ANTI THEFT TRACKING SYSTEM REMOTE USING GSM

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This report is submitted in partial fulfillment of the requirement for the award of Bachelor of Electronic Engineering (Wireless Communication) With Honours

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JUNE 2015

ABSTRACT

As the amount of urban vehicle grows rapidly, vehicle theft has become a shared concern for all citizens. However, present anti-theft systems, lack of tracking and monitoring function. The anti-theft tracking system, remote using GSM is designed to provide all-round active service for the owners. This system is controlled by a GPS for location tracking. When the car is stolen, the PIR sensor mounted inside the vehicle will be triggered, and GSM module will send the SMS to the owner's mobile phone, thus owners can check SMS alert. This system uses mobile terminal, which is more convenient and flexible than other offline kinds of products since the owner can immobilize and track the position of the car immediately with a mobile phone once the car is stolen. The system is powered by Arduino microcontroller that manage all of the communication and control. The developed system has been evaluated and the result shown user can locate their stolen car and shut down the engine from anywhere with just a simple SMS.

ABSTRAK

Kerana jumlah kenderaan bandar tumbuh dengan pesat, kecurian kenderaan telah menjadi perhatian kesemua rakyat. Walau bagaimanapun, sekarang sistem anti-kecurian kekurangan keberkesanan dan fungsi pengawasan. Sistem pengesanan anti-kecurian jauh menggunakan GSM direka untuk menyediakan semua pusingan perkhidmatan aktif untuk pemiliknya. Sistem ini dikawal oleh GPS untuk mengesan lokasi. Apabila kereta itu dicuri, sensor PIR yang dipasang di dalam kenderaan tersebut akan mengesan pengerakkan, dan modul GSM akan menghantar SMS ke telefon bimbit pemilik, dengan itu pemilik boleh menyemak SMS amaran. Sistem ini menggunakan terminal mudah alih, yang lebih mudah dan fleksibel daripada jenis produk luar talian lain kerana pemilik boleh melumpuhkan dan mengesan kedudukan kereta dengan segera dengan telefon bimbit sekali kereta itu dicuri. Sistem ini dikuasakan oleh mikropengawal Arduino yang menguruskan semua di luar komunikasi dan kawalan. Sistem yang dibangunkan telah dinilai dan pengguna hasil ditunjukkan boleh terletak kereta dicuri mereka dan menutup enjin dari mana-mana sahaja dengan hanya sms mudah.

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LIST OF ABBREVIATION

SYMBOL	DEFINITION
GSM	Global System Mobile
IC	Integrated Circuit
GPS	Global Positioning System
UART	Universal Asycronous Receive Transmite

LIST OF SYMBOL

SYMBOL	DEFINITION
Gnd	Ground
Tx	Transmiter
Rx	Receiver
GPIO	General Purpose Input Output
Vcc	Voltage Collector

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Now days, the statistical reports of thefts of automobile shows that drastically rising especially motor car at all over the world. This bad situation cause all over the world especially Europe has started worrying for the past of years. Indirectly, the insurance provider has started make new guideline for automobile manufacture to produce their product more secure.

In Malaysia, reports on automobile theft have been reported. This situation rising every years. Based on General Insurance Association of Malaysia (PIAM), urban areas such as Kuala Lumpur and Shah Alam widely applicable in areas like this. Moreover, by 10 to 20% of vehicle theft rate increased every year [5]

1.2 Problem Statement

Based on the data and discussion on automobile theft, this theft cases is a problem all over the world. No one wants his vehicle stolen. Customers who make insurance claims resulting insurance companies feel pressured. This situation resulted increasing the price of insurance premiums by insurance companies. Therefore, insurance premiums affordable for low percentage of customers. Security weaknesses that are installed in the automobile causing automobile insurance premiums increased the price.

Minimum standards such as security systems based on alarm many installed by the vehicle manufacturer. However, the effectiveness of this device is not enough. Pager system is not installed in it. This security system requires only a little time to turn off by the vehicle thieves. Furthermore, when the alarm goes off, no one pay attention. Due to this reason, idea Anti-theft tracking system using GSM remote designed and developed to enhance the effectiveness of current security system.

1.3 Objective

The main objective of this project is to develop, design and test the vehicle anti-theft tracking system using GSM remote that can be used to disable the vehicle and locate the vehicle's user. The proposed system also allows the user to disable the vehicle and locate the current position of the vehicle remotely by SMS.

