkan masalah yang boleh datang daripada penggunaan kunci pendua. Sistem RFID yang akan digunapakai ini merangkumi daripada tag dan pengesan tag yang akan menjadi tulang belakang sistem keselamatan ini. Secara keseluruhan, sistem ini bermula apabila kunci suis mula dimasukan ke dalam suis penalaan motosikal dan sistem RFID akan bertindak untuk mengesan tag yang dilampirkan bersama kunci suis berikut. Untuk penggunaan masa hadapan, sistem ini boleh digunapakai untuk keselamatan di rumah dan di pejabat dengan menggunakan kad pengenalan yang sedia ada.

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LIST OF ABBREVIATION

RFID	-	Radio Frequency Identification
EPC	-	Electronic Product Code
ICAO	-	International Civil Aviation Organization
LED	-	Light Emitting Diode
FSK	-	Frequency Shift Keying
AM	-	Amplitude Modulation
GPS	-	Global Positioning System
RF	-	Radio Frequency
PIC	-	Peripheral Interface Controller
CPU	-	Central Processing Unit
I/O	-	Input / Output
EEPROM	-	Electrically Erasable Programmable Read-Only Memory
SRAM	-	Static Random Access Memory
CMOS	-	Complementary Metal Oxide Semiconductor
LCD	-	Liquid Crystal Display
RAM	-	Random Access Memory
PC	-	Personal Computer
IC	-	Integrated Circuit

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CHAPTER I

INTRODUCTION

1.1 Background of Project

RFID is a technology for automated identification of objects and people. Human beings are skilful at identifying objects under a variety of challenge circumstances. A bleary-eyed person can easily pick out a cup of coffee on a cluttered breakfast in the morning for example. RFID may be viewed as a means of explicitly labelling objects to facilitate their perception by computing devices. An RFID tag is a small microchip designed for wireless data transmission. It is generally attached to an antenna in a package that resembles an ordinary adhesive sticker. The microchip itself can be as small such $0.4mm^2$. An RFID tag transmits data over the air in response to interrogation of reader.

In both the popular press and academic circle, RFID has seen a swirl of attention in the past few years. One important reason for this is effort of large organizations such as Wal-Mart and the U.S Department of Defence to deploy RFID as a tool for automated oversight of their supply chains. Due to tag cost, RFID tags are unlikely to appear regularly on consumer items for some years. Retailers have expressed interest, though, in ultimately tagging individual items. Such tagging would, for instance, address the perennial problem of item depletion on retail shelves, which is costly in term of lost sales.

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Today, RFID is seeing fruition in the tagging of crates and pallets, that is, discrete bulk quantities of items. RFID tagging improves the accuracy and timeliness of information about the movement of goods in supply chains. The main form of barcode type RFID device is known as an EPC. An organization known as EPCglobal Inc. oversees the development of the standards for these tags.

In general, small and inexpensive RFID tags are passive, there is no on-board power source and they derive their transmission power from the signal of an interrogating reader. This will be discuss lately in chapter 3; methodology.

Many of us already use RFID tags routinely. Examples include proximity cards, automated toll-payment transponders, and payments tokens. The ignition keys of many millions of automobiles moreover include RFID tags as a theft-deterrent. RFID privacy is already concern in several areas of everyday life:

- Libraries – Some libraries have implemented RFID systems to facilitate book checkout and inventory control and reduce repetitive stress injuries in librarians

- Passports – An international organization known as ICAO has promulgated guidelines for RFID-enabled passports and other travel documents

- Human Implantation – Few other RFID systems have inflamed the passions of privacy advocates like the VeriChip system. VeriChip is a human-implantable RFID tag, much like the variety for the house pets

Malaysia is among the leading RFID user countries in the world. RFID technology was first introduced in 1997 in the Touch ‘n Go system – the Malaysian electronic toll payment systems. In the following year, Department of Immigration Malaysia used RFID for passport issuance; and is the first country in the world to implement electronic Passport (e-Passport).

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1.2 Objectives of Project

The aims of doing this project are stated below:

- Build up security system base on the RFID application
- To learn how to integrate RFID circuit with ignition coil of motorcycle
- To avoid and reduce duplication key

1.3 Problems Statement

Nowadays, security provides home introduced a lot of their products in market to strengthen the security. RFID Smart Key Detector is the best way as a guardian of our properties with RFID technology, it makes more secure and overcomes counterfeit. It can be used for at home, office or our vehicles. Among those products, RFID smart key detector is the best way as a guardian of our properties and avoids key duplication.

1.4 Scopes of Project

In this project, the scope is based on two major parts. By understanding these elements, the maximum usage of RFID can be obtained to fulfil the requirement.

- Research and find information about RFID
- Do analysis about the system and base of passive RFID

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1.5 Brief Methodology

In order to complete this project, there are so many works that need to be done. The first stage is by understanding the concept of RFID. The second stage will be more on choosing the best RFID reader and passive tag in market and combination of ignition coil of motorcycle. The third stage is about test the hardware and makes troubleshoot the hardware problems if occurred.

