UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF UBIQUITOUS VEHICLE TRACKING SYSTEM BASED ON MOBILE APPLICATION

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

by

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APPROVAL

This report is submitted to the Faculty of Electrical and Electronic Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Electronics Engineering Technology (Industrial Electronics) with Honours. The member of the supervisory is as follow:

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ABSTRAK

Sejak kebelakangan ini, kes kecurian kereta semakin berleluasa dan alat mencegah kecurian untuk kereta pula mahal dan kebanyakannya hanya didapati pada kereta mewah. Matlamat projek ini adalah untuk mencipta Ubiquitous Vehicle Tracking System based on Mobile Application. Objektif projek ini pula adalah untuk mengahasilkan suatu sistem jejak yang murah untuk kereta terutamanya kereta buatan Malaysia dan boleh dipantau dengan hanya menggunakan aplikasi Android di telefon pintar. Modul NodeMCU ESP8266 telah dipilih sebagai mikropengawal utama untuk mengawal keluaran dan masukan projek ini. Hal ini kerana modul ini mempunyai teknologi WiFi yang mana akan digunakan untuk menjadi penghubung terus ke modul GPS Ublox Neo-6M. Blynk Application telah dipilih sebagai ruang hubung kait antara projek ini dengan peranti kerana ianya mempunyai ruang muka yang menarik dan mudah difahami oleh pengguna. Kesimpulannya, projek mudah alih ini dibina dengan menggunakan teknologi WiFi kerana ia dapat menjejak lokais projek ini secara langsung dan juga merangkumi seluruh negara selagi mana ia mempunya liputan internet.

ABSTRACT

Recently, vehicle theft is at worrying stage and the system for anti vehicle theft is quite expensive and mostly the anti theft system was built in luxury cars. This project's goal was to develop an Ubiquitous Vehicle Tracking System based on Mobile Application. The objectives were to design a low cost tracking system for vehicle especially local car brand and developed a mobile application by using Android Application to make an easy access interface between the system and user. NodeMCU module was set as the prime controller to organize the input and output of this project. Plus this module contains a WiFi technology which will be use to communicate directly with the GPS Ublox Neo 6-M module. The Blynk Application had been selected as the mobile application end user interface since the application is an user friendly. In conclusion, this portable tracking device is built by using WiFi method for real time tracking all over the world as long as there is a internet connection.

DEDICATION

I would like to dedicate this thesis to my beloved parents, my warm-hearted supervisor and not to forget, all my faithful friends.

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First and foremost, all praise to God for His graceness and merciful that this thesis can be completed. I am also genuinely thankful to my supervisors, Dr. Suhaila Binti Mohd Najib and Dr. AKM Zakir Hossain, whose support, encourage and guidance from the beginning to the final level that enabled me to develop the understanding of this project. Without her dedicated help in every step of the process, this project will unable to achieve. To my beloved parents and family, I would like to offer them my deepest gratitude for all their supports and prayers. Lastly, to my housemate, classmate and all of my friends, I am thanked and blessed to meet beautiful person like you all because of the massive dedication they give for me to successfully complete this project.

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LIST OF SYMBOLS

cc	-	Cubic Centimetres
mA	-	Mili Ampere

LIST OF ABBREVIATIONS

GPS	Global Positioning System
GSM	Global System for Mobile
GPRS	General Packet Radio Service
PIAM	Persatuan Insurans Am Malaysia
AVL	Automated Vehicle Location
OBD	On-board Diagnostic System
ECU	Engine Control Unit

CHAPTER 1

INTRODUCTION

1.1 Introduction

Nowadays, vehicle is one of the most needed things in human basic life. It can be either motorcyles, cars, buses and lorries. The main reason vehicle was created is for transportation such as traveling, going to work and visiting family at village. However, the number of vehicle stolen cases is in a large number due to lack of security system inside the vehicle itself. There are few companies in Malaysia that offer the vehicle security system for user to minimize the rate of vehicle stolen but the system that they offered is not affordable for low-income group of people.

