IN-VEHICLE SIGNING SYSTEM USING RFID

HARMIDA BINTI AROBI

This report is submitted partial fulfillment of the requirement for the award of Bachelor of Electronic Engineering Computer Engineering With Honours

Faculty of Electronic and Computer Engineering
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PROJEK SARJANA MUDA II

Tajuk Projek : **IN-VEHICLE SIGNING SYSTEM USING RFID**

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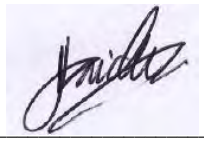

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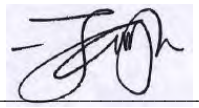

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AHMAD NIZAM BIN MOHD JAHARI @ JOHARI
Pensyarah
Fakulti Kejuruteraan Electronik Dan Kejuruteraan Komputer
Universiti Teknikal Malaysia Melaka (UTeM)
Hang Tuah Jaya
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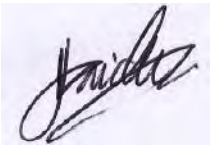

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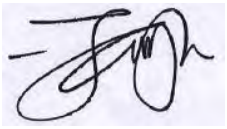
Signature : 

Supervisor Name : EN. AHMAD NIZAM BIN MOHD JAHARI@JOHARI

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Especially for

My beloved mom(Hasidah bt Ayob) and dad (Arobi b. Bakar)

My lovely sister(Rasimah bt Arobi), My Family

My supervisor
Mr Ahmad Nizam Bin Mohd Jahari@Johari

All beloved friends

Thanks for everything...

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ABSTRACT

Road traffic sign is very important and has been used as common guidance to vehicle drivers globally. Usually, traffic sign located at the roadside are likely to be overlooked than dynamic visual information during driving. In this report, the development of In-Vehicle Signing System using Radio Frequency Identification (RFID) technology is discussed. The system is designed to alert the vehicle driver on the speed limit signboard at low speed area such as at school, university campus and curve area. This project system was designed to read traffic sign depend on the signal data stored in RFID tags. The data was presented as an alarm and image data on vehicle terminal screen using Visual Basic 6 (VB6) software as Graphical User Interface (GUI). Microsoft Comm. Control 6.0 is used to connect the Visual Basic with serial port for RFID communication. The process of programming in VB6 will drive the output as a sign display in the vehicle terminal (computer). The GUI was connected with Microsoft Access 2007 database that store the tag data using Microsoft ActiveX Data Object (ADO) tool in VB6. As a result, this system was able to alert the driver about the speed limit at the low speed area. The in-vehicle signing system is suggested to replace the existing static traffic sign that located at the road side.

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ABSTRAK

Papan tanda isyarat adalah sangat penting dan secara umumnya digunakan sebagai petunjuk kepada para pemandu kenderaan. Akan tetapi, papan tanda isyarat dan maklumat visual statik biasanya akan terlepas pandang berbanding dengan maklumat visual dinamik atau visual bergerak semasa pemanduan dilakukan. Di dalam laporan ini, Sistem Paparan Isyarat dalam Kenderaan menggunakan RFID akan dibincangkan. Projek ini merekabentuk sistem yang akan memaparkan isyarat jalan di dalam kenderaan menggunakan teknologi *Radio Frequency Identification* (RFID). Sistem ini dibina bertujuan untuk memastikan pemandu kenderaan sentiasa dalam keadaan berwaspada dalam mematuhi had laju yang telah ditetapkan terutamanya di kawasan-kawasan berkelajuan rendah seperti kawasan sekolah, kampus universiti dan kawasan selekoh tajam. Sistem paparan isyarat papan tanda ini direkabentuk bergantung kepada data yang disimpan dalam tag RFID. Paparan isyarat papan tanda di dalam kenderaan dihasilkan dalam bentuk imej visual dan berpenggera menggunakan perisian Visual Basic 6 (VB6) sebagai grafik antaramuka atau GUI. Dalam perisian VB6, perkakas *Microsoft Comm. Control 6.0* digunakan untuk menghubungkan perisian dengan RFID. Proses merekabentuk dan pengaturcaraan dalam perisian VB6 akan menghasilkan GUI bagi sistem ini. GUI berhubung dengan pangkalan data menggunakan perkakas *Microsoft ActiveX Data Object (ADO)* yang terdapat pada perisian VB6. Sebagai hasil, sistem ini dapat memastikan pemandu lebih berwaspada ketika pemanduan terutamanya di kawasan berkelajuan rendah. Sistem Paparan Isyarat dalam Kenderaan menggunakan RFID ini disaran dapat menggantikan isyarat trafik yang terdapat di pinggir jalan.