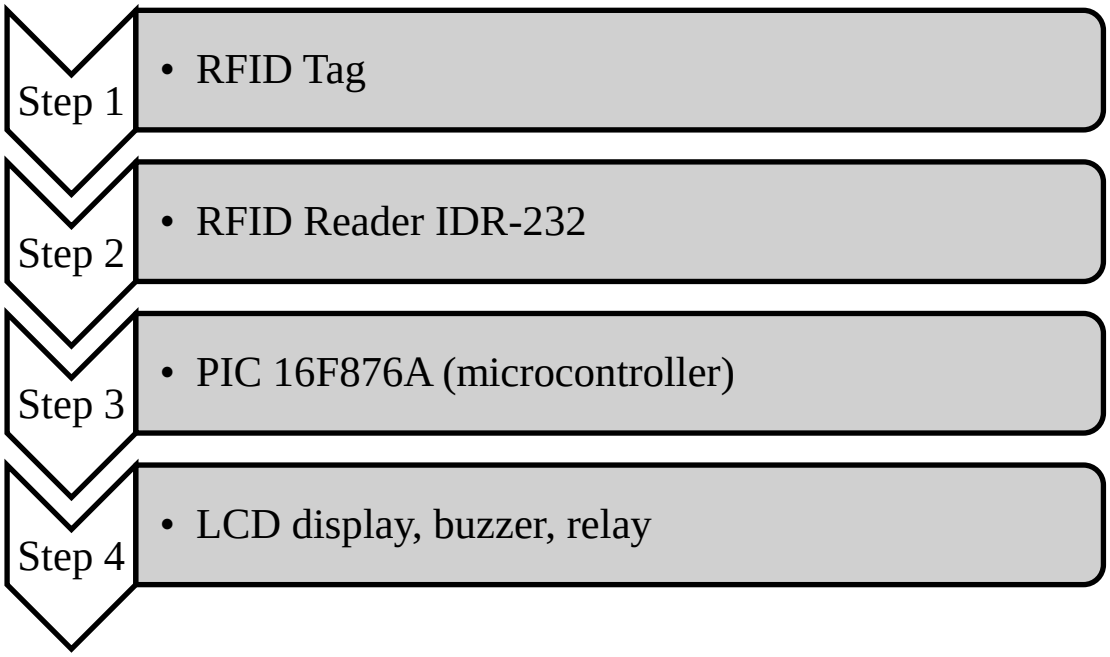

Figure 1.1: Basic System Operation

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1.6 Outline of Thesis

This thesis consists of five chapters. The first chapter discuss about background, objective, problems statement, scope and the brief methodology of this project. Chapter two discuss more on theory and include literature reviews that have been done. It also will discuss on components of the hardware and software used in this project. Chapter three discuss on the methodology software hardware development of this project and also the advantages and disadvantages. Chapter four will discuss about project's testing and results. Finally in chapter five it will discuss about conclusion and future work proposal for the project.

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HAPTER II

LITERATURE REVIEW

2.1 Literature Review Overview

This chapter discuss about reviews of existing project created to get an idea about the project design, conception and any information that related to improve the project. With different concept and design, there are other creation and innovation of project done by other people.

2.2 Proximity Security System for Cornell University ID

An RFID based on proximity security system that use an antenna coil to power the RFID tag embedded in the Cornell ID's and read the induced response from the card. This response is then filtered and manipulated into useful data and interpreted by the Atmel Mega32 microcontroller which runs the actual security program. The security system can store up to 20 to 45-bit codes which are derived from communications with each unique RFID tag. If a card is read and it is not in the code database, a red LED flashes for 3 seconds. Likewise, if the code can be found in the database, a green LED lights for 3 seconds. From hyper term, the administrator has the power to add codes, delete codes, list all codes, "unlock" the door (the equivalent of the green LED flashing), and initialize routines which allow codes to be added to the database by gathering data from the reader itself.

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Figure 2.1: RFID Reader with Combination of Door Lock

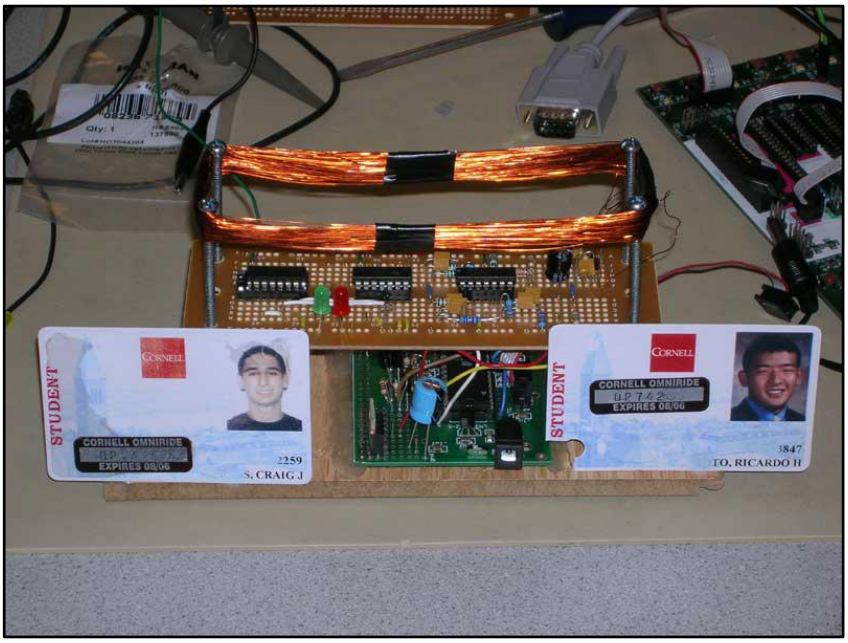

Figure 2.2: ID Cards Posing with the RFID Reader

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