Global Positioning System (GPS) is a global navigation satellite system. As stated by Beth Laura (2009), GPS was launched by the U.S Department of Defense in 1973 for use by United States military and became fully operational in 1995 and it started for public uses in the 1980's. The function of the GPS is to provide the location and time information in all-weather anywhere or near the Earth through transmitting data from GPS to Satellite around Earth orbit. The car tracking device can be used to locate the missing or stolen vehicle by using the GPS technology. GPS module will give the exact location of the vehicle and sent a notification message to user through mobile application. Therefore, this project is proposed to develop a framework that can monitor a vehicle location by using mobile phone.

1.2 Problem Statement

In this modern days, the mass amount of property violations leads to a huge outcome of a Malaysia crime list. According to the Department of Statistics Malaysia (2017), where the total of property crime is in a concerned number which is 77,802 cases. Among the classifications in property crimes, vehicle thefts contributes 54% crimes, which exceed half of the of the total crime property. Figure1.1 shows the statistics for property crimes including house break-in and theft, vehicle theft, snatch and other theft.

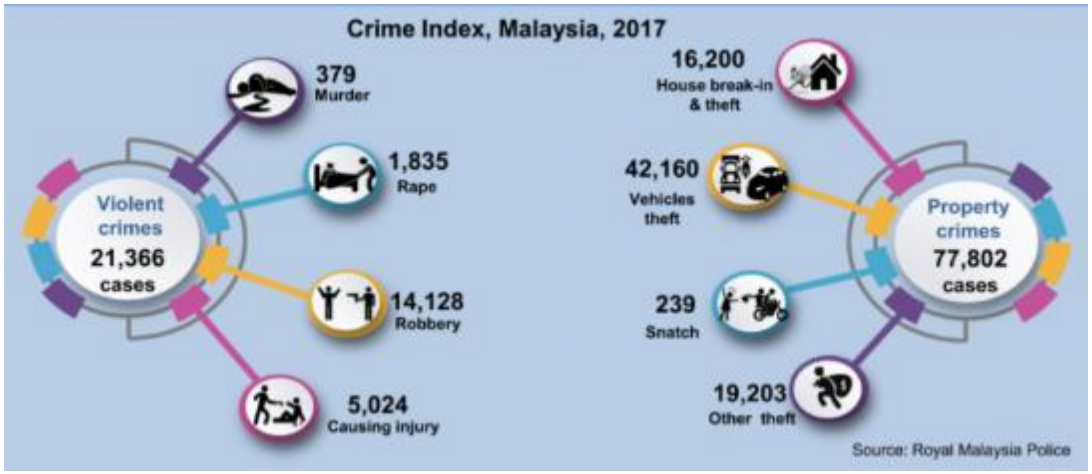

Figure 1.1: The Total Number of Crime Index in Malaysia. (Source: Royal Malaysia Police in 2017)

This type of cases usually occured with some imposing factors, for instance, high state joblessness, excessive population in a certain place and mostly due to low salary. An analysis done by Zulkifli and Noriszura (2013) who applied the negative binomial regression models method made a conclusion that the the risks of vehicle theft crime in Malaysia are higher for vehicles above 8 years, vehicles above 1800 cc, local vehicles, and vehicles located in the central area.

Figure 1.2 shows the number of vehicle theft from 2014 till 2018. Even the number of cases decreasing from year to year, it still gives a big impact for the Malaysian

Crime Index. One of the reason for this decreasing result is because of the anti-theft system built in the modern car nowadays. This system works by notifying the owners of the vehicles where is the current location of the vehicle. Usually this type of system was built in luxury cars such as Mercedes-Benz, Bentley, Audi and Chevrolete cars. As for the ordinary car, local brands to be specific, their product usually did not come with this anti-theft system. Owner for these local brands car's need to have another inisiative for the anti-theft system such as buying a GPS tracker.

