DEVELOPMENT OF ANTI-THEFT VEHICLE AND GPS LOCATOR USING GSM

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This project are dedicated to my dearest parent,
Othman Bin M. Daud and Rohani Binti Abd Hamid,
my siblings, and not forget to my friends,
who have always there when I need them.
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ABSTRACT

Nowadays, a lot of cars have been stolen in the world. Development of Anti-Theft Vehicle and GPS Locator Using GSM or ATVS is an electronic device installed in a vehicle to track the vehicle's location and disable or enable the vehicle by owner or third party. In addition, ATVS can send early warning Short Message Service (SMS) if vehicle's door forcedly opened. The main objective for this project is to develop a device to control and prevent vehicle from stolen. Even the vehicle they stolen, it can be tracked by using Global Positioning System (GPS). Basically, this project proposed to design an anti theft system using GPS and Global System for Mobile communication (GSM). ATVS can be divided into two parts which are hardware and software development. The hardware development includes the GSM modem, GPS receiver and microcontroller. This project will use a GSM modem and microcontroller as anti theft system which is to disable and enable the vehicle engine using hand phone if the vehicle gets stolen. The GSM modem, GPS receiver and microcontroller will work as locator system. Besides, sensor and microcontroller is used to send message warning to user if someone open the car. The function of GPS receiver is to locate the vehicle by indicating the position of the vehicle in term of latitude and longitude. GPS receiver is used to collects the latitude and longitude and then forwards to the microcontroller. After that, the data is sent to the mobile after requested by owner or a third party in form of SMS with the help of GSM modem. For future development, GPS can be replaced with Indoor Positioning System (IPS) because the GPS is not suitable for use in the building. Integrate with Google map.

Keywords-GPS; GSM ;anti-theft ;tracking system

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ABSTRAK

Pada masa kini, banyak kereta telah dicuri di dunia. Pembangunan Anti-Kecurian Kenderaan dan Pencari GPS Menggunakan GSM atau ATVS adalah alat elektronik yang dipasang pada kenderaan untuk mengesan lokasi kenderaan dan mematikan atau menghidupkan kenderaan oleh pemilik atau pihak ketiga. Di samping itu, ATVS boleh menghantar Perkhidmatan Pesanan Ringkas (SMS) amaran awal jika pintu kenderaan dengan paksa dibuka. Objektif utama projek ini adalah untuk membangunkan satu alat untuk mengawal dan mencegah kenderaan dari dicuri. Malah apabila kenderaan mereka dicuri, ia boleh dikesan dengan menggunakan Sistem Kedudukan Global (GPS). Pada asasnya, projek ini dicadangkan untuk merekabentuk sistem anti kecurian menggunakan GPS dan Sistem Global untuk Komunikasi Mudah Alih (GSM). ATVS boleh dibahagikan kepada dua bahagian iaitu pembangunan perkakasan dan perisian. Pembangunan perkakasan termasuk modem GSM, penerima GPS dan mikropengawal. Projek ini akan menggunakan modem GSM dan mikropengawal sebagai sistem anti kecurian yang digunakan untuk mematikan dan menghidupkan enjin kenderaan dengan menggunakan telefon bimbit jika kenderaan dicuri. GSM modem, penerima GPS dan mikropengawal akan bekerja sebagai sistem pencari. Selain itu, pengesan dan mikropengawal digunakan untuk memberi mesej amaran kepada penguna jika terdapat seseorang yang membuka pintu kereta. Fungsi penerima GPS adalah untuk mencari kenderaan dengan menunjukkan kedudukan kenderaan dalam jangka latitud dan longitud. Penerima GPS digunakan untuk mengumpul latitud dan longitud dan kemudian menghantar maklumat tersebut kepada mikropengawal. Selepas itu, data tersebut dihantar ke telefon mudah alih selepas diminta oleh pemilik atau pihak ketiga dalam bentuk SMS dengan bantuan modem GSM. Bagi pembangunan masa depan, GPS boleh digantikan dengan Sistem Kedudukan Dalaman (IPS) kerana GPS

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Kata kunci-GPS, GSM; anti-kecurian, sistem pengesanan

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LIST OF ABBREVIATIONS

ATVS	-	Development of Anti-Theft Vehicle and GPS Locator Using GSM
GSM	-	Global System for Mobile communication
GPS	-	Global Positioning System
LED	-	Light Emitting Diode
NMEA	-	National Marine Electronics Association
PCB	-	Printed Circuit Board
SMS	-	Short Message Service
UART	-	Universal Asynchronous Receiver/Transmitter
UV	-	Ultraviolet

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CHAPTER I

INTRODUCTION

The "Development of Anti-Theft Vehicle and GPS Locator Using GSM" called ATVS is designed and developed to accommodate the needs of today's where a lot of cars have been stolen in the world. It is a very useful device and able to be used by anybody with the need to track their vehicle. This chapter will briefly discuss the general background of this project, its concept, objectives, scope and the problem statement.

1.1 Project Background

Nowadays, computer and electronic technologies are growing rapidly. In fact, it plays important role in our life and it can be used to prevent vehicle from stolen. Development of Anti-Theft Vehicle and GPS Locator Using GSM is a project that contains electronic device installed on a vehicle so that the vehicle can be detected by the owner or a third-party user. ATVS uses Global Positioning System (GPS) to get an accurate reading in term of latitude and longitude of the vehicle. Global System for Mobile communication (GSM) will be used as warning system when has someone open the car door of the vehicle. In addition, GSM modem will be used to send the position of the vehicle to remote user. Vehicle's information from GPS and GSM can be viewed by using a software or Google map on a computer.

