UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF LOST VEHICLE TRACKING SYSTEM THROUGH GPRS NETWORK

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electronic Engineering Technology (Telecommunication) with Honours.

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APPROVAL

This report is submitted to the Faculty of Electrical and Electronic Engineering Technology, Universiti Teknikal Malaysia Melaka as a partial fulfilment of the requirements for the conferment of degree of Bachelor of Engineering Technology (Telecommunication) with Honour. The member of the supervisory is as follows:

…………………………………

Ts. Zahariah binti Manap

ABSTRAK

Sistem pengesan kenderaan yang hilang adalah sistem yang akan membantu pemilik kenderaan untuk mengesan kenderaan mereka. Sistem ini membolehkan pemilik untuk memaparkan lokasi kenderaan dan memberi amaran kepada mereka apabila kenderaan mereka dicuri. Sistem penjejakan kenderaan melalui rangkaian GPRS adalah peranti yang boleh mengesan kenderaan di persekitaran luar. Pada masa kini, pencuri kenderaan boleh mencuri kenderaan dalam beberapa minit dengan alat penggodam berulang yang boleh diakses di Malaysia. Masalah ini boleh membahayakan pengguna kereta yang menggunakan rangka kerja kunci tanpa kunci. Masalah ini juga mempengaruhi pengguna untuk menekankan keselamatan kenderaan mereka apabila berhenti kenderaan mereka di tempat letak kereta awam. Dalam projek ini, satu modul kenderaan berdiri sendiri sistem pengesanan disediakan dan menjejaki lokasi modul kenderaan dengan bantuan modul GPS dianalisis. Untuk memaparkan lokasi modul kenderaan yang dilacak pada aplikasi Android juga dianalisis. Projek ini terdiri daripada beberapa komponen yang digunakan, termasuk aplikasi GPS, GSM / GPRS, Arduino UNO dan Android. Pada proses pertama, pengguna mengunci lokasi kenderaan apabila mereka meletak kenderaan di tempat tertentu. Apabila kenderaan bergerak keluar dari lokasi, pengguna akan mendapat amaran yang memberitahu kenderaan mereka bergerak. Selepas pengguna membuka kunci lokasi, mereka akan mendapatkan lokasi baru kenderaan itu dan mengesan lokasi kenderaan itu kerana lokasi itu akan disambungkan ke peta google. Data yang diambil dalam cuaca baik di tempat tertutup dan luaran adalah lebih baik dibandingkan dengan data yang diambil dalam cuaca buruk dengan ketepatan 18% untuk luaran dan 10% untuk tempat tertutup untuk mendapatkan 0 meter.

ABSTRACT

Lost vehicle tracking system is the system that will help the owner of the vehicle to keep track of their vehicle. This system enables the owner to display the location of the vehicle and give warning to them when their vehicle is stolen. Vehicle tracking system through GPRS network is a device that can track vehicle in outdoor environment. Nowadays, the vehicle thief can stole the vehicles in minutes by a recurrence hacking gadget that is accessible in Malaysia. This problem can endanger the car users that use the keyless passage framework. This problem also influences the user to stress over the security of their vehicle when to stop their vehicle at the public parking. In this project, a stand-alone vehicle module of the tracking system is provided and track the location of vehicle module with the help of a GPS module is analyzed. To display the location of the tracked vehicle module on an Android application also is analyzed. This project consists of several components that use, including GPS, GSM/GPRS, Arduino UNO and Android application. At the first process, the user lock the location of the vehicle when they park the vehicle at certain place. When the vehicle is moving out of range from the location, the user will get the warning that notify their vehicle is moving. After the user unlock the location, they will get the new location of the vehicle and detect the location of the vehicle because the location will connected to google map. The data taken in good weather both in indoor and outdoor place is better compare to data taken in bad weather with the accuracy of 18% for outdoor and 10% for indoor place to get the 0 meter.

DEDICATION

To my beloved parents Yusof bin Che Mat and Normah Ani binti Ismail

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Alhamdulillah. Thanks to Allah, whom with His willing giving me the opportunity to complete this Final Year Project which is title Development of Lost Vehicle Tracking System through GPRS Network. This final year project was prepared for Faculty of Electrical and Electronic Engineering Technology, Universiti Teknikal Malaysia Melaka, basically for student in final year to complete the undergraduate program that leads to the degree of Bachelor of Electronic Engineering Technology (Telecommunication) with Honours.

