



**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

**DEVELOPMENT OF ANTI-THEFT CAR SECURITY USING  
SMS SYSTEM**

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

by

**SHAZATUL ATHIRAH BINTI MOHD SALLEH**

**B071310925**

**921110-10-5652**

FACULTY OF ENGINEERING TECHNOLOGY

2016

## BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

TAJUK: **DEVELOPMENT OF ANTI-THEFT CAR SECURITY USING SMS SYSTEM**

SESI PENGAJIAN: **2016/17 Semester 2**

Saya **SHAZATUL ATHIRAH BINTI MOHD SALLEH**

mengaku membenarkan Laporan PSM ini disimpan di Perpustakaan Universiti Teknikal Malaysia Melaka (UTeM) dengan syarat-syarat kegunaan seperti berikut:

1. Laporan PSM adalah hak milik Universiti Teknikal Malaysia Melaka dan penulis.
2. Perpustakaan Universiti Teknikal Malaysia Melaka dibenarkan membuat salinan untuk tujuan pengajian sahaja dengan izin penulis.
3. Perpustakaan dibenarkan membuat salinan laporan PSM ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. **\*\*Sila tandakan (✓)**

- SULIT (Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia sebagaimana yang termaktub dalam AKTA RAHSIA RASMI 1972)
- TERHAD (Mengandungi maklumat TERHAD yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijalankan)
- ✓  TIDAK TERHAD

Disahkan oleh:

Alamat Tetap: \_\_\_\_\_

LOT 2982 KG BATU 6

JALAN KEBUN

40460 SHAH ALAM SELANGOR

Tarikh: 9 DECEMBER 2016

Cop Rasmi: \_\_\_\_\_

Tarikh: \_\_\_\_\_

**\*\*** Jika Laporan PSM ini SULIT atau TERHAD, sila lampirkan surat daripada pihak berkuasa/organisasi berkenaan dengan menyatakan sekali sebab dan tempoh laporan PSM ini perlu dikelaskan sebagai SULIT atau TERHAD.

## DECLARATION

I hereby, declared this report entitled “DEVELOPMENT OF ANTI-THEFT CAR SECURITY USING SMS SYSTEM” is the results of my own research except as cited in references

Signature : .....

Author's Name : SHAZATUL ATHIRAH BINTI MOHD  
SALLEH

Date : 9<sup>th</sup> DECEMBER 2016

## **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 Automation & Robotics) (Hons.). The members of the supervisory committee are as follow:

.....

(Principal Supervisor)

.....

(Co-Supervisor)

## ABSTRAK

Pengeluaran kereta telah mengalami pembangunan yang pesat pada era baru globalisasi ini. Kereta merupakan satu kemudahan untuk bergerak kemana-mana. Tetapi kos untuk memiliki sebuah kereta ia melibatkan kos yang tinggi. Harga untuk sesebuah kereta diukur daripada segala spesifikasi, enjin, *cubic capacity* (CC), ciri keselamatan dan sebagainya. Akibat daripada harga kereta yang terlalu tinggi, ramai rakyat yang tidak mampu dan berpeluang memiliki sesebuah kereta. Lantaran itu, ada yang mengambil jalan singkat untuk memiliki sebuah kereta dengan mencuri kereta orang lain. Sistem keselamatan yang sedia ada di dalam kereta, tidak dapat mengesan kereta apabila sudah dicuri. Oleh yang demikian, sebuah sistem dibangunkan untuk mendapatkan notifikasi apabila kereta hendak dicuri. Dengan adanya sistem ini, kes kehilangan kereta dapat dikurangkan. Projek ini dirangkumi oleh sistem keselamatan yang diaplikasikan bersama dengan sistem pesanan ringkas (SMS). Tema utama projek ini adalah untuk mengurangkan kes kehilangan kereta dengan dikawal oleh pengawal PIC dan menggunakan SMS. SMS adalah satu sistem yang telah digunakan secara meluas dalam sistem perhubungan telefon mudah alih di seluruh dunia. Sistem ini bermula apabila kereta telah dikunci menggunakan penggera kawalan oleh pemilik daripada luar. Apabila berlaku cubaan untuk mencuri kereta sama ada melalui pintu, bonet ataupun ditunda, penggera akan berbunyi dan pemilik kereta akan menerima pesanan yang memberitahu kereta telah diceroboh.

