UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF CAR SAFETY SYSTEM VIA SMS

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Engineering Technology (Industrial Power) (Hons.)

by

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TAJUK: **DEVELOPMENT OF CAR SAFETY SYSTEM VIA SMS**

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APPROVAL

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Engineering Technology (Industrial Power) (Hons.). The member of the supervisory is as follow:

…………………………….

(Project Supervisor)

………………………….

(Co-Supervisor)

ABSTRACT

Today many changes and improvements have been made in line with the development of technology. Transportation is one of the most important requirements in the daily life of human beings in the present. At the same time, the percentage of transportation theft especially car theft is high during the development of these technologies. Car safety is given less attention compared to car shape and other features during the design stage. Security system that is normally used on a car is only alarm system. Car alarms commonly used at present, namely radio controlled alarm system where it is used to lock, unlock and activate the alarm. The concept of this alarm system is that when an intruder illegally opens the door, a siren will be activated. Thus based on the outcomes using current alarm system improvements have been made in car safety system where it can be detected and controlled over long distance. The development in telecommunication technology is enhancing very rapidly. The mobile phone technology was created in 1980 and used only in European country then. Mobile phone is a device that works without wires in in which the signal is sent from a tower. At present, the Global System Communication for mobile phones has been used widely in mobile phones communication systems (GSM) worldwide. The GSM system can transfer data fast on long distance through short messaging service (SMS). Therefore, SMS technology is applied to upgraded car alarm system that allows car owners to detect theft and remotely control cars. In conclusion, this project will develop an alarm system with a combination of the alarm system with GSM system that can control without distance limitation, "Development of Car Safety System via SMS."

ABSTRAK

Pada zaman ini, pelbagai perubahan dan peningkatan telah berlaku apabila pembaharu dibuat mengikut teknologi moden masa ini. Pada zaman ini, pengangkutan merupakan satu keperluan yang sangat penting dalam kehidupan harian manusia. Pada masa yang sama, peratus kecurian pengangkutan terutamanya kereta terlalu tinggi berlaku pada perkembangan teknologi ini. Sistem keselamatan pada kereta adalah rendah berbanding dengan kecanggihan yang sibuk dikejar-kejarkan oleh pencipta rekabentuk kereta. Sistem kawalan keselamatan yang digunakan pada kereta hanya focus pada sistem penggera. Sistem penggera kereta yang biasa digunakan pada masa kini iaitu sistem penggera kawalan radio dimana ianya digunakan untuk mengunci, membuka dan mengaktifkan penggera. Penggera akan berbunyi apabila pintu dibuka tanpa menggunakan kunci. Oleh yang demikian hasil daripada projek ini, penambahbaikan dari segi sistem keselamatan pada kereta telah dibuat, dimana ianya boleh mengesan kecurian dan dikawal pada jarak jauh. Perkembangan pada teknologi telekomunikasi adalah sangat pesat pada masa ini. Telefon mudah alih ataupun dikenali sebagai telefon bimbit telah dicipta pada tahun 1980 dan hanya digunakan di negara Eropah pada masa itu. Telefon bimbit merupakan satu peranti yang berfungsi tanpa menggunakan wayar dengan pancaran isyarat yang dihantar dari satu menara. Sistem Global bagi perhubungan mudah ahli (GSM) adalah salah satu sistem komunikasi yang digunakan secara meluas dalam sistem perhubungan telefon mudah ahli di seluruh dunia. Sistem ini boleh memindahkan data yang pantas pada jarak yang jauh salah satu caranya adalah melalui servis khidmat pesanan ringkas (SMS). Teknologi SMS ini diaplikasikan dalam pembangunan sistem penggera kereta bagi memudahkan pemilik kereta mengesan kecurian dan mengawal kereta pada jarak jauh yang tidak dapat dicapai oleh siren. Kesimpulannya, projek ini akan menghasilkan satu sistem penggera yang dinaiktarf iaitu gabungan diantara sistem penggera dan GSM yang boleh dikawal tanpa had jarak. "Pembangunan Sistem Keselamatan Kereta Melalui SMS".