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LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

GPRS - General Packet Radio Service

GPS – Global Positioning System

GSM – Global System for Mobile Communication

IoT – Internet of Things

MIT - Massachusetts Institute of Technology

SMS - Short Message Service

WAP - Wireless Application Protocol

CHAPTER 1

INTRODUCTION

This project aims to suit the necessities of the present vehicle for the owner to keep track their vehicle. It is an exceptionally helpful and adaptable device, an in reality it can be utilized by anyone with the need to keep track on their significant merchandise. The desired output from the system will be information, for example, position, speed, and time got from the Global Positioning System (GPS) receiver and will showed on the application. This chapter will cover the overview of project, problem statement, objectives, scope and the outline of the project.

1.1   Overview of Project

These days, there are a great deal of assortments application in our life. One of the applications is the vehicle tracking systems. The vehicle tracking system enables the user to display the places of different vehicles and cripple them remotely if there should arise an occurrence of theft. Vehicle tracking system through General Packet Radio Service (GPRS) network is a device that can track vehicle in outdoor environment. Basically, this project aims to develop vehicle tracking system using GPRS network that will be more valuable for users and more dependable. This system utilizes a GPS receiver to perform geo-referencing, plotting real-time focuses which is longitude and latitude from genuine areas on a map. Past tracking system depended on Short Message Service (SMS) (in view of Circuit Switching Mode) communication, yet this system utilized GPRS (in view of Packet Switching Mode) for tracking the vehicles. Along these lines, information shows up as live tracking (updating each second). Another main advantage of GPRS is the cost. The data can be transferred in

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the unit of Kilobytes/Megabytes (KB/MB) and it is exceptionally modest, when contrasted with SMS where the maximum of the SMS is only up to 160 characters.

GPRS is a wireless communication solution based on the current GSM network. It gives genuinely necessary bundle information services to most regions of the world. The implementation a GPRS solution for a vehicle tracking system is to empower information exchange utilizing packet switched mode. Utilizing GPRS, a large amount of information can be transferred in a brief span and in an exceptionally modest cost for a large amounts of information, for instance, it will enable to send or get extensive files which in Mega Bytes within seconds. GSM depends on circuit switched mode that exchanges information character by character and has numerous confinements, for example, a most extreme of 160 characters for every SMS, and charges based on the span of the call. GPRS enables to utilize the Internet facility in an extremely speedy way where the maximum is 171.2 kbps utilizing the packet data services and Wireless Application Protocol (WAP) Technology on the mobile phone. Utilizing WAP, the compresses data files can be transfer through TCP/IP.

1.2 Problem Statement

Vehicle burglary cases over the Malaysia – Thailand outskirt from 2012 until the point that 2017 have announced a 42% drop (Mohamad Fuzi Harun, 2018). When remarking on a car robbery syndicate from Malaysia that made Thailand as a travel community for stolen vehicles before sneaking them to different nations in the area, for example, Laos, Cambodia and Vietnam (Mohamad Fuzi Harun, 2018). Proprietors of cars utilizing the keyless passage framework are in danger of having their vehicles stolen in minutes by a recurrence hacking gadget that is accessible in Malaysia. This problem influences the user to stress over the security of their vehicle when to stop their vehicle at the public parking. For this time being, vehicle tracking system has been selected as a standout amongst other tracking system for the misfortunes of vehicle.

The vehicle manufacturer introduced a base standard security system such alarm based security system. In any event, it is not adequately powerful because the robbery can takes only two or three minutes to deactivate the security system. Nobody will give thought when the alert system sounded, that is the reason this system is

created to handle this issue. This project ought to be produced to help us to identify the lost vehicle if the vehicle thief happened. It is coordinated that this task will help as a decent guide of the fact that it is so huge to anticipate vehicle theft, security or position tracking in the nation. Along these lines, a basic gadget, low charging expense, and low system utilization must be built up.

1.3 Objectives

The objective of this project is to design and develop a Vehicle Tracking System using GPRS network. With an exact end goal to completely comprehend the GPRS technology, the research and study on how the technology works is necessary to finish the entire project. The objectives of this project are:

i. To develop a stand-alone vehicle module of the tracking system.
ii. To track the location of the vehicle module with the help of a GPS module.
iii. To display the location of the tracked vehicle module on an Android application.