## **ABSTRACT**

Auto generation has experienced a quick improvement in this new time globalization. The cost of owning an auto can't have the capacity to get at the least expensive cost. The cost for an auto is measured by the particular, motor, cubic capacity (CC), and security framework. The impact of costly auto offering cost, numerous conventional natives cannot stand to possess an auto. Hence, a few people take an easy route approach to have an auto by stealing another person's auto. Existing security framework in the auto is not able to tell when it has been stolen. In this manner, a framework is developed to send notice when an auto has been stolen. With the development coming of this framework, the occurrences of auto burglary can be decreased. This build up a security framework which is connected together with short message framework. The fundamental topic of this venture is to lessen the instances of stolen auto which is controlled by PIC microcontroller and short message framework. Short messaging framework is a framework that has been generally utilized as a part of cell phone correspondence framework around the globe. This framework triggers when the auto is bolted utilizing the remote control by the proprietor. At the point when there is an endeavor to intrude an auto either through entryway, boot or by towing, the caution will sound and the proprietor of auto will be advised by message that tells the auto was attacked.

## **DEDICATION**

The dedication of this work was just conceivable because of the few individuals' coordinated effort, to which craving to express my thankfulness. To my folks, thank you for your unequivocal backing with my studies. I am are respected to have both of you as my folks. Much obliged you for allowing me to demonstrate and enhance myself through every one of my strolls of life.

I might want to thank from a unique approach to Puan Intan Mastura Binti Saadon and Puan Rosziana Binti Hashim for their scholarly counsel, direction, consolation and consistent discourses were extremely significant and moving during the time spent the proposition composing, investigate undertaking, extend making and postulation composing. To wrap things up, this proposition would be inadequate without a say of the backing from individuals. Without them this proposition appeared not wearisome and question it ought to ever have been uncompleted.

## ACKNOWLEDGEMENT

Alhamdulillah, praise to Allah S.W.T for His Mercy that showered, I ready to finish this task. Peace upon to our Prophet Muhammad S.A.W as the best case to human sorts. In finishing this dissertation, as a fractional satisfaction of the prerequisite Bachelor of Electrical Engineering Technology (Industrial Automation and Robotics) with Honors. I am obliged to numerous people for their backings and supportive gestures. Their commitments are very esteemed and acknowledged.

Most profound appreciation supervisor, Puan Intan Mastura Binti Saadon and Co-Supervisor, Puan Rosziana Binti Hashim for tolerance and direction to make this dissertation simpler for me to complete it on time. All the advices, suggestions, and remarks will dependably be recalled, with the end goal of this paper as well as in our future study. Not to overlook my folks for their unified love and bolster that has endured.

To wrap things up, I might want to thank both my panel, Pn Rozilawati Mohd Nor and Encik Ahmad Muzaffar Abdul Kadir. Additionally, thank to every one of my partners who strolled the same way in accomplishing our Bachelor, all lecturer in Universiti Teknikal Malaysia Melaka (UTeM) for their time and inestimable encounters shared. Only Allah S.W.T. is the best in compensating every one of these backings and makes a difference.

Much obliged to You..