Objective and achievement of this project are:-

i. Develop and design based on the proposed hardware system.

ii. Develop software coding based on the proposed control system.

iii. The proposed system is controlled appropriate tests.

1.4 Thesis Layout

This thesis contains five chapters and summarized as follows:-

i. Chapter 1 it about the background of the project, which consists of an introduction, problem statement, and objectives project.

ii. Chapter 2 it regarding the literature review. It is reviewing on vehicle theft, statistics of stolen vehicle, rules and methods used by thieves to steal the car. It also discusses the previous project been used or developed by other researchers associated with this project.

iii. Chapter 3 it regarding the design procedures used to make software and hardware based on the proposed project.

iv. Chapter 4 it regarding the results and a discussion of all the tests conducted for this project.

v. Chapter 5 it regarding the proposals, conclusions and future improvements that can be used to improve the functioning and effectiveness.

CHAPTER 2

LITERATURE VIEW

2.1 Introduction

One of the social problems in the community is vehicle theft. Contributing to this problem was found several factors including:-

i. The effect of the gap between the rich and the poor are falling further. This is among the reasons for dissatisfaction among the people. This condition occurs due to causes of crime and car theft is one crime that provides opportunities for good returns.

ii. furthermore, laws and enforcement is not enough to teach people not to commit crimes

iii. Current security system is not effective and the vehicle owner carelessness did not help for against the crime

Every state of the country and found many forms of vehicle theft. Most crime using common equipment and brute force to unlock the vehicle. Locks and security system provides little deterrent to a skilled thief vehicles.

Moreover, there are two types of vehicle thieves among them "of" the vehicle and "from" the vehicle. Thieves "of" the vehicle consists of a professional thief who stole a car to get parts and accessories, and even change the identity of the vehicle for resale. The second "from" the vehicle, the thief only stole personal items, accessories and spare parts of vehicles. Sometimes, these thieves will stops momentarily committing crimes to avoid suspicion.

As vehicle theft rates are increasing, customers always expect anti-theft system is provided on their new vehicles as a basic requirement.

2.1.1 Statistic of Stolen Car

Statistic by private cars stolen in 1980-1995 shows a decrease every year. After 2000, there was an increase in the number of private cars stolen significantly. In 1980-1995, a total of 5958 private cars stolen average every year. In 2005-2009, this number drastically increased more than 3.5times to 21.501 private cars are stolen every year [5].

Some vehicle models became popular with thieves. The latest vehicle theft statistic shows local vehicles, Perodua and Proton, is frequently stolen vehicles, which accounted for two-thirds of the total stolen vehicle model. 52% more than half of the vehicles stolen are proton model. Although, Nissan vehicle model is the fourth most stolen models in Malaysia, it only accounts for 6% of the overall model was stolen in Malaysia. By PIAM statistic latest, it state model Nissan Vannette is the most stolen [5].

2.1.2 Common Methods Used by Thieves to Steel Cars

There are many ways thieves steal vehicles such as: -

i. Keys Stolen in Burglary one of the most popular among thieves. This method increases due to increased vehicle safety systems, especially on luxury vehicles stolen by thieves is very difficult without a key [7]. Thieves will break into the victim's house just to steal the keys inside house.

ii. Keys Left in Car is the second most common method used by thieves. Thieves will steal the vehicle when victim left the keys inside the vehicle when paying for petrol, heating the vehicle on a cold morning and went to the convenience store [7]. Thieves will take the opportunity to bring victim vehicle to another place.

iii. one of the popular methods that in times past where thieves break in the steering lock then make connecting wires to the vehicle ignition switch. But this method is only effective on older vehicles because immobilizer security system is not installed on old vehicles [7].

2.2 Preview Works Related to the Proposed Project

An Automotive Security System for Anti-Theft is one method that has been proposed to enhance effective vehicle security system. The proposed method uses the GSM modem, and PIC microcontroller.