1.4 Scope

This project will focus on developing the lost vehicle tracking system using GPRS network that can give an output of the data such as time and position. This system use an android application, which is MIT inventor 2 as the output where the Blynk server will detect the latitude and longitude from the satellite through GPS and send the location to the mobile apps. However, android has limitations on where android has vast number of foundation process which keeps running in the background, which eats so much mobile data. Furthermore, along these lines cost load of cash if you are not into unlimited data plan and need a strong connection. Android application must be revived each time as it gets new information from the server. Because of system issue, individuals may confront issue on their web access because of this service may get halt.

Besides that, GPRS also used in this proposed system as GPRS can connected with the internet application and conveyed a flow of new features. No new technology is fool proof and there are drawbacks indeed, even in all the new energizing highlights that go into making GPRS a standout amongst the most available advancements for

the regular individual, there are some large limitations. The hypothetical speed of the GPRS information transmission speed is 172.2 kbps however this is just conceivable in a situation when one single client with no mistake insurance is keeping all the time slots.

This project has limit where it only work in outdoor environment and cannot work in indoor environment because GPS cannot detect the location when there is interruption such as buildings, tree and etc.

CHAPTER 2
LITERATURE REVIEW

2.1 Introduction

This chapter provides an overview of vehicle tracking system and the technologies used in the system based on the related work. The project of vehicle tracking system is focus on outdoor system.

2.2 Overview of Vehicle Tracking

Tracking system is vital in present day world. The systems are very helpful in combatant observing, tracing of the robbery motor vehicle and other applications. Basically, the system relies on a microcontroller and comprises of a GPS module and a GSM module (Jethwa, Sheffer and Thompson, 2015). Motor vehicle robbery is the illegal action of burglary or make an attempt to bargain a car. According to the authors in (Jethwa, Sheffer and Thompson, 2015) GPS based Vehicle tracking system is compulsory in numerous conditions, including a case of car theft detection. Additionally, in the event that someone needs to track school transport of their kids, it will be useful to discover the location of children. The system is to track and offer whole position and speed data to user over mobile phone. In GPS tracking system the area of vehicle is sent to distant place and it is completed by GSM modem and it requires least 3 satellites to compute the correct position. This modem interfaces just in sole way with microcontroller which implies that it can simply convey information to microcontroller. GPS modem does not get to some degree information from microcontroller and send information to satellite, it just gets signal from satellites.

Jethwa et al (2015) also proposed that this system has GPS where the GPS will get information from the satellites amongst other simple information. The system proposed in (Jethwa, Sheffer and Thompson, 2015) is depicted in Figure 2.1. The idea

utilizes just a single GPS device and the communication procedure is accomplished utilizing a GSM modem. GSM modem, along with a SIM card uses a similar communication process as we are using as a part of regular phone. The system is not restricted to discover the area of the target yet in addition calculates the distance between two stations. This system additionally is anything but difficult to utilize, easily installable, adequately open and can be used for different duties. The system will discover object by using of a web application in Google map after establish the system. Other than that, the system grants to track the target at whatever time and anyplace in any climate conditions. Then, the author also made a comparison between GPS and GSM to know which is better for the system. The comparison discussed in (Jethwa, Sheffer and Thompson, 2015) is summarized in Table 2.1.

Table 2.1: Comparison between GPS and GSM

GPS	GSM
GPS encourages us to locate the correct area of the vehicle.	GSM just give the area not the correct area.
GPS utilized satellites to discover the area of the vehicle.	GSM utilizes base station to discover the area.
It is expensive yet successful.	It is less expensive however less expensive
GPS can be utilized as a part of any topographical region on the earth.	GSM is just utilized where base station are executed.
It utilizes longitude and latitude to discover the area.	It is used distance of the base station from one other.
More precise	Less precise
Better technology	Worse when contrasted with GPS