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ATVS is commonly can be used by those who want to prevent their vehicle from being stolen. In some cases police can follow the signal emitted by the ATVS and locate the stolen vehicle. Other applications are to know our exact location by a parent with a teen driver. The existence of ATVS then can be used to decrease the insurance cost. It is because the loss-risk of the vehicle drops significantly.

1.2 Problem Statement

Nowadays, a lot of cars have been stolen in the world. Based on Polis Diraja Malaysia (PDRM), in 2011, 45,452 vehicles were reported stolen in Malaysia [2]. In order to solve this problem, GSM and GPS can be used to prevent the vehicle from stolen. The GSM can also be used to enable and disable the vehicle engine. Besides, user will get an SMS warning from GSM modem when someone trying to open the car door. The GPS receiver is used to identify the vehicle position in term of latitude and longitude and then forwards to the microcontroller. After that, microcontroller will send an SMS to user with the help of GSM modem. GPS have proven so effective in tracking and determining the location of a vehicle or asset over a decade. Table 1.1 below shows the recent statistics on vehicle lost in various countries [10].

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Table 1.1: Number of car thefts

Rank	Countries	Amount
1	United States	1,246,096
2	United Kingdom	348,169
3	France	301,539
4	Italy	232,564
5	Canada	161,506
6	Mexico	141,007
7	Australia	139,094
8	Spain	134,594
9	South Africa	93,133
10	Germany	70,617

1.3 Project Objectives

The main objective for this project is to design and develop a device to prevent vehicle from stolen. This project includes the research and study on how the GPS receiver and GSM modem would works. The objectives of this project are:

- To design and develop a GSM and GPS tracking system.
- To enable and disable a vehicle using hand phone if the vehicle gets stolen.
- To send SMS warning to user if someone trying to open the car door of the vehicle.
- To come out with hardware of GSM and GPS Vehicle Anti-Theft System and gain programming skills.

1.4 Scope Project

This project involves with study and designs the Global Positioning System (GPS) and Global System for Mobile communication (GSM) to track the vehicle's location and disable or enable the vehicle by owner or a third party. The users will be

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able to send command to the GPS receiver by using GSM modem that can give data about the position of the vehicle. This system will be used to control vehicle system using GSM network as a medium of communication [8]. The user can disable and enable the vehicle by using hand phone. ATVS sending SMS to the user with the help of GSM modem if someone open the car door.

This project has two fractions, software development and hardware development. For the software development, ATVS have using MPLAB IDE v8.89 software to program the PIC18F4520. The GSM modem, PIC18F4520 and relay have been programmed to disable and enable the vehicle. Besides, GSM modem, PIC18F4520 and GPS receiver were programmed to locate and send the vehicle position which is latitude and longitude indicating the position of the vehicle to owner or third party user. The switch, PIC18F4520 and GSM modem have been programmed to know if someone opens the car door.

After that, ATVS circuit will be simulated using Proteus 7.5 while Altium Designer Release 10 has been used to design PCB layout. The hardware is divided into GSM Modem (Wavecom), GPS Receiver (SKGPS), microcontroller (PIC18F4520), power supply and MAX232 circuit.

1.5 Project Methodology

In order to achieve the objective, several methodologies have been proposed. Literature review is done by gathering information about this project from journal, article, books and papers in order to get a deep knowledge. In the beginning, literature review including understanding about GSM, GPS and microcontroller have been studied. Then, the methodologies proceed with design and analyze the results. At the end of the project, programming skills was learned and gain. Finally, the report has been prepared.

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1.6 Thesis Outlines

Chapter I consists of the introduction of the project includes the project background and problem statement. Besides that, the objectives, scope of work and methodology of the project also discussed and mention in this chapter. Then, a little explanation is discussing related to the project.

Chapter II covers on the literature review of the project. The literature review was obtained from journal paper, article, books and technical papers in order to get a deep knowledge. The literature review includes three parts which are previous project study, hardware development and software development.

In chapter III, project methodology is fully covered with discussion and explanation about the method and approach that apply in this project. The method of designing Development of Anti-Theft Vehicle and GPS Locator Using GSM was including the design process, simulation, and fabrication. The all steps of the design are explained in detail in this chapter.

The result from the simulation is analyzed and explained in very detail statement in Chapter IV. The finding on analysis results is presented in this chapter.

Chapter V is the last chapter contains an overall conclusion of the project. The future works of the project is also mentioned and described in this chapter.

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CHAPTER II

LITERATURE REVIEW

Literature review is done by gathering information about this project from journal, article, books and papers in order to get a deep knowledge. This chapter describe some literature related to the information which utilizing Global System of Mobile Communications (GSM), Global Positioning System (GPS) and microcontroller. Basically, this chapter is divided by three sections which are previous project study, hardware development and software development. Literature review is necessary before initiate the project and literature researches regarding the project are important in understanding the concept of the overall project.

2.1 Previous Project Study

Some case study and review of previous researches is performed to gain more information and understanding on GSM and GPS tracking system. Previous study shown there are many projects based on GSM and GPS applications.

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