# TABLE OF CONTENT

<b>DECLARATION</b> .....	iii
<b>APPROVAL</b> .....	iv
<b>ABSTRAK</b> .....	v
<b>ABSTRACT</b> .....	vi
<b>DEDICATION</b> .....	vii
<b>ACKNOWLEDGEMENT</b> .....	viii
<b>TABLE OF CONTENT</b> .....	ix
<b>LIST OF TABLE</b> .....	xi
<b>LIST OF FIGURE</b> .....	xii
<b>LIST ABBREVIATIONS AND SYMBOLS</b> .....	xiv
<b>CHAPTER 1</b> .....	1
<b>INTRODUCTION</b> .....	6
1.1    Problem Statement .....	2
1.2    Objective of Project.....	2
1.3    Scope of Project.....	2
1.4    Thesis Structure.....	3
1.5    Flow Chart.....	5
<b>CHAPTER 2</b> .....	6
<b>LITERATURE REVIEW</b> .....	6
2.0    Introduction .....	6
2.1    Related Work.....	6
2.1.1    Microcontroller Based Anti-Theft Security System Using GSM Networks with Text Message as Feedback.....	6
2.1.2    An Intelligent Tracking System Based on GSM and GPS using Smartphones.....	7
2.1.1    Design and Construction of A Remotely Controlled Vehicle Anti- Theft System via GSM Network .....	7
2.2    Global System for Mobile Communication (GSM) Modem.....	7
2.2.1    Global System for Mobile Communication Technology.....	9

2.3	Mobile Phones .....	9
2.3.1	Short Messaging Service .....	10
2.3.1.1	Applications of Short Messaging Service .....	10
2.3.1.2	Operational Mode: Short Messaging Service Text and Short Messaging Service PDU .....	11
2.3.1	Short Messaging Service Protocols .....	13
2.4	AT Command .....	14
2.4.1	Types of AT Commands .....	17
2.4.2	Generally Syntax of Extended AT Commands .....	18
2.5	PIC Microcontroller .....	60
2.5.1	PIC Microcontroller Pin Configurations .....	60
2.6	Software Specification .....	63
2.6.1	Proteus 8.0 Professional .....	63
2.5.2	MikroC MikroElektronika C Compiler .....	63
2.5.2	PICkit 2 .....	63
<b>CHAPTER 3 .....</b>		<b>25</b>
<b>METHODOLOGY .....</b>		<b>25</b>
<b>3.0</b>	<b>Introduction .....</b>	<b>25</b>
3.1	Flow Chart .....	26
3.2	Project Flow Planning .....	28
3.2.1	Design the basic PIC Microcontroller with Basic Input / Output .....	28
3.2.2	Regulated Power Supply .....	29
3.2.3	Magnetic Switch .....	30
3.2.4	LED and Buzzer as indicator .....	31
3.2.5	Liquid Crystal Display .....	33
3.2.6	Boot Loader .....	34
3.3	Hardware Implementation .....	35
3.3.1	Electromagnetic Lock .....	35
3.3.2	Vibration Sensor .....	37

<b>CHAPTER 4</b> .....	38
<b>RESULTS &amp; DISCUSSIONS</b> .....	38
4.0 Introduction .....	38
4.1 System Overview .....	38
4.2 Result Overall Project .....	39
4.2.1 Result from Project for Situation 1 .....	39
4.2.2 Result from Project for Situation 2 .....	40
4.2.3 Result from Project for Situation 1 .....	41
4.2.4 Result from ALRM RST .....	42
4.2.5 Result from ALRM LCK .....	43
4.3 Analysis Duration SMS .....	44
4.3.1 Duration SMS When Starting The System .....	44
4.3.2 Duration SMS For The Full System .....	46
4.3.3 Graph Analysis of Hardware .....	46
4.4 Discussion from Overall Result and Analysis .....	48
<b>CHAPTER 5</b> .....	50
<b>CONCLUSIONS &amp; FUTURE WORK</b> .....	50
5.0 Introduction .....	50
5.1 Conclusion .....	50
5.2 Advantage of System .....	51
5.3 Suggestion for Improvement .....	51
<b>REFERENCES</b> .....	52
<b>APPENDICES</b> .....	53

## LIST OF TABLE

Table 2.1	Table 2.1: Show string receive by phone	14
Table 2.2	PDU Format	15
Table 2.3	Types of AT Command	17
Table 2.4	Common Syntax of Extended AT Commands	18
Table 2.5	PIC 16F877A microcontroller pin description	20
Table 3.1	Specification of BEL-M5 Vibration Sensor	37
Table 4.1	The result for situation 1	40
Table 4.2	The result for situation 2	41
Table 4.3	The result for situation 3	42
Table 4.4	Time Taken From System Reboot To System Online	44
Table 4.5	Time Taken Received SMS from System Online To Owner Phone	45
Table 4.6	Time Recorded For SMS	46