The structure of the proposed system is:-

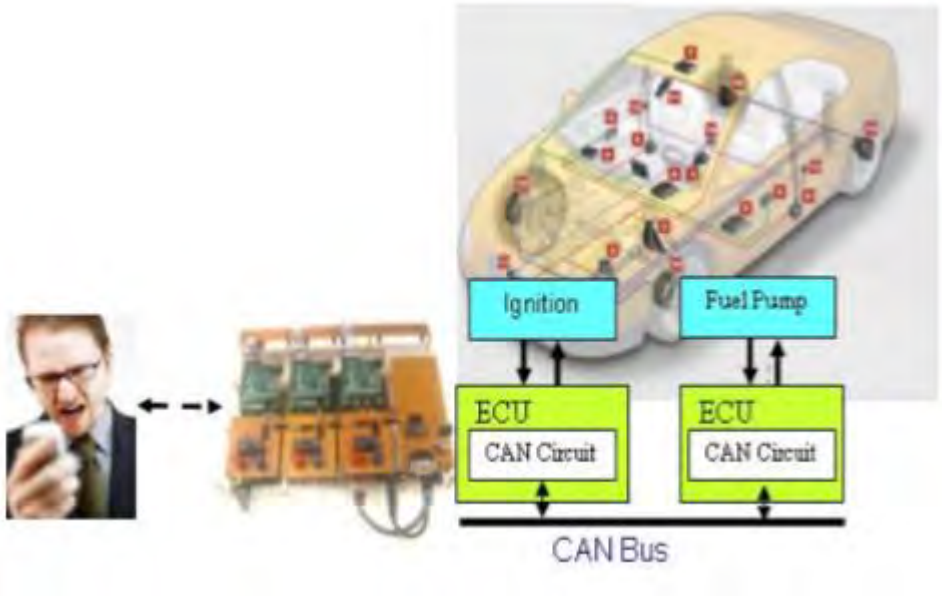

Figure 2.1: Overall system structure diagram

Once an owner realizes his vehicle is lost, all he needs to do is to send a "Disable" SMS from his mobile phone to a secret and specific phone number which is dedicated to the electronics on the automobile. After receiving the SMS, the security system will check the mobile phone number of owner and his allocated automobile numbers for authentication. If there is a match (owner to vehicle), the SMS is forwarded to process and the automobile cannot be started again after it stops. In other word, only owner's mobile number is recognized by the system and an attacker cannot disable the automobile remotely by a SMS message [1].