The system would be dull to track area on printed maps. In any case, now daily's different sites are accessible on web which indicated online map. Google maps is one of the primary and helpful site. Any of these sites to track had been used to trace or discover the area of the motor vehicle. By using the longitude and latitude got in SMS, the area of the motor vehicle can be track. By utilizing these maps, the correct area can be received and also the directions to those spots is displayed. Currently, the

technology of vehicle is quickly expanding, with this we can have a decent controller in it and the vehicle can be turned off by just with a basic SMS. By adding a show to demonstrate some essential data about the vehicle, this setup can be made more intuitive and by include the emergency numbers, it can be used as a part of an emergency.
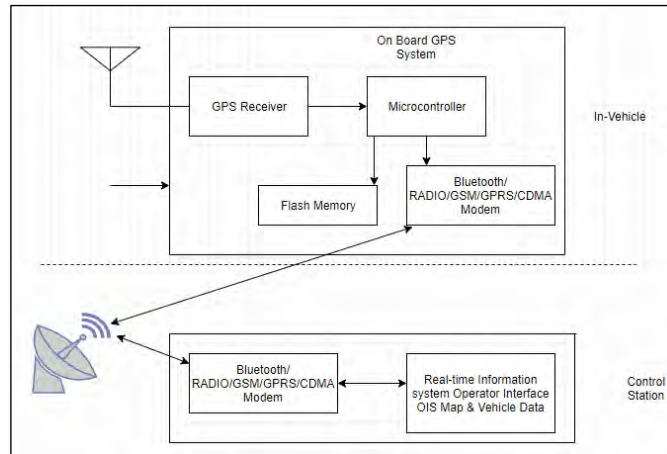
Figure 2.1: Vehicle Tracking System

2.3 Technology of the Vehicle Tracking

There are variety of technologies used to track vehicles. The technologies are introduced to the world as a convenience for vehicle users. Common technologies used to facilitate the implementation and functionality of vehicle tracking systems are Internet of Things (IoT), GPS, GSM and GPRS.

2.3.1 Internet of Things (IoT)

The IoT represents a great revolution of the technique by which our reality will rapidly interface. IoT is like World Wide Web where it associated computer to networks, and the following development associated people to the Internet and other people. In addition, IoT look ready to be linked to the devices, societies, surroundings, virtual things and machines in ways that exclusive science fiction scholars could have envisioned.

The authors in (Anirudh Karthik, 2015; Ishan Karande, Gandhar Deshpande, Saurabh Kumbhar and B, 2016; Desai and Arati Phadke, 2017; Taneja *et al.*, 2017) used IoT as vehicle tracking system to track down the situation of vehicle in real-time. Taneja et al (2017) proposed that an IoT based application can find the position of our

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bag or vehicle in real-time and show that same position on Google Map. The end-user will have the capacity to see the real-time position of his/her lost or stolen bag or stolen vehicle on a web portal, which is send on cloud stage and the author likewise have built up an Android Based App, which will demonstrate a similar real-time position of bag or vehicle on their cell phone, and easy to use.

Generally, there was no system or device which track somebody's lost/stolen bag or stolen vehicle. In the event that there is, where somebody's bag or vehicle may get stolen and they were not able to find because there was no such system through which they can find their bag or vehicle, so they were depending on civilian police for finding their bag/vehicle. The system use GPS module to get correct whereabouts of the bag or vehicle and also GSM module to transfer the information to the open source cloud via GPRS. Utilizing cloud APIs benefits, user send information to the google map and show it in their application or web portal. While voyaging, user can put this tracker in his/her bag or vehicle. The device tracks the correct area of the bag and send the area to the application and web portal. User can use the tracking android application or web portal to find the area of the bag. The direction feature likewise connected in the system. By clicking the direction button on the android application / web portal, it will demonstrate the briefest route to the lost / stolen bag. Additionally, along these lines the tracking system work for vehicles also. User can put the GPS device in trunk and abandon it. On the off chance that the vehicle got stolen, the user not need to worry. He / She can track the vehicle using the application or web portal. The system is not restricted to the stuff and vehicle but also can be used for different situations like tracking lost pets, little kids' and so on. The authors also expressed that by execute an IoT based application in Travel Sector, it will help the general population to find their lost / stolen bag or stolen vehicle. It will be an extraordinary commitment to the world and the Internet of Things group.