## LIST OF FIGURE

Figure 2.1	Design of Global System for Mobile Communications Network	8
Figure 2.2	PIC 16F877A	22
Figure 3.2	Overall drawing system of this project	28
Figure 3.3	Design of basic input / output	29
Figure 3.4	Simulation for Regulated Power Supply	30
Figure 3.5	Simulation for Magnetic Switch	30
Figure 3.6	Light Emitting Diode	31
Figure 3.7	Buzzer	32
Figure 3.8	Simulation for implement of car model	33
Figure 3.9	Basic simulation of LCD 16 x 2.	34
Figure 3.10	Schematic diagram for MAX 232 and RS232	35
Figure 3.10	Electromagnetic lock	36
Figure 3.11	BEL-M5 Vibration Sensor	37
Figure 4.1	The result before ALRM RST	43
Figure 4.2	Circuit for ALRM LCK	44
Figure 4.3	System Initialization	45
Figure 4.4	System Online 1	45
Figure 4.5	System Online 2	45
Figure 4.6	Notification	45
Figure 4.6:	The graph of analysis between Distance and Time of the GSM modem	47

Figure 4.8

The graph of analysis between Distance  
and Time of the GSM modem

48

## LIST ABBREVIATIONS AND SYMBOLS

GSM	=	Global System communication for mobile phone
GPRS	=	General Packet Radio Service
GMSK	=	Gaussian Minimum Shift Type
GPS	=	Global Positioning System
PDU	=	Protocol description unit
ISP	=	Internet Service Provider
IC	=	Integrated circuit
LED	=	Light emitting diodes
LCD	=	Liquid Crystal Display
PIC	=	Programmable Interface Controller
MAP	=	Mean Arterial Pressure
SS7	=	Signaling System Number Seven
SMS	=	Short Messaging Service
ISIS	=	Intelligent Schematic Input System
UART	=	Universal Asynchronous Receiver/Transmitter
BDP	=	Bachelor Degree Project
GSM	=	Global System communication for mobile phone
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
RC	=	Radio Controlled
SMS	=	Short Messaging Service
RFID	=	Radio-Frequency Identification



# CHAPTER 1

## INTRODUCTION

In the period of globalization, crime rate is expanding step by step as it is entirely obvious from the way that robberies have turned into a matter of schedule. The auto burglary especially causes the proprietor to acquire gigantic misfortune as a part of the sum contributed on their auto. The security framework has been improved in all fields in the general public. Car security has conjointly earned a few expedient changes, however, the estimation of all security redesigns are so high and are not sensible for vehicle proprietors. In this manner, the need of great importance might be a higher hostile to robbery framework which will be upheld abuse numerous advancements.

This venture is planned to give the most straightforward security answer for the vehicles at a sensible cost. It gives another style to a hostile to robbery framework as a sensible answer for shield for autos from being taken and from intruders client by utilizing PIC. This venture joined the short messaging system as an enhancement for a more secure and simple car security system. The short messaging system is getting utilized among this venture since it incorporates a higher scope in each indoor and open air environment. Furthermore, short messaging system being the main innovation is widely used considering nations all over the world.

This framework conjointly utilizes vibration sensor to identify movement thus send the notification through the application to the proprietor of the auto. The stream of this framework initiates when the auto is in off condition, then it will trigger the sensor. At that point, once it identifies a movement or invaded, the alarm will turn on and it will send the notification to the proprietor. At a duration

of a minute, the proprietor will cut off the alarm and shutdown the auto framework. It is normal that this venture can expand the auto security framework and might diminish the wrongdoing of auto taking.

### **1.1 Problem Statement**

These days, the security framework inside the auto is not sufficient to determine the matter of auto taking. It doesn't have any electronic gadget framework snared thereto. The auto criminal exclusively simply takes a few seconds or minutes to deactivate the security framework that as of now being secured into the at auto by the manufacturers. Other than that, nobody can give careful consideration once the auto alert burst. Once the auto is stolen, it is becomes elusive to track the auto back. Besides that, one amongst the matter is the constraint of shift location for caution. Bolstered these reasons, an against burglary auto ready framework utilizing short messaging framework is anticipated to help the execution of this auto security framework.