DEDICATIONS

I dedicate this theses especially to my parents. I hope this achievement will fulfil the dream that you had for me and thank you very much too to all my friends for their support and help in this project.

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Syukur alhamdulilah, first of all, I would like to thank my supervisor, Puan Intan Mastura Binti Saadon for the guidance and support through the whole project preparation. My appreciation also goes to my family members who support and give a lot of advice from the beginning to the end. Thanks to them for their trust and support to me.

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LIST OF SYMBOLS AND ABBREVIATIONS

BBS	=	Bulletin board services
CMOS	=	Complementary metal–oxide semiconductor
GSM	=	Global System communication for mobile phone
EDGE	=	Enhanced Data Rates for GSM Evolution
EEPROM	=	Electrically erasable programmable read-only memory
EECON1	=	Contains control bits
EECON2	=	Register does not exist physically and serves to protect EEPROM from accidental writing.
EEDATA	=	Holds read data or that to be written
EEADR	=	Contains an address of EEPROM location being accessed.
GPRS	=	General Packet Radio Service
GMSK	=	Gaussian Minimum Shift Type
GPS	=	Global Positioning System
GPR	=	General Purpose Register
ISP	=	Internet Service Provider
IC	=	Integrated circuit
LED	=	Light emitting diodes
LCD	=	Liquid Crystal Display
PIC	=	Programmable Interface Controller
PDU	=	Protocol description unit
PCB	=	Printed circuit board

RC	=	Radio Controlled
RAM	=	Random Access Memory
ROM	=	Read-only memory
SMS	=	Short Messaging Service
SFR	=	Special Function Register
SPDT	=	Single pole, double throw
SSR	=	Solid State Relays
TTL	=	Transistor–transistor logic
RF	=	Radio Frequency
IR	=	Infrared

CHAPTER 1

INTRODUCTION

1.0   Introduction

In a situation where there is high level of theft, there is need for better security system. It is much safer to have a system that monitors and communicates to the device owner without putting human life at risk in the name of "Watchman". There are many steps that have been taken to protect the car from being stolen or hijacked. Hence, it is important to have a security system installed in every vehicle that we use.

Basically, the car remote control, has been widely used in order to lock and unlock the vehicle at the parking area. The main functions of car remote control is to unlock, lock, and activating the alarm system. There are many types of car remote control in the market. The selection, are made based on the range, cost and most importantly, the range of effectiveness. Normally, by using Radio Controlled (RC) remote control, the maximum range of effectiveness can be within 1.5 km in range. Only the driver only knows their car status in this range, normally based on their alarm siren loudness.

Therefore, alternative method is needed to increase this range of effectiveness, whereby a driver will have better security notifications of their vehicle. This tends to utilize the availability of GSM network, mobile phone and electronic circuit to achieve an automated system which is programmed to work as a thinking device to accomplish this purpose. By simply dialling the phone number of the mobile phone attached to the circuit and sending a code after the phone has automatically been answered, puts the system to either "active or inactive" state, and on any attempt of theft the system

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sends a text message to the device owner, demobilizes the system car and then starts up an alarm. With this, the car is always protected.

The total absence of sufficient security personnel in a packed car is a great discomfort to car owners. This insecurity has paved way to increasing rate of stealing packed cars even with security. In order to enhance an improved and life risk free security system, the purpose of this study is to aid a better security system of cars with the use of GSM. This system monitors one's car against theft, and has a text message sent to the car owner, telling him that his car is being tampered, and at which part of the car either doors or boot is being tampered. The system will also demobilize the car that is stopping the car, set up an alarm for the people around to notice and alert on what is happening.

