

VEHICLE SECURITY SYSTEM USING ZIGBEE

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Special Dedicated

To my family for their endless encouragement and support,

My friends for their help not for

getting my supervisor for his guidance throughout completely my degree.

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ABSTRACT

The first car thefts reported was in 1896. It happened in a period of ten years after the gasoline car was invented. Since then, car has become the focus object to the thief. This is due to the high value of the car, easy to sell and there is a lot of demand in the market. Therefore, the security system has become one of the key factors in car manufacturing. It is supported by the technological developments that allow the onset of the latest innovations in vehicle safety systems. Currently, the car is only equipped with a lock and siren system as their security features. Unfortunately, it is no longer relevant in the present use. Therefore, this project has been propose to solve this problem. The main objective of this project is to secure and monitor the car based on combination of Zigbee system, PIC16F877A microcontroller, vibration sensor, temperature sensor, and PIR sensor. This system is used to send the data at the LCD to display the car situation. So, the owner can monitor the car condition. This system is expected to enhance the capability of existing system and cost of the system is reduced. So, it should have good application value in future as well as reduce the statistic of stolen cars. A wireless monitoring system have been successfully developed using Zigbee technology and the result is satisfactory and meet the intend objective. Although this project has turn out to be a great success, more improvement can be done in order to create a more complete security system and more reliable for the future. Such improvement is, to create a more compact circuit and smaller in size. A smaller size remote control helps user to carries it with ease. With the additional of reliable sensor and LCD display interface monitoring so it can make this system more users friendly in future. A good security system not only makes your car more difficult to steal, it also makes it easier to live with.

ABSTRAK

Kecurian kereta pertama telah dilaporkan pada tahun 1896. Hal ini berlaku dalam tempoh sepuluh tahun selepas kereta petrol dicipta. Sejak dari itu, kereta telah menjadi objek tumpuan kepada pencuri. Oleh itu, sistem keselamatan telah menjadi salah satu faktor utama dalam pembuatan kereta. Ia disokong oleh perkembangan teknologi yang membolehkan bermulanya inovasi terkini dalam sistem keselamatan kereta. Pada masa kini, kereta hanya dilengkapi dengan kunci dan sistem siren sebagai ciri-ciri keselamatan. Malangnya, pada masa kini ia tidak lagi relevan bagi penggunaan kereta. Oleh itu, idea untuk menghasilkan projek ini telah direalisasikan. Objektif utama projek ini adalah untuk memastikan serta mengawal kereta berdasarkan gabungan sistem ZigBee, PIC16F877A mikropengawal, sensor getaran, sensor suhu dan sensor pasif infrared. Sistem ini digunakan untuk penghantaran data manakala paparan cecair kristal digunakan untuk memaparkan keadaan kereta. Sistem ini dijangka akan meningkatkan keupayaan sistem yang sedia ada. Oleh yang demikian, sistem ini perlu dikomersil agar statistik kecurian kereta dapat dikurangkan. Sistem pemantauan wayarles berjaya dibangunkan menggunakan teknologi ZigBee dan hasilnya memuaskan dan memenuhi berhasrat objektif. Walaupun projek ini telah berubah menjadi satu kejayaan besar, lebih banyak peningkatan boleh dilakukan bagi mewujudkan sistem keselamatan yang lebih lengkap dan lebih dipercayai untuk masa hadapan. Peningkatan itu, untuk mewujudkan litar yang lebih padat dan lebih kecil. Dengan penambahan sensor yang sesuai projek ini boleh memberi keselesaan kepada pengguna dimasa akan datang. Satu saiz lebih kecil kawalan jauh membantu pengguna untuk membawa ia dengan mudah. Satu sistem keselamatan yang baik bukan sahaja menjadikan kereta anda lebih sukar untuk mencuri, ia juga menjadikannya lebih mudah dalam kehidupan seharian.