### **1.2 Objective Of Project**

The objectives of this project are:

- 1) To develop the prototype of anti-theft car security system which will find the prevalence of car theft.
- 2) To build an extra feature to the current security system that may warn the owner of the car by causing notification once there has been an intrusion into the car. Owner also can send the instruction to cut off / reset the car.

### **1.3 Scope Of Project**

This project is to install an appropriate sensor in the car that may find the presence of motion complies with this two condition: the car engine is switch OFF and the car door is lock. Upon detection a motion at the car, the sensor with relay a

message to the system wherever it'll send a notification to the owner. The scope of this project is split into 2:

- a) Design a car alarm system which will detect whenever stealing happens or non-authorized people - Software implementation using PIC, Hardware implementation using 16F877A microcontroller, magnetic lock and vibration sensor.
- b) Design a system that may send notification to owner when the car detect the motion. – Using short message system (SMS) via Global System for Mobile Communication (GSM) modem.

#### **1.4 Thesis Structure**

This proposal consists of five chapters that may describe the various components of the project. Every chapter can justify every half in terms of software and hardware thereon chapter. The contents includes info of elements utilized in this project.

**Chapter I:** This chapter will justify the project in terms of objectives, statement of the matter, scope and causes of issues that make this project.

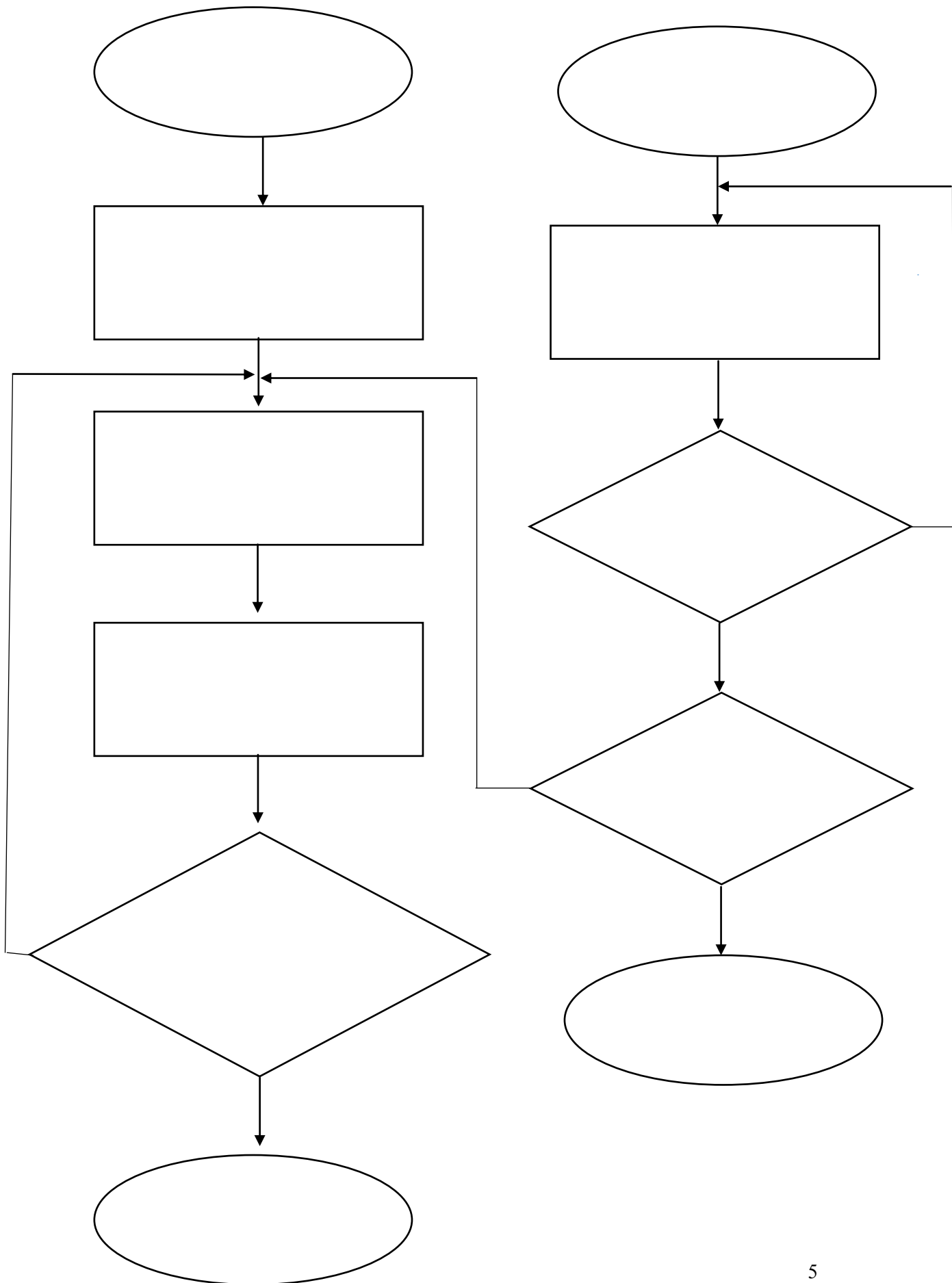
**Chapter II:** This chapter describe the literature review of current problems and reviewing previous terms of journal thesis. This chapter also will examine somewhat of the half utilized in the project.

