UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF ANTI-THEFT VEHICLE TRACKING SYSTEM WITH IOT

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

by

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Tajuk: DEVELOPMENT OF ANTI-THEFT VEHICLE TRACKING SYSTEM WITH IOT

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APPROVAL

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

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ABSTRAK

Kereta sentiasa menjadi sasaran pencuri semenjak awal permulaannya sehingga kini. Hal ini kerana ianya berharga dan setiap bahagian pada kenderaan senang untuk dijual semula. Hal ini telah menjadi kebimbangan orang awam. Kebanyakan pengguna kini sanggup mengeluarkan sejumlah duit bagi membeli sistem keselamatan yang mahal untuk kereta mereka. Oleh itu, system pengawasan berdasarkan GPS kebiasaannya akan digunakan di dalam kereta mereka. Projek ini membentangkan sistem anti-kecurian berasaskan IoT untuk kenderaan. Cadangan ini adalah untuk membantu pengguna kereta untuk memantau kereta di mana sahaja. Bagi menjalankan projek ini, Sistem Penentududukan Global (GPS), dan NodeMCU ESP32 digunakan untuk sistem ini. Di samping itu, suiz micro dan GSM juga disediakan untuk memberikan keselamatan tambahan kepada kenderaan. Suis mikro yang diletakkan didalam pintu kenderaan akan memberi amaran sekiranya berlakunya cubaan mencuri dan mikropengawal akan menghantar amaran. Sebuah aplikasi akan digunakan dalam telefon pintar pengguna untuk memantau kenderaan mereka.

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ABSTRACT

Cars have always been a target for thieves from such an early age to today since they are highly valued, and its part are easy to resell. For all civilians, it has been a matter of concern. Most of them are willing to invest large amounts of money on their vehicle's pricey security system. Accordingly, in vehicle tracking a GPS-based monitoring system is commonly used. This paper presents an IoT-based anti-theft vehicle system for tracking. This proposed development makes it possible for users to monitor their vehicle in real time anywhere. In order to monitor the vehicle coordinates, Global Positioning System (GPS), NodeMCU ESP32 were used for this system. In addition, micro switch and GSM are also incorporated to provide the vehicle with an additional layer of safety. The micro switch placed inside the door of vehicle signals the user about theft attempt and the microcontroller along with GSM will send the alert notification. An application will be used for the user to monitor their vehicle through smartphone.

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DEDICATION

I would love to express my dedication to my beloved parents,

EN. HUSSIN BIN ALI

PN. JAMILLAH BINTI ABDULLAH

My siblings,

(Nur Izzaty Binti Hussin, Muhammad Haiqal Bin Hussin)

My respected supervisor,

PN. AZIEAN BINTI MOHD AZIZE

My beloved friends,

(Nabil Fikri Bin Rusmadi, Muhammad Jamal Hafiz Bin Che Japar, Muhammad Hafizuddin Bin Abdul Halim, Muhammad Amin Bin Khusairie, Muhammad Zulfan Amier Bin Adenan, Muhammad Muadz Bin Md Yusuf)

Thank you so much for all your help, guidance and motivation.

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I would like to dedicate this thesis to my beloved parents, Hussin Bin Ali and Jamillah Binti Abdullah for believing in me all this time and motivated me through my degree. Second, I would like to express my dedication to my beloved siblings Nur Izzaty Binti Hussin and Muhammad Haiqal Bin Hussin for their moral support. The dedication also goes to my respected supervisor, Puan Aziean Binti Mohd Azize for her guidance throughout the process. Not to forget to all my respected lecturers that have teaches me through 7 semesters in Universiti Teknikal Malaysia Melaka (UTeM). Lastly, to my beloved friend for their help and guidance through this project.

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TABLE OF CONTENTS

		PAGE
TABLE OF CONTENTS		**x**
LIST OF TABLES		**xiii**
LIST OF FIGURES		**xiv**
LIST OF APPENDICES		**xvii**
LIST OF ABREVIATIONS, SYMBOLS AND NOMENCLATURE		**xviii**
CHAPTER 1	**INTRODUCTION**	**1**
1.1	Introduction	1
1.2	Background of Project	1
1.3	Problem Statement	2
1.4	Objective	3
1.5	Scope of Project	3
1.6	Project Outline	4
CHAPTER 2	**LITERATURE REVIEW**	**5**
2.1	Introduction	5
2.2	Sensor	5
2.3	Internet of Things (IoT)	7