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LIST OF ABBREVIATIONS

GPS	-	Global Position System
PIC	-	Peripheral Interface Controller
PIR	-	Passive Infra Red
MMS	-	Multimedia Messaging Service
GPRS	-	General Packet Radio Service
SMS	-	Short Message Service
PCA	-	Principle Component Analysis
CDMA	-	Code Division Multiple Access
CPU	-	Central Processing Unit
ALU	-	Arithmetic Logic Unit
ADC	-	Analogue to Digital Converter
PWM	-	Pulse Width Modulation
RISC	-	Reduce Instruction Set Computer
CISC	-	Complex Instruction Set Computer
HEX	-	Hexadecimal
RAM	-	Random Access Memory
EEPROM	-	Electrically Erasable Programmable Read-Only Memory

MCU	-	Microcontroller Unit
PC	-	Personal Computer
ICSP	-	In-Circuit Serial Programming
LED	-	Light Emitting Diode
LCD	-	Liquid Crystal Display
PCB	-	Printed Circuit Board
UART	-	Universal Asynchronous Receiver Transmitter

CHAPTER I

INTRODUCTION

1.1 PROJECT OVERVIEW

The appearance of automobiles impacts the life of people. It is becoming the progressive symbol of modern society. Not only the demand on performance and quality of vehicle increase rapidly, but there is also demand on anti-theft system for vehicles. Although some sophisticated systems like Global Position System (GPS) can be used to retrieve vehicle, but people dare not to use it due to cost is too high. By using Zigbee system network for this anti-theft system, the cost is lower compare to GPS.

The project basically to provide a security system for a vehicle with the remote that have at the user that can know the condition of our vehicle. This security system consist of vibration sensor (body), alarm, buzzer, temperature sensor ,special key as a switch, and Passive Infrared(PIR) sensor. User will able to inform using receiver that equipped with Liquid Crystal Display (LCD) by Zigbee module that transfer data wirelessly.

1.2 OBJECTIVES

The aim of this project is to investigate and design one system that can help user to monitor their car. This project can be summarized as follow:

- i. to analyze wireless communication using Zigbee communication.
- ii. to develop a user friendly security system.
- iii. to develop more compatibility device so that it can be more efficient to use.
- iv. to design a controller using PIC microcontroller that giving transmitted and receive signal from sensor that mounted in a car.

The view point of the project is to reduce risk of the vehicle stealing and its rate. Therefore in this security system we can solve the entire problem.

1.3 PROBLEM STATEMENT

Based on the official website of Polis Diraja Malaysia (PDRM) ,the total numbers of vehicles that has been stolen in the year of 2011 amounted to 17,474 cases .From the amount ,12,427 cases are for other vehicles which is included van, lorry and etc. The first documented case of car theft was in the 1896, only a decade after gas-powered cars were first introduced. From that early era until today, cars have been the primary target for thieves.

One of the main factors that lead to car theft is the car are not locked. This is due to the carelessness of the owner to lock up their car before leaving.

Another contributing factor of car theft is the car is not equip/installed with a security system. In other situation, car owner often leaves their valuable things inside the car. This will attract the attention of thieves.

Other than that, security systems also play an important role to ensure those vehicles are safe from theft. Unfortunately, when it comes to car security, Malaysian are still lack of expertise in this field. Due to this, vehicle will be in high risk for being stolen.

1.4 SCOPE AND ORGANIZATION

Since the vehicle security system via Zigbee that is going to develops is for car applications, the target user for this system will be targeted to the people who have their own car. This system will be attached inside the car for the detection process. There are several process involved in order to develop this Car Security and Monitoring system. This system consist of several devices such as PIC16F877A, Passive Infrared Sensor (PIR sensor), temperature sensor ,vibration sensor ,alarm, switch or key and a pair of Zigbee module. Beside the components and devices, there are two program is need to create which is at transmitter and receiver. Proteus 7 Professional will be used in designing process of the circuit and to conduct simulation works. Meanwhile, PIC C Compiler software will be used to compile the C language code to Hexadecimal (HEX) code so that it is compatible to the PIC.