**Chapter III:** This chapter specialize in the methodology utilized in the project. This project consists of the two ways whereby can use software and hardware. Each divisions are delineate.

**Chapter IV:** This chapter will discuss result and analysis detailed on designing of the model. It also discussed about result of hardware and software. All construction circuit, analysis, observations and designed are represented in this chapter.

**Chapter V:** This chapter will discuss about discussion, issue, conclusion and suggestion of this project. Any remark and suggestion can be appended with a specific end goal to enhance the project later on.

1.5 Flow chart



## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.0 Introduction**

This section judges an exact references and data from the previous tasks among ideas that are related to malfunction in automotive alarm. In addition, this chapter will elaborate explanation regarding the software and hardware throughout this project. This section justifies and discusses the literature reading that is said to the development of the anti-theft automotive alarm. This chapter reviews each part utilized within the system. The part concerning are PIC, electromagnetic lock, vibration sensor, GSM Modem and a few device and software application are explained.

#### **2.1 Related Work**

##### **2.1.1 Microcontroller Based Anti-Theft Security System Using GSM Networks with Text Message as Feedback**

One automobile security system utilizes an embedded system style with GSM to observe a automobile. Once the system activated, the automobile automatic demobilize by disconnecting the key. In addition, if a shot of the theft happens through the door or boot, the SMS is sent via GSM to the automobile owner and car alarms are activated. This technique is extremely little and compact it will be put in on any car consistent with Visa M. Ibrahim, (2012).

### **2.1.2 An Intelligent Tracking System Based on GSM and GPS Using Smartphones**

The security and theft interference area unit the most areas in current state of affairs. This is achieved by using GSM and GPS technology. By using this technology, it solely can't track and monitor the vehicle in current position of the two wheeler. The position of this two wheeler acquired by GPS module that is interfaced to microcontroller and to the user of smartphone by using GSM Module. It addition, is implement this technique by using Atmel microcontroller. This vehicle chase system is consistent with Vigneshwaran.K, (2015).