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CHAPTER 1

INTRODUCTION

1.0 Introduction

Traffic signs visually provide drivers with regulatory, warning and guide information. Vehicle drivers are requested to collect dynamic visual information such as traffic signals and static visual information including traffic signs. However, traffic signs and other static visual information are having less benefit and tendency to be overlooked than dynamic visual information during driving are higher. The traffic signing system can be improved by using RFID technology.

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The RFID technology is a wireless sensor technology which is based on the detection of electromagnetic signals [1]. Electromagnetic passive RFID tags require no power source, are highly resistant to dust or obstacles and of very small size. Tags are so cheap that they can be installed in large numbers [2]. An in-vehicle signing system is built and assessed that uses general-purpose RFID tags as digital traffic signs and communications between the road surface and vehicle equipment.

1.1 Problem Statement

Nowadays, too many accident happened because of lose control of the vehicle due to over speed driving. Besides that, drivers are lacking of concentration during driving, their comfortable vehicle and does not notice and realize about the traffic signing especially speed limit signboard. This contributed to increase the number of vehicle accidents from time to time. In addition, many drivers are not focuses on their driving because of not aware of the traffic signs, especially speed limit signs. As a solution to this problem, the signal display system in a vehicle has been built to make driver more alert on every condition when their driving. The system will display traffic signs in the vehicle using RFID technology as an alternative to replace the signal board on the existing road.

1.2 Objective

i. To study and understand the RFID system and implementation
ii. To create a system that aims to make drivers be more cautious when approaching the sign board area.
iii. Design interface of traffic signal display system in the car.
iv. Building a database to store data related to traffic signs

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1.3 Scope

The scope of work in this project is:

i. Build an interface and assessed an in-vehicle traffic signing system using passive frequency identification (RFID) tags. For example accessed in vehicle speed limit, especially in low-speed areas such as area schools, hospitals, university campuses and the sharp bend / hill.
ii. Build a database by using Microsoft Access 2007 to store RFID tag data and data on the signal board
iii. GUI is developed by using Visual Basic 6 that connected with RFID
iv. Design circuit using PIC 16f877A and connected with RFID
v. Testing display systems in vehicles that have been designed

1.4 Report Outlines

This thesis is a written documentary that contains records such as the idea generated, concepts applied, activities done and the final year project product itself. It consists of five chapters. Following is a chapter-by-chapter description of information in this thesis.

In Chapter 1, discussion on what the project is really all about, such as the introduction of the project, the project objectives, problem statement and the scopes of project that been elaborated.

Chapter 2 looks into the literature review that has been done especially on the theoretical concepts on the various methods and applications in stability monitoring systems of high rise buildings currently being practiced. This chapter discusses the background study, the stability monitoring system and the optical technique being used.

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Besides that, this chapter provides the preview on the concepts and fundamentals of Radio Frequency Identification (RFID), Image Processing, Global Positioning System (GPS), Dedicated Short-Range Communication (DSRC) and the basic concepts of the system applicable to achieve the objectives of the project.

Chapter 3 is regarding the project methodology that involves the necessary tasks and activities to be undertaken to complete the project such as hardware development and software development that form the major bulk of the project. Besides that, this chapter also describes how to integrate the hardware and software to function as complete system.

Chapter 4 discusses about the results from the research and literature review and the option that is suitable for the project development. It also discusses on the improvement that can be done in this project.

Finally, Chapter 5 contains the summary of the final year project. Problems encounter during progress of the project will also be discussed in this chapter. The conclusion, suggestions or recommendations for improvements can be implemented in future are discussed as well.

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CHAPTER 2

LITERATURE REVIEW

2.0 Literature Review

This chapter will be focusing on the technology and software that can be used in this project. The previous studies or project that has been done by previous researcher will also be discussed.