Desai and Arati Phadke (2017) proposed a system which can observe or track the area and vehicle limitations of various assessment vehicles from a federal residence for development work purposes and to stock information of testing limitations of those vehicles on the sever for advance investigation and histories. The authors claimed that utilization of technologies like IoT can facilitate the procedure of statistics collection and analysis. To empower these devices to gather and trade information, IoT is the only systems administration of physical gadgets, motor vehicles or some other

associated gadgets with hardware, programming, sensors, network availability that can be used. IoT enables targets to be detected as well as controlled slightly through current system organization. "Things" in the IoT can allude to varied assortment of gadgets. These gadgets gather helpful information utilizing different technologies and after that communicate with different devices. IoT can aid combination of communications, control and data handling through different carriage systems. Use of IoT stretches out to all parts of carriage systems.

The anticipated system mainly comprises of a microcontroller and GPS / GPRS module where the vehicle limitations and whereabouts coordinates from GPS module are encouraged to the controller. The average vehicle limitations checked that the controller exchanges the information to server with the assistance of GSM / GPRS technology are vehicle position, vehicle speed, motor partition temperature, fuel level and so on. A website page is made to show vehicle limitations information where these limitations are put away in database on a web server. At the same time vehicle position information is connected with Google maps to show vehicle position on map. A page is made to show information of vehicle limitations sent by Arduino and SIM808 hardware system to the database. By using Google maps, this information is additionally connected for real time location display of vehicle on map. IoT and open source stage makes this system extremely powerful, proficient and savvy. In this way it can be utilized to sum up the checking of various vehicle parameters.

Besides that, Ishan Karande et al (2016) clarifies that a proficient car safety system is executed intended for hostile to robbery and misfortune exposure, utilizing an embedded system comprising of a GPS and a Wi-Fi Module. IoT additionally executed since it is the primary medium communications.

The security system that display in the proprietor's vehicle will dependably be available 24/7 and that system will get constant control from an outside battery bank. This is because robbery or misfortune can occur whenever and the system ought to work constantly with no hiccups. The system operate when the proprietor start his vehicle and by using a legitimate key to turn on the start, the system will sends a predefined message to the proprietor when detects the vehicle's engine has been started. Additionally, the GPS module begins transfer directions to the cloud server so they can be utilized discovery the locations of the vehicle on the off chance it meets with a misfortune. The proprietor will disregard the message as this is unmistakably

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not a situation of vehicle getting taken if the proprietor himself is using the vehicle, but the same predefined message will be sent to the proprietor of vehicle if a theft one way or a different acquire access into a similar vehicle and one way or a different technique to start the vehicle. The owner will obviously recognise that his vehicle is getting taken. The owner will have two choices which is either promptly press the "Motor control" include display on the 'Vehicle tracker application' introduced on proprietor's smartphone to halt and catch secure the criminal from escaping with the vehicle in the event that he / she requests to or begin tracking the vehicle's location in perspective of the directions sent by the GPS module where the directions are starting at now put away in cloud server and are sent to application on owner's demand display in the vehicle, current in the vehicle, pledge location tracking on maps and contact the law authorization specialists quickly to catch the robber and recoup the vehicle. This system gives a functional plan to achieve and develop safety and defensive actions in the circumstances of thefts and misfortunes. IoT while still in its infant stage has incredible potential to automate a variety of functions to an exact degree and assurance that procedures keep on working without human intercession.

In addition, Anirudh Karthik (2015) explained that by Real Time Vehicle Tracking System, which is a GPS, and GPRS empowered GPS device that works at the standards of IoT. The Real Time Vehicle Tracking System uses the LinkIt ONE Development board's GNSS features to obtain the position and the speed of the vehicle. The information is then conveyed to the MediaTek Cloud Sandbox (MCS) over a GPRS connection. MCS at that point gives a perception of the information on a map. For further developed measurements an accelerometer is additionally connected to the board, to gather information on the g-forces produced by the vehicle. The completely working IoT model, assembles GPS and accelerometer information, transmits the information through a GPRS connection with empower control and conception utilizing a cloud service through a web interface or Android application.

The system will be put in an unreachable location in the vehicle and must be worked remotely by the organisation and not by the driver of the car. Accurate location readings because of GPRS / GSM signal misfortune will be effectively stayed away from with the arrangement of a Wi-Fi antenna which empowers the system to interface with the vehicle Wi-Fi network or some other open Wi-Fi network it finds, to transfer the position information. The real time vehicle tracking system will be built utilizing