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2.4 Previous Research Related to Project 8

2.5 Table Comparison 25

CHAPTER 3 METHODOLOGY 27

3.1 Introduction 27

3.2 Project Development 27

3.3 Flowchart of Project Flow 28

3.4 Operation Flowchart 30

3.5 Hardware Development 31

3.5.1 Micro Switch Sensor 32

3.5.2 NodeMCU ESP32 33

3.5.3 GPS/GSM Module 34

3.5.4 OLED 35

3.5.5 Piezo Buzzer 35

3.6 Software Development 36

3.6.1 Arduino IDE 36

3.6.2 Proteus Software 37

3.6.3 MIT App Inventor 37

CHAPTER 4 RESULTS AND DISCUSSION 39

4.1 Introduction 39

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4.2 Hardware Configuration 39

4.3 Software and circuit configuration 41

4.3.1 Software configuration using Arduino IDE 41

4.3.2 Software configuration using MIT App Inventor 44

4.3.3 Circuit design using Proteus software 45

4.4 Result Analysis 47

4.4.1 SMS Alert Notification Analysis. 48

4.4.2 Server Data. 49

4.5 Analysis on overview of the product and to provide feedback regarding the project. 52

4.6 Discussion. 56

CHAPTER 5 CONCLUSION 59

5.1 Introduction 59

5.2 Conclusion 59

5.3 Project Recommendation. 60

5.4 Project Potential. 62

REFERENCES 63

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LIST OF TABLES

TABLE	TITLE	PAGE
Table 2.1:	Comparison of component used in previous research Part 1.	25
Table 2.2:	Comparison of component used in previous research Part 2.	25
Table 2.3:	Comparison of component used in previous research Part 3.	26
Table 2.4:	Comparison of component used in previous research Part 4.	26
Table 4.1:	Response time based on location of vehicle.	48
Table 4.2:	Date, Time, Latitude and Longitude of the vehicle.	49

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LIST OF FIGURES

FIGURE	TITLE	PAGE
Figure 1.1:	Statistics on stolen vehicle in Malaysia, 2016-2017	2
Figure 2.1:	Location tracking system architecture.	8
Figure 2.2:	The tracking system architecture.	9
Figure 2.3:	Block schematic for vehicle locking and tracking system.	11
Figure 2.4:	Automatic Anti-theft System Based on GSM and GPS Module.	12
Figure 2.5:	The structure of main unit of anti-theft system.	13
Figure 2.6:	Architecture of transmitting unit.	14
Figure 2.7:	Monitoring unit Architecture.	15
Figure 2.8:	Block diagram of Vehicle tracking and locking system based on GSM and GPS.	16
Figure 2.9:	The overall system structure diagram and working flow diagram.	17
Figure 2.10:	The proposed vehicle tracking system layout.	18
Figure 2.11:	Anti-theft system architecture.	20
Figure 2.12:	Block diagram of Anti-theft Vehicle Tracking system and Program flowchart of the tracking system.	21
Figure 2.13:	Functional block diagram of vehicle tracking and regaining system.	22

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Figure 2.14: The circuit diagram (left) and dataflow diagram (right) of in-vehicle device. 23

Figure 2.15: The Mobile application and dataflow diagram of the user application. 24

Figure 3.1: The Overall Block Diagram of Development. 27

Figure 3.2: Flowchart of Project Flow. 28

Figure 3.3: Flowchart of Project. 30

Figure 3.4: Project Block Diagram 31

Figure 3.5: Micro Switch. 32

Figure 3.6: NodeMCU ESP32 33

Figure 3.7: SIM5320. 34

Figure 3.8: OLED I2C. 35

Figure 3.9: Piezo Buzzer. 35

Figure 3.10: ARDUINO IDE Software Logo. 36

Figure 3.11: The Proteus Software Logo. 37

Figure 3.12: The MIT App Inventor Logo. 38

Figure 4.1: Hardware configuration setup for vehicle monitoring system. 40

Figure 4.2: Hardware configuration setup for vehicle tracking system. 40

Figure 4.3: Coding for Micro Switch Sensor. 41

Figure 4.4: SMS Alert. 42

Figure 4.5: Google Map Interface. 42

Figure 4.6: Coding for OLED I2C Display. 43

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Figure 4.7: OLED I2C Display Result. 43