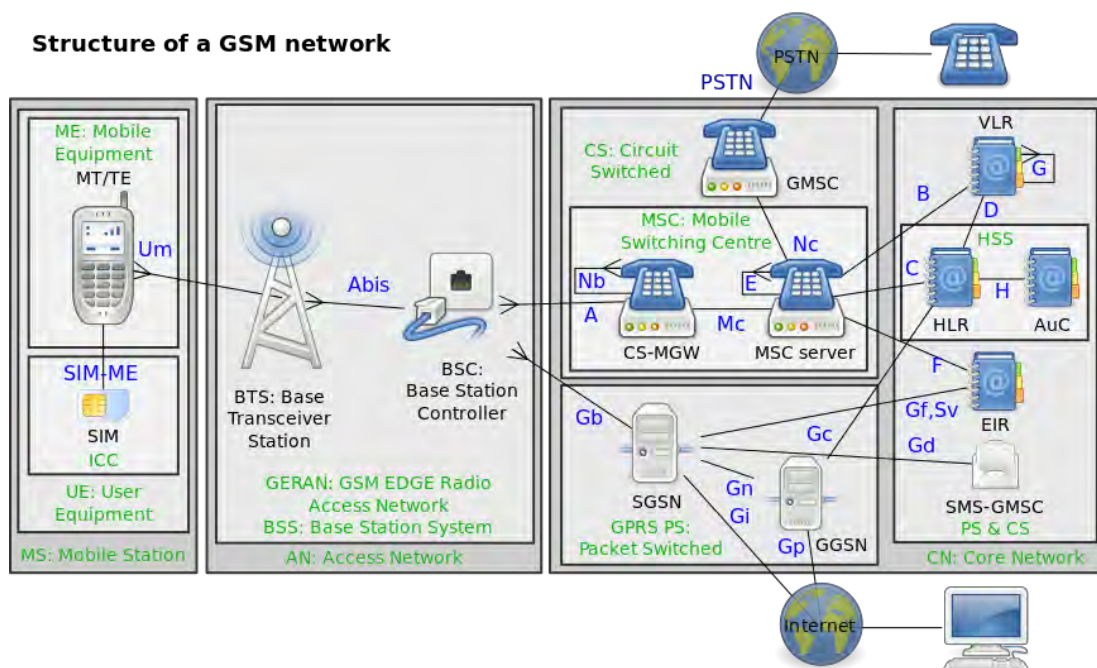
### **2.1.3 Design and Construction of A Remotely Controlled Vehicle Anti-Theft System via GSM Network.**

Consistent with analysis by Alli, Ijeh-Ogboi & Gbadamosi, (2015), this project remotely controlled via GSM network. This project is split into two scheme that is vehicle scheme and device access link. This technique is the same as the previous connected work however it was solely explored to trace down the precise location however not to demobilize the vehicle. It additionally sent a warning immediately to user's phone and report the condition of the car to forestall the car from being taken by unauthorized person.

## **2.2 Global System for Mobile Communications (GSM) Modem**

Global System for Mobile Communications is an open unwired communication system. Global System for Mobile Communications is employed by over two hundred countries around the world. A number of the GSM standards makes international roaming at home with "roaming agreements" between portable operators. There is additionally another sense of the Global System for Mobile Communications (GSM) may be a global normal for digital mobile communications. GSM was established in 1982 in Europe to ascertain a normal standard in operation within the 900MHz frequency vary. GSM with previous technology in signal and "channel" negotiations are digital , which implies that it

is seen as a system of mobile phones of second generation ( 2G ) . GSM is an open normal that is presently developed by 3G. Overview of the Global System for Mobile Communication (2010) shows that GSM additionally supports SMS text messaging is additionally consistent with John. Scourias, University of Waterloo, (May 1995). Figure 2.1 shows the Design of Global System for Mobile Communications Network.



**Figure 2.1: Design of Global System for Mobile Communications Network**

Global System for Mobile Communications will support the indoor coverage exploitation indoor Pico cell base station or exploitation repeater indoor with internal antenna that is distributed through the ability splitter to deliver the signal quantitative relation of the external antenna in an order that is distributed one by one within the antenna system. It is done if the call capacity is needed indoors too much. Sometimes this may occur within the looking centers or aerodrome. Thus it is not a pre-signal penetration within the buildings as a result of radio from near cells given by indoor coverage. Quite continued part shift controlling used within the GSM frequency kind referred to as Gaussian Minimum Shift Type (GMSK). GMSK signal through on initially smoothed