1.1 Problem Statement

Car alarm system on today have shortcomings that can lead to car theft occurred on the negligence of the user. But what happened today, the feedback function effectiveness is limited within 1.5 km in range making the system less effective. These events can be used as one of the causes of auto theft. Besides, car theft also occurs by car towing a public place. Therefore other alternatives have been taken into account which is designing GSM car alarm system. GSM is using the satellite technology to create data communication between any points on the earth making almost unlimited range. By using this technology implemented on the ordinary car security system, the limitations of car security system in terms of feedback range can be successfully cancelled out making a tremendous mechanism of car-user notification.

1.2 Objective of Project

The objectives of this project are:

i.   To design and test of car safety system using software.

ii. To implement modem to control with PIC.

iii. To develop hardware implementation for this project to detect theft and develop design into car model.

1.3 Scope of Project

In order to achieve the objectives of the project, there are several scopes that have been outlined. The scopes of this project are:

i.   Coding MikroC use to run simulation draw in Proteus8.

ii. To interface GSM modem into microcontroller with AT command.

iii. Construct circuit for magnet switch and IR obstacle detection sensor display the output to alert by using SMS and perform real time analysis into car model.

1.4 Thesis Outline

This thesis consists of 5 chapters that will describe the different parts of the project. Each chapter will explain each part in terms of software and hardware on that chapter. The contents includes information of components used in this project.

Chapter 1 will explain the overall project in terms of objectives, statement of the problem, scope and causes of problems that create this project.

Chapter 2 will describe the literature review of current issues and reviewing previous terms of journal thesis. This chapter will also examine a bit of the components used in the project.

Chapter 3 will focus on the methodology used in the project. This project consists of the two methods whereby will use software and hardware. Both divisions will be described.

Chapter 4 will discusses about the project result. This result outcome is divided by to which is hardware and result analysis.

Chapter 5 will discusses about the project conclusion and recommendation.

CHAPTER 2
LITERATURE REVIEW

2.0 Introduction

This chapter review some references from previous project and information of the project between concepts that was failure in cars alarm system. Besides that, on this chapter also have a detail description about the software and hardware use in this project. This chapter will explain and discuss the literature reading which is related to the development of the car alarm system. This chapter review each component used in the system. The component involved are microcontroller, magnetic sensor, GSM modem and car alarm remote and some other electronic device that will be explained. From the past researches, from previous studies, research was carried out on GSM control system to find more information on the GSM. At the same time, the study is to obtain and understand on how to use the software and device in the GSM control system.

2.1 Related Work

2.1.1 Anti-theft Security System Using GSM

One system created to prevent car theft by using the GSM the system. This system is needed to reduce the percentage of car theft because currently is there high percentage of car thefts. By the current car security system which depends only on a car alarm, is not sufficient. Under this system, whereby it could be monitored irrespective of time limits remotely via the GSM by provide there is GSM network coverage. At the same time, when the system is turned on, the car would stop

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automatically by disconnecting the supply of car batteries that have been created by using a combination of the AT command and the addition of some electronic component. In addition, if the theft occurs through the car door or boot, the SMS sent via GSM to the car owner and car alarms will be activated. This system is very small and compact it can be installed on any car according to Visa M. Ibrahim, 2012.

2.1.2   Tracking and Locking Vehicle by GSM and GPS System

In the present the percentage of vehicle owners is too high and at the same time it increases vehicle theft. Security on public transport vehicles is essential. To detect the theft and turn off the vehicle engine need to install vehicle tracking system and locking system in the vehicle. GPS and GSM are used to identify the location of the vehicle. The system can monitor and report vehicle position on the demand. When it detects identify theft, owner will send SMS to a microcontroller, then microcontroller sends a signal to turn off the vehicle engine. The owner must send the password to the microcontroller to restart the vehicle and open the door. Dr N.Suthanthira Vanitha, 2013 said, this system is more secure, and low cost.