Figure 4.8: Smartphone Application layout. 44

Figure 4.9: Schematic diagram for the system. 45

Figure 4.10: PCB design for the system. 46

Figure 4.11: The Constructed Circuit for Anti-Theft Vehicle Tracking System. 46

Figure 4.12: Final Product of Anti-Theft Vehicle Tracking System. 47

Figure 4.13: Graph for time taken to receive SMS alert. 48

Figure 4.14: Latitude VS Time. 50

Figure 4.15: Longitude VS Time. 50

Figure 4.16: Have you ever worried about the safety of your vehicle when you park your vehicle somewhere? 52

Figure 4.17: In your opinion, what is the percentage to recover the stolen vehicle? 53

Figure 4.18: Have you provided additional security for your vehicle? 53

Figure 4.19: In your opinion, vehicle tracker can prevent your vehicle from being stolen. 54

Figure 4.20: Vehicle tracking devices able to reduce vehicle theft rates in Malaysia. 54

Figure 4.21: Vehicle tracking device should be installed on each vehicle. 55

Figure 4.22: Do you consider on buying a vehicle tracker to improve your vehicle's safety features? 55

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LIST OF APPENDICES

APPENDIX	TITLE	PAGE
Appendix 1	Gantt Chart of PSM 1	65
Appendix 2	Gantt Chart of PSM 2	66
Appendix 3	Survey Questions	67
Appendix 4	Coding	68

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LIST OF ABREVIATIONS, SYMBOLS AND NOMENCLATURE

IoT	-	Internet of Things
Wi-Fi	-	Wireless Fidelity
GPS	-	Global Positioning System
IEEE	-	Institute of Electrical and Electronic Engineering
GND	-	Ground
PCB	-	Printed Circuit Board
API	-	Application Programming Interface
AC	-	Alternating Current
DC	-	Direct Current
KB	-	Kilo Byte
V	-	Voltage
mV	-	Mili Voltage
Vin	-	Input Voltage
IR	-	Infrared
App	-	Application
VCC	-	Input Voltage
VDD	-	Voltage Drain
OLED	-	Organic Light-Emitting Diode

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CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter defines the project idea briefly. In this chapter, it provides a brief explanation of the background of the project, the issues that contribute to the suggestion of the project, the goals that the project must achieve, the scope it is targeting, and the outline of the project.

1.2 Background of Project

The danger of vehicles being stolen in this rapidly growing world is still a fundamental concern to be handled on the grounds that it can happen anywhere. Even though the vehicle was equipped with safety to prevent theft such as mechanical lock and car alarm system, the thieves could still get their hands in the vehicle. This is due to the distance between the owner and his vehicle, the owner did not hear the alarm. In addition, the people around the area may not be aware of the alarm because of the constant false alarm triggered, which also interrupts the lives of the people around the area. The alternative preventive measure available for anti-theft is the steering lock, which is inexpensive, but the skilled thieves can easily disable it. The owner and the law enforcement agencies cannot locate the vehicle once the thieves are able to steal the vehicle.

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Therefore, the idea of developing a tracking system to track the stolen vehicle comes to mind. When the vehicle is stolen, the vehicle owner will receive a notice sent from the microcontroller attach to the car, at which point he can use his smartphone to locate the vehicle whereabout using the application. The GPS will observe the location of the vehicle that was stolen.

1.3 Problem Statement

In the course of recent years, the quantity of stolen vehicle in Malaysia continue to increase. From the newspaper report on www.nst.com.my New Straits Times expressed in their paper on 9 February 2018 that the insurance agency pays generally RM5.38 billion for the stolen vehicle protection. This is higher than the earlier of 12 months which is RM5.02 billion. This sum recorded an expansion of seven percent. Proton Wira and Toyota Hilux was among the top vehicle brand that are getting stolen followed by Perodua Kancil with 378 stolen units, Proton Iswara with 340 stolen units, Perodua Myvi with 290 stolen units, Proton Waja with 231 stolen units, Proton Saga with 214 units, Honda Civic with 133 units, Honda City with 119 units and Toyota Vios with 117 units.