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2.1 Radio Frequency Identification (RFID)

Radio-frequency identification (RFID) is a technology that uses communication via electromagnetic waves to exchange data between a terminal and an object such as a product, animal, or person for the purpose of identification and tracking. Some tags can be read from several meters away and beyond the line of sight of the reader. Radio-frequency identification involves interrogators (also known as readers) and tags (also known as labels) [3]. RFID systems can be classified into two categories according to the tags power supply: active RFID systems or passive RFID systems. In passive RFID tags require no power source, are highly resistant to dust or obstacles and of very small size. Tags are so cheap that they can be installed in large numbers.

RFID tags store information by a small integrated circuit that will communicate via antennas that located on the tag reader. RFID readers are capable to reading information on the tag and send the information to a computer terminal [5].It will receive a radio frequency from RFID tag before it sends to computer. RFID reader and tag must follow the same standard to make a communication between readers and tag successfully Figure 2.1 shows the components block of RFID systems.

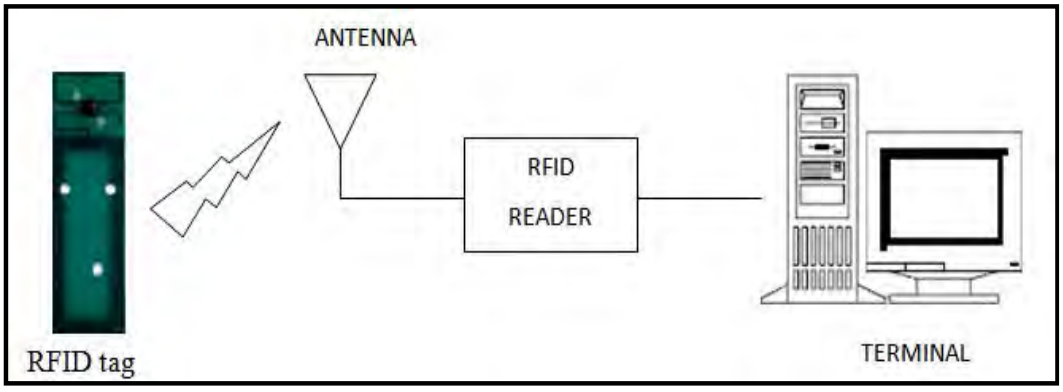

Figure 2.1: The Components Block of RFID Systems.

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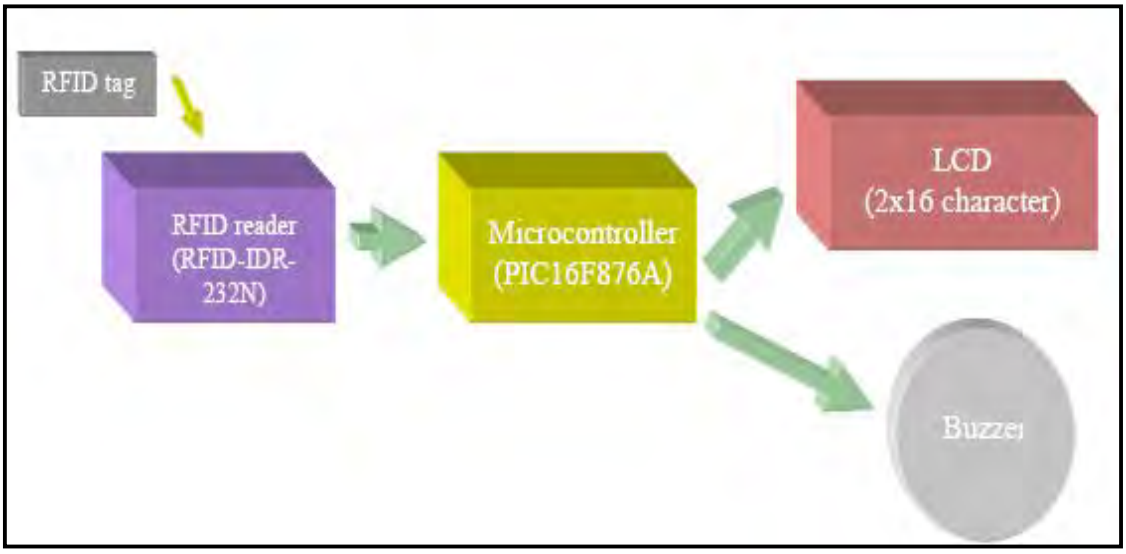

Figure 2.2: System Overview RFID with PIC 16F877A

RFID tag also can be read and display using microcontroller (PIC 16F877A). RFID-IDR-232N can be connected to PC or microcontroller as part of embedded system. In this project as shown in figure 2.2, the reader will be interface to a microcontroller. Assembly language or C compiler (depending on microcontroller type) can be used to write program in microcontroller. RFID-IDR-232N will read the ID from RFID tag if the tag is near enough to RFID Reader. The ID is normally 10 digit of number. RFID-IDR-232N will automatically send this ID with 1 byte of Start of heading (0x01), followed by 10 byte of ASCII character (ID) and 1 byte of Start of text (0x02).