The scope of work included:

- i. Identify the suitable method that will be used for the security system. For this project, remote will be used to monitor the car. The transmission part of this system is based on Zigbee communication network and the whole system must be programmed by PIC to control all the sensors in the car.

- ii. Choose suitable IC to be programmed for the system.
The project used 16F877A PIC Microchip as the brain of the system. In order to burn the program into the IC, the USB ICSP PIC Programmer V2010 was used along with the ICSP socket to connect the IC to the burner.

1.5 THESIS ORGANIZATION

This thesis is a combination of five chapters which includes the introduction, literature review, methodology, result and conclusion.

The first chapter is an introduction of the project. In this part, explanation the background of the project, its problem statement, objectives as well as the scope of the project are discussed. It also include on the concept and overall view of the project.

The second chapter will focused on the literature review and the flow of the project. In this part, the journal that is related to the project were studied.

While, chapter three will focus on the methodology of the project. This will include in the procedure, workflow, block diagram and the method used to complete this project.

In chapter four, all the result of the project are explained and recorded systematically. All the hardware and applied concept was clearly documented.

Lastly in chapter five, the overall conclusion about the project was describe clearly. This chapter also proposed the recommendation regarding the improvement.

CHAPTER II

LITERATURE REVIEW

2.0 INTRODUCTION

This chapter reviews some references from previous projects, journals, articles, books and datasheets. All these information were collected from the different sources such as library, internet, product manual and etc. Furthermore, the information gathered is related to the background study of this project.

2.1 CAR MONITORING USING BLUETOOTH SECURITY SYSTEM

According to FR M Rashidi, et.al, [1] in their study; Using Bluetooth car safety monitoring system, each vehicle must be equipped with additional safety system such as Bluetooth module communication to reduce the risk of theft. The main part was using Bluetooth application on a mobile phone to send message to users in the event of their vehicle intrusion. Passive Infra Red (PIR) sensor founded in the system will send a message if there is an intrusion to the car through Bluetooth to PIC microcontroller.

In addition, this journal also rates indicate that the sensor PIC will comply any movement or human presence in vehicles continuously.

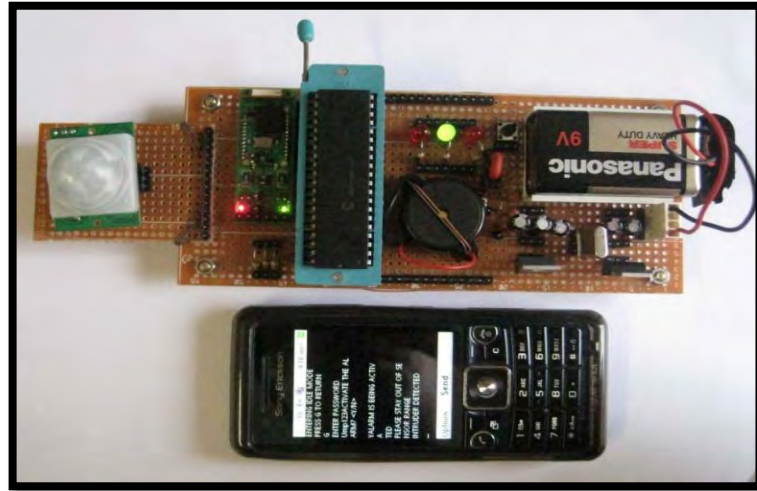


Figure 2.1: Image of embodiment [1].

2.2 VEHICLE ANTI-THEFT SYSTEM USES RADIO FREQUENCY IDENTIFICATION

In the journal, K S Khangura, et.al [2] said that this innovative system is based on a tamper-proof electronic link between the driver's key and the ignition system. This method based upon radio frequency technology improves a new level of theft protection to vehicle security systems in a way that doesn't require any effort from the drivers. In addition, this tactic removes the normal wear and replacement of keys common to contact based security systems.