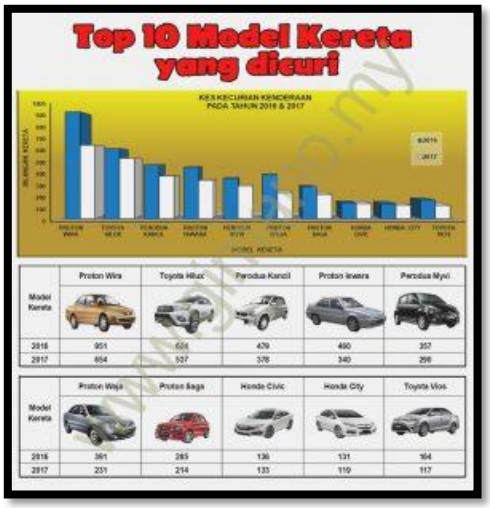

Figure 1.1: Statistics on stolen vehicle in Malaysia, 2016-2017

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1.4 Objective

There are a few objectives to be achieved from this project:

1.4.1 To develop vehicle monitoring and tracking system.

1.4.2 To utilize NodeMCU ESP32 in developing vehicle tracking system.

1.4.3 To develop IoT based vehicle tracking system with phone application.

1.5 Scope of Project

There have several guidelines that are proposed to make sure that the project proposed will reach the objectives. This monitoring system consist of NodeMCU ESP32 as its main component. This project consists of three major part which is detection, notification and tracking system. As for detection system, it uses micro switch to detect the possibility of theft. The notification will then be sent from the micro controller with the help of GSM directly to the owner. The Arduino IDE software is used to configure and code the microcontroller. With the smartphone, the user will track the location of his car using the GPS module that has been put along the microcontroller. Tracker application will be installed in the smartphone for the owner to monitor his vehicle. There will be a small model of vehicle build to demonstrate the operation of the project.

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1.6 Project Outline

The project's layout and structure:

Chapter 1 — Introduction: This chapter describes briefly the introduction covering the goals, scopes of the project, and statements of the problem.

Chapter 2 — Literature Review: This chapter explains what research has been conducted and also the results of previous researchers on an anti-theft vehicle tracking system. It also contains a lot of information which is a guideline for this project to develop.

Chapter 3 — Methodology: This chapter describes and explains the details of the method to be used to develop this project.

Chapter 4 — Expectation Result: This chapter will result from the shuttle launcher's movement with a dual mode trajectory system.

Chapter 5 — Conclusion and Recommendation: This chapter should surmise the project as a whole and the future recommendation to be used for future projects.

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CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter will be discussed in the previous article, journal and all the information or ideas that may be related to the construction of an anti-theft vehicle tracking system. Also, the previous studies were compared so this project could be better implemented. There are some important things that should be taken in order to make this project which is the study or research about the component used and how it was done in previous related project. From this chapter, the knowledge of all the previous journal and article is the main goal of getting the ideas as far as possible and giving the reader some overview of the source discovered.

2.2 Sensor

Sensor is a tool which senses and reacts from the physical surroundings to a certain form of input. The particular input might be infrared, temperature, movement, humidity, force, or any of many other. Generally speaking, the output is a signal that is transformed to beings-readable display at the location of the sensor or transmitted wirelessly through a channel for viewing or scanning. This section will discuss on the sensor use by previous research and the process conducted.

(T L *et al.*, 2018) stated that the IR sensor is used in their project. A key detection IR sensor was used to verify whether or not the key was inserted in the keyhole. For entering

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the password, a 4 X 4 matrix keypad is used. It consists of 16 switches. None of the switches are pushed at the start in the beginning. To evaluate whether or not the switch is pressed, it is necessary to scan the row and columns. All first column is set to high while low is set to all rows. When pressing the switch, the corresponding column will go low. To inspect the row, the rows are made high one after another, the right key pressed can be identified if the column obtained is high.

(Lakshmi *et al.*, 2017) used an IR sensor, an electrical piezo sensor and an ADXL355 sensor for their project. The PIC18f452 is received from the nodes of the sensor. The IR sensor is attached to the internal frame of the door. The user can ignore the signal sent from the microcontroller when driving or when entering the vehicle. But in any case, when they are not near the vehicle, they always have to monitor the received signals. The IR sensor will be sent data indicate theft trying to enter the vehicle. The signal will be interrupted from the door frame. Thus, the sensor will submit the controller a signal that will be analysed.

The next situation was that the thief may break into the car. Once an object is breached or thrashed, a specific set of vibrations will be produced which in turn will trigger the piezo electrical sensors installed on the metal body of the vehicle. Thus, in case of above the limit vibration in the car frame, the micro controller receives the signal from the piezo electrical sensor, just in the absence of the client. The ADXL355 sensor is the sensor for axis identification, which enables to check if the user has left the vehicle around the same location it was parked.

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