The software design of the proposed system is:-

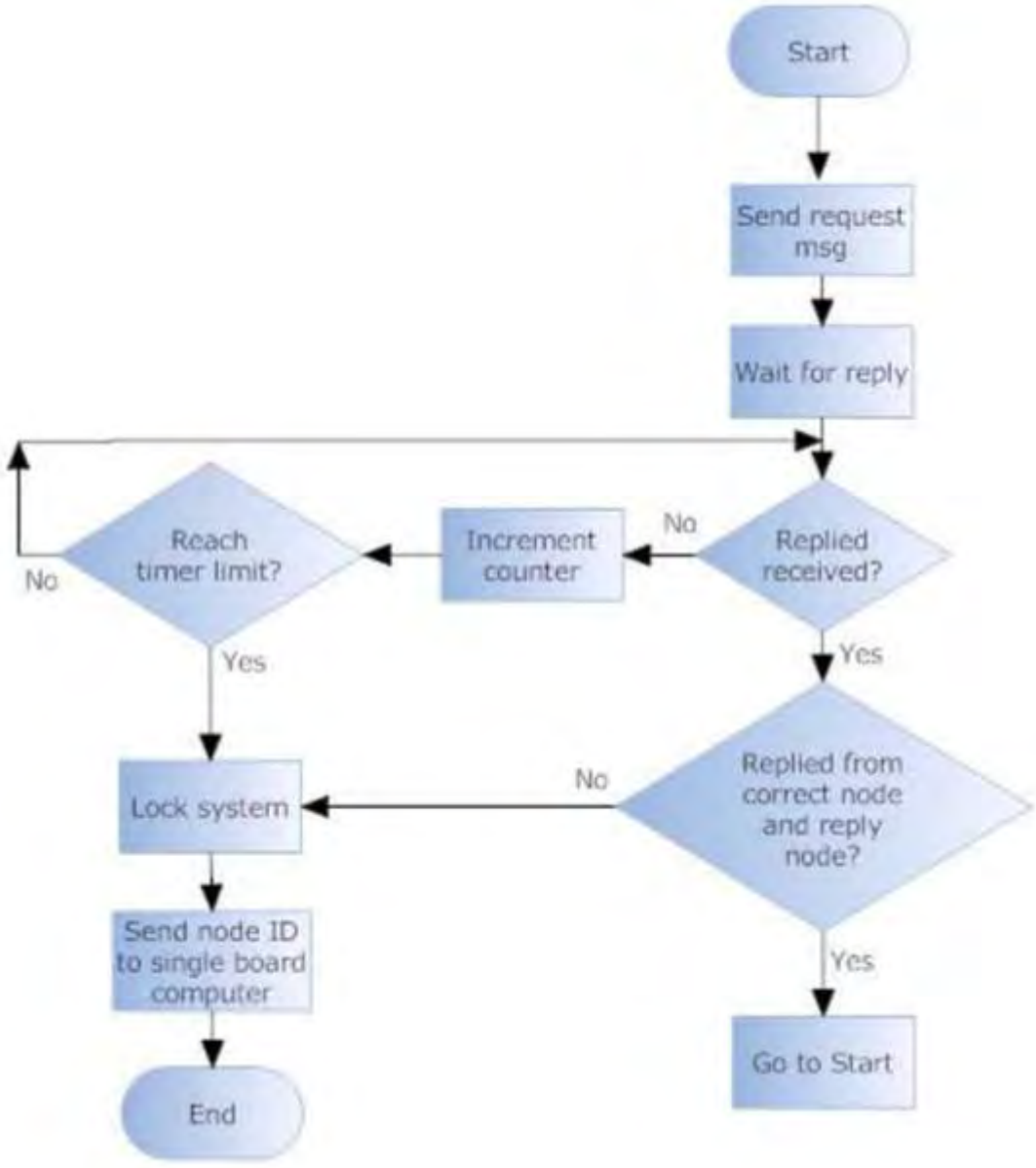

Figure 2.2: Working flow diagram

2.3 SIM908

2.3.1 Power supply

The power supply range of SIM908 is from 3.2V to 4.8V. The transmitting burst will cause voltage drop and the power supply must be able to provide sufficient current up to 2A. For the VBAT input, a bypass capacitor such as a 100uF is strongly recommended, this capacitor should be placed as close as possible to SIM908 VBAT pins. The following figure is the reference design of +5V input power supply. The designed output for the power supply is 4.1V, thus a linear regulator can be used [2].

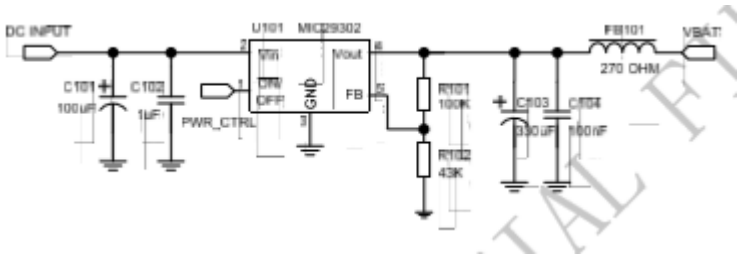

Figure 2.3: Reference circuit of the LDO power supply

If there is a high drop-out between the input and the desired output (VBAT), a DC-DC power supply will be preferable because of its better efficiency especially with the 2A peak current in burst mode of the module. The following figure is the reference circuit [2]

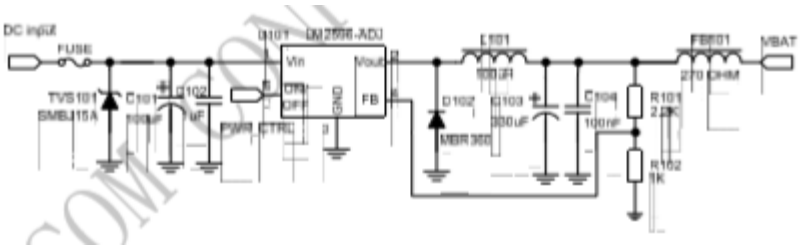

Figure 2.4: Reference circuit of the DC-DC power supply

The single 3.7V Li-ion cell battery can be connected to SIM908 VBAT pins directly. But the Ni-Cd or Ni-MH battery must be used carefully, since their maximum voltage can rise over the absolute maximum voltage of the module and damage it [2].

When battery is used, the total impedance between battery and VBAT pins should be less than 150mOhm. The following figure shows the VBAT voltage drop at the maximum power transmit phase, and the test condition is as following [2]:

VBAT = 4.0V,

A VBAT bypass capacitor CA = 100uF tantalum capacitor (ESR = 0.7Ohm)

Another VBAT bypass capacitor CB = 1uF