2.1.3   Advance Car Security System Using GSM

More sophisticated security system has been proposed using GSM system. GSM system is used to receive signals from alarm systems and alert the owner using SMS on mobile phone. Car Alarm will be activated and SMS will be sent automatically via the GSM to the car owner's mobile phone when the door is opened illegally or the car vibrates. This simple system to safeguard and control their car anywhere and anytime. This project consists of hardware and software. The system uses micro-control system and using MikroC to give instructions on the micro-control according to Hnin Pwint Han, 2014.

2.2   Microcontroller

Name PIC is initially known as "Programmable Interface Controller", after that the name was changed to Programmable Intelligent Computer PIC (reprogramming the flash memory) capacity. PIC micro-control has wide application especially in industries that are used in the applications control and robotics. PIC memory is divided into two, namely data and program memory. These different memories can communicate with each other through the different bus line. Both of the buses may be used at the same time in the same clock cycle. PIC16F877A is type of PIC which has several characteristics, the operating frequency is 20 MHz, has only 35 instruction word, two 8-bit and one 16-bit Timer and Interrupt fifteen according to according to Romy Kansal, 2008. Figure 2.1 shows the schematic pin of PIC16F877A.
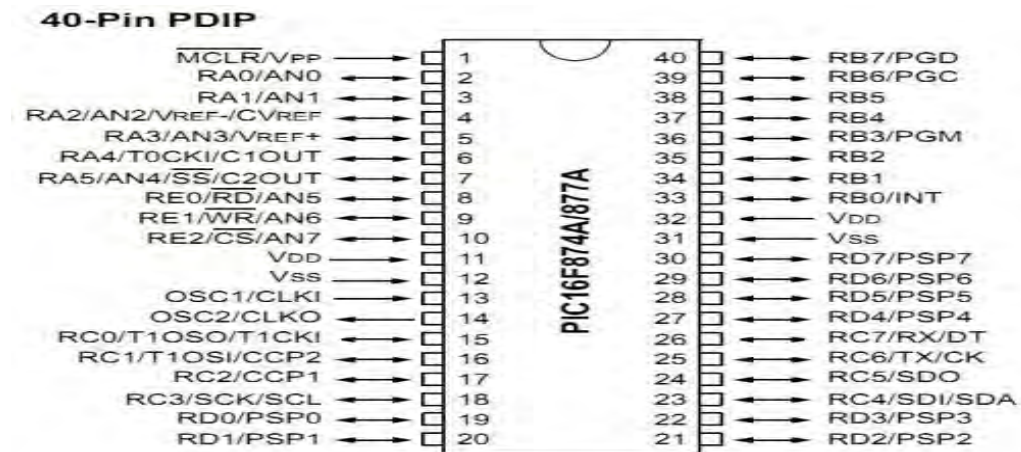

Figure 2.1: Pin Diagram for PIC 16F877A

The first part of the PIC micro-controller architecture is internally Flash program memory that is used for storing the program on PIC. The program stored by Flash program memory would not be erased when the power supply is cut off and it has an advantage that can be reprogrammed by one thousand times. The second part of PIC is the registered files to Random Access Memory (RAM). RAM does not have a limit to write a program and data may be erased when the power supply is cut off. RAM has a registered size of 368 bytes. The memory is divided into two, namely the

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Special Function Register (SFR) and General Purpose Register (GPR). The third part in the architecture of PIC is an EEPROM. The program that has been written in the EEPROM will not be erased when the power supply is disconnected and it can be erased and may write back the program of up to a million times. EEPROM has the size of 128 or 256 bits of data to a variety of addresses from 00H to FFH. These data memory may be written and read at the time normal operation. Memory is not directly mapped into the file list but is not directly addressed to SFR. SFR consists of four types that are used to write and read in the memory of EECON1, EECON2, EEDATA and EEADR. EECON1 function is to control the registrant in EEPROM and EECOM2 used to protect the registrant write to the EEPROM. EEDATA provides space for storing the data which has a size of 8 bits. EEADR function in the EEPROM is for the address marker. Data EEPROM memory would be allowed to read and write, if the byte that has been written are activated, it will automatically delete the old data before being moved to a new place. The writing period, controlled by a timer chip and it will follow the change in temperature, voltage, and the difference from chip to chip.