When the RFID tag is place near the RFID reader, the RFID reader read the RFID tag, further sends the tag ID to the PIC microcontroller. PIC microcontroller process the tag ID, the user name and the tag ID will be display on the LCD display.

In general, low frequency RFID passive tags have the capability of communication distance of about 30cm. While high frequency passive tags within 1m and Passive Ultra High Frequency tags (UHF) have an effective range of 3-5m. Comparison of the specification of passive RFID and active RFID are shown in table 2.1.

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Table 2.1: Comparison of the specification of passive RFID and active RFID

	Active RFID	**Passive RFID**
Tag battery	Required	Not required
Availability of power	Continuous	Only in field of reader
Range	Up to 100m	10mm up to 5m
Tag power source	Internal to tag	Energy transferred using RF from reader
Required Signal Strange From Reader	Very low	Very high
Available Signal Strange from Tag to Reader	High	Low
Size	Larger	Small
Multi-Tag Collection	• Collects 1000s of tags over a 7 acre region from a single reader • Collects 20 tags moving at 100 mph	• Collects hundreds of tags within 3 meters from a single reader • Collects 20 tags moving at 3 mph^2 or slower
Sensor Capability	Ability to continuously monitor and record sensor input; date/time stamp for sensor events.	Ability to read and transfer sensor values only when tag is powered by reader; no date/time stamp.
Data Storage	Large read/write data storage (128KB) with sophisticated data search and access capabilities available.	Small read/write data storage (e.g. 128 bytes)

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2.2 Software

Nowadays, various applications are available for building and managing databases system. There are ranges of database management software that can be used. Each software comes with different features and used for different applications. The database management software that is usually used is MS Access, SQL Server, and Oracle. Studies are done in choosing database management software to be developed accordance with the In Vehicle signing Systems. The criterions for identified software are choosing the best software and compatible with the system. Among the criteria to be considered are:

i. The database can accommodate the number of total number of data is high.
ii. User-friendly GUI.
iii. Reasonable prices for commercial purposes.

2.2.1 Visual Basic

Visual Basic (VB) is a software and programming language developed by Microsoft Company. It is derived from the BASIC and can be used in Rapid Application Development (RAD) for advanced graphical interface or Graphical User Interface (GUI). VB on the database is using tools such as Data Access Objects (DAO), Remote Data Objects (RDO), or ActiveX Data Objects (ADO) and ActiveX objects.

Writing programming languages such as VBA and VBScript is commonly used in VB through in different methods. Programming in VB is a combination of a visual component parts or control over the form, setting properties and actions of each component. Lines are addition to writing code for the display system of multiple functions. Because of the properties and actions have been determined for each component, it can facilitate the process manual for the construction of more simple program.

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Due to its advantages, the use of Visual Basic development system has been applied extensively in various fields such as project "Development of a Modern Control System Analysis Package Using Visual Basic Programming" by M. F. Khan Rahmat and Shu, Lee [4].

2.2.2 Microsoft Access

Microsoft Access (MS Access) is a database management system from Microsoft that can connect to the Microsoft Jet Database Engine with a GUI interface and tools for software development. MS Access is one of the software in Microsoft Office 2007 system.

MS Access software to use and retrieve data stored in Access or Jet, Microsoft SQL Server, Oracle and others. MS Access is usually used in small businesses, departments within large companies, and the programmers to design ad hoc customized desktop systems in handling and manipulating data [6].

From the perspective of the functions that programmers, one of the advantages of this software are comparable to the Structured Query Language (SQL). Queries can be displayed graphically or edited as SQL statements and SQL statements can be used directly in Macros and Visual Basic Applications (VBA) Modules to manipulate tables in MS Access. Other than that; it allows the data to be viewed and modified easily at any time. It can create different types of interface objects that allow working with the data in the databases become simple and efficient. Users can combine and use both VBA and Macros for programming procedures.

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