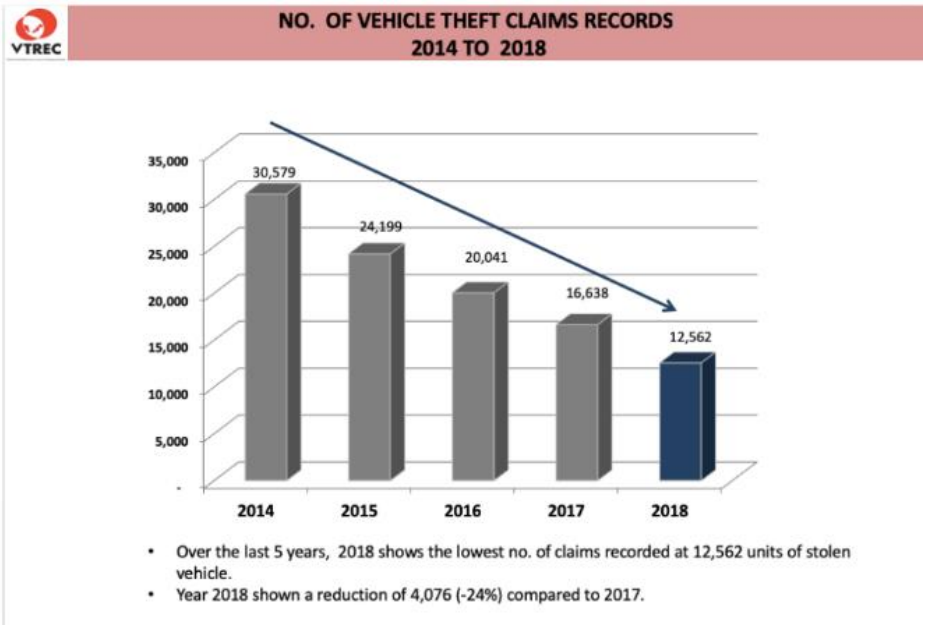

Figure 1.2: Number of Vehicle Theft Claims Record from 2014 till 2018. (Source: Vehicle Theft Reduction Council of Malaysia (VTREC) in 2018)

There are few companies that provide the GPS tracker but mostly the price is quite expensive and need to be renew annually. Meanwhile for the low-income group of people, they will find that these GPS tracker is not affordable and thus feels there's not important for them to puchase the GPS tracker. Figure 1.3 shows that most the stolen car model is Proton Wira followed with Proton Iswara. This proves that most of owners for the local car brand could not afford to buy the high cost GPS tracker device.

TOP 10 PRIVATE CAR - THEFT CLAIM RECORDS
for as at 2018 vs as at 2017 (by MODEL)

	2018	Vol.
1	PROTON WIRA	534
2	PROTON ISWARA	436
3	TOYOTA HILUX	414
4	PERODUA KANCIL	265
5	PERODUA MYVI	258
6	PROTON SAGA	217
7	PROTON WAJA	176
8	TOYOTA VELLFIRE	149
9	TOYOTA VIOS	85
10	PERODUA ALZA	68

	2017	Vol.
1	PROTON WIRA	712
2	TOYOTA HILUX	577
3	PERODUA KANCIL	418
4	PROTON ISWARA	362
5	PERODUA MYVI	318
6	PROTON WAJA	242
7	PROTON SAGA	239
8	HONDA CIVIC	149
9	HONDA CITY	125
10	TOYOTA VIOS	122

Figure 1.3: Top 10 Private Car-Theft Claim Record from 2017 till 2018. (Source: Vehicle Theft Reduction Council of Malaysia (VTREC) in 2018)

1.3 Objectives

Based on the problem statements discussion above, the objectives of this study includes;

i. To develop a low cost vehicle tracking system based on mobile application.

ii. To analyze the accuracy of the tracking system in providing the correct longitude and latitude to the user.

1.4 Scope

The scope of the research works are based on the objectives that were mentioned earlier and focuses on the local car brands such as Proton and Perodua. The tracking system is built by using the GPS Neo module to determine the exact location of the tracker. Meanwhile a NodeMCU module is set as the microcontroller for the whole

system to operate and since this module has a WiFi technology, it will act as the medium for transmiting and receiving signal between the GPS module and the NodeMCU itself.. Lastly, a custom android application from Blynk Application will be used as the end user interface in mobile phone.

1.5 Organization

This report contains four chapters in order to complete this project. Firstly, introduction is about describing the history of the tracking system, issue of stolen and losses vehicle cases, scope and objectives. Next for chapter two, writing a literature review of existing system and methods before making a comparison between them all. In chapter three, the complete vehicle tracking system had been explained by using the block diagram and flowchart. The selection of hardware were also discussed based on the previous development system discussion. Lastly in chapter four, the expected result for this system had been explained based on hardware testing.