2.2.1   I/O Port of PIC16f877A

Each micro-chip on the control has a range of differences, but function remains the same. The-chip PIC16F877A only has the differences in terms of the amount of memory that contains it. Refer to the datasheet, PIC16F877 contains a 33 pins of input and output. These pins may be accessed through a number of ports on these chips which port is A, B, C, D and E. Mostly input or output pin has multiple functions and are labelled referring to the function. To use each pins, it needs to be configured through program to perform functions on it. The programs write to special function registers which are responsible for configuring the pins.

2.3   Global System for Mobile Communication (GSM)

GSM is a technology that is widely used in digital communication. This consists of a GSM wireless telecommunications technology that is used on the mobile phones. The first generation, the existence of a mobile communication system using analog communication techniques. On the second generation, digital communication

techniques were used. When digital communication techniques were used, circuit switched transport use and subsequently updated with data transport packets. The data packet has the different generation of General Packet Radio Service (GPRS) and Enhanced Data Rates for GSM Evolution (EDGE). Generally GSM began operating in the 900MHz and 1.8GHz bands in Europe, while in the United States, GSM operates at 850MHz band and 1.9GHz ranges and countries such as Australia and Canada operate at 850MHz range.

GSM network has 4 different cell of the macro, micro, Pico and umbrella cells. Coverage in each area varies according to the environment. Each cell is a type of antenna that is on GSM. Macro cells are the cells where the base station antenna is mounted on a pole or building high above the roof. Micro cells are cells that have a high antenna under the roof of the building which is used in urban areas. Pica is a cell antenna commonly used in building because the cells over small diameter. Umbrella cells are the cells used to protect smaller cells and fill in gaps in coverage between cells. Cell horizontal radius of a cell depends on the height of the antenna, antenna and propagation conditions from several hundred meters to several tens of kilometres. GSM can support up to 35 kilometres. There are also some implementation of advanced cell concepts, where the cell radius could be double or more, depending on the antenna system, the type of terrain and time in advance. Figure 2.2 below shows the structure of GSM network.
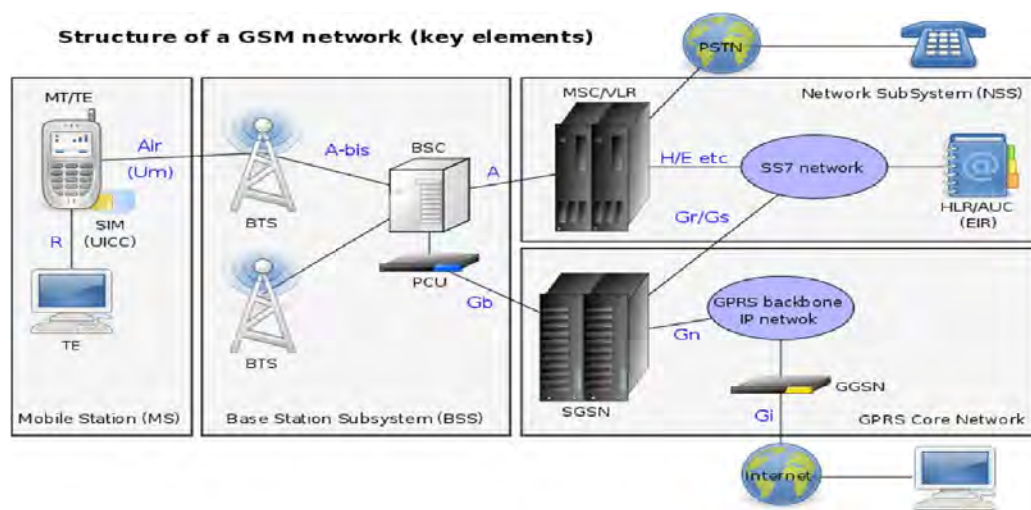

Figure 2.2: Structure of GSM Network