



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**DESIGN AND DEVELOPMENT OF VEHICLE SECURITY
DEVICE BY USING BIOMETRIC IDENTIFICATION
(FINGERPRINT)**

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Manufacturing Engineering (Manufacturing Design) (Hons.)

by

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This report is submitted to the Faculty of Manufacturing Engineering of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Manufacturing Engineering (Manufacturing Design) (Hons.). The member of the supervisory is as follow:

.....

(Dr. Zulkeflee Bin Abdullah)

ABSTRAK

Projek ini adalah berkaitan tentang merekabentuk dan mencipta sebuah sistem keselamatan kenderaan yang menggunakan pengenalan biometrik iaitu pengesanan cap jari yang diberi nama sebagai VSBIF. VSBIF adalah sebuah perisian yang menggabungkan sistem keselamatan kenderaan dengan sistem biometrik. Antara tujuan perisian ini dicipta adalah untuk menghalang kenderaan digunakan oleh orang yang tidak dikehendaki justeru mengurangkan kadar kecurian kenderaan di Malaysia. Dalam usaha untuk membangunkan sistem keselamatan kenderaan baru dan belum ada di pasaran, kaji selidik perlu dijalankan untuk mengenalpasti kemahuan dan keperluan pelanggan. Selepas itu, data dianalisis dengan menggunakan kaedah yang diberi nama *House of Quality* untuk mendapatkan keperluan teknikal yang perlu diambil kira dalam merekabentuk produk. Berdasarkan data yang telah dikumpul dan dianalisis, perkakasan, perisian dan bahan yang akan digunakan untuk membangunkan prototaip ini ditentukan. Perisian *Computer-aided-design (CAD)* yang merupakan perisian *SolidWorks* juga digunakan untuk merekabentuk bahagian mekanikal bagi prototaip ini. Manakala perisian *Proteus 7.1* telah digunakan untuk merangka reka bentuk litar skematik. Selain itu, produk ini telah dicetak dengan menggunakan *Up Plus 3D Printer* dan *Acrylonitrile butadiene styrene (ABS)* sebagai bahan mentah untuk mencetak. Di samping itu, semua modul dalam peranti VSBIF ini menggunakan Bahasa C ++ sebagai pengaturcaraan program. Secara keseluruhannya, hasil dan prosedur juga ditunjukkan dalam Bab 4 iaitu hasil dan perbincangan.

ABSTRACT

This project is focusing on designing and developing the vehicle security system that employ biometric identification which is fingerprint verification or named as VSBIF device. VSBIF device is a product build by a combination of vehicle security system and biometric system. The purpose of VSBIF device was developed is to prevent the vehicle from being used by unauthorized people thus to reduce the number of vehicle theft in Malaysia. In order to develop the new vehicle security system that does not have in the market yet, the survey needs to be conducted in order to get a customer requirement and needs. After that, the data were analysed using a house of quality method to get the technical requirements to take into account in designing the product. Based on the data collected and analysed, the hardware, software and material to be used for developing the prototype is determined. Computer-aided-design (CAD) software which is SolidWorks software also use the design the mechanical part for this prototype. While for schematic circuit, the Proteus 7.1 software was used in order to design the schematic design. Besides that, the prototype was produced by using Up Plus 3D printer and Acrylonitrile butadiene styrene (ABS) as a material used. In addition, all the modules in the prototype device used C++ language as a program coding. As overall, the result and work procedure shown in Chapter 4 which is result and discussion.

DEDICATION

*I dedicate this hard work of mine to my beloved parents who were always supported
me,*

Abdullah Sani Bin Legi

Asrumi Binti Kosni

To my supervisor,

Dr. Zulkeflee Bin Abdullah

To my beloved families and friend. Their continuous encouragement, motivation, inspiration, and support had led me towards completion of this project.

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All praise to Allah for giving me healthy mind and body which led to the accomplishment of this Final Year Project entitled Design and Development of Vehicle Security Device by Using Biometric Identification (Fingerprint) -VSBIF. I would like to express my special gratitude to my supervisor Dr Zulkeflee bin Abdullah and acknowledge the advices an guidance he gave to me. I could not have survived this one year period without the support and direction.

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LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

ABS	-	Acrylonitrile Butadiene Styrene
ASR	-	Automatic Speech Recognition
CAD	-	Computer Aided Drawing
FR	-	Fingerprint
FAR	-	False Acceptance Rate
FRR	-	False Rejection Rate
GPS	-	Global Positioning System
HOQ	-	House of quality
ID	-	Identity Document
IDE	-	Integrated Environment Development
LED	-	Light Emitting Diode
QFD	-	Quality Function Deployment
VSBIF	-	Vehicle Security Device by Using Biometric Identification (Fingerprint)
3D	-	Three Dimensional

CHAPTER 1

INTRODUCTION

1.0 Introduction

This chapter will discuss about the background of study, problem statement, objective of the study, scope of the project, and expected result of the project in order to complete this study. Based on the background of the study, the problem statement will be determined and objective of the project constructed. This chapter is important to explain overall of the project is about.

1.1 Background of Study

Biometric identification is an effective way to identify individual on the basis of uniqueness of physical characteristics owned by an individual. Although each type of biometric system has their different methods of application, all the biometric techniques are based on the human physical or behavioral, such as fingerprint, iris, voice patterns, and also facial patterns.

Nowadays, the fingerprint scanner device is the most popularly used in the field of information security compared to other biometric systems. This is because the

fingerprint scanner device is easier to use compared to other biometric system according to a small size and convenient to implement in a laptop, cell phone and also can be installed for door security.

Recently, biometric technology is used because it fulfils two functions; identification process, and verification process. Besides that, biometric technology has their unique characteristics which is cannot be lose, cannot be forgotten compared to ID password used. It is also not easy to counterfeited as well as it is attached to a human body. By using biometric technology, the security system will be more secure and strong because each individual has a different biometric characteristic. Therefore, biometric techniques make the security more guaranteed.

The impact of modern world technology that rapidly, it was causing the huge number of vehicle theft over a few years ago. Vehicle thieves can easily annihilate the existing vehicle security system through the advance technique and tool such as cut the steering wheel lock. Since the biometric technology shows a good percentage of accuracy and security, it is chosen to be implemented in vehicle security system to avoid vehicle theft. Basically, the biometric technique will connect with a vehicle's central lock system which is allowed user to lock and unlock the vehicle's door by using the biometric identification technique. Therefore, it is able to protect the vehicle being stolen or use by unauthorised persons.

1.2 Problem Statement

Nowadays, vehicle theft becomes rising due increasing the technology (N. Kiruthiga1 and L. Latha2 2014). Motorists are starting to feel worried about the theft of vehicles by the day. Security systems for vehicles, either by using the key or remote control, are no longer effective to prevent stolen personal vehicles. By using the keys as security measure vehicles, professional vehicle thieves can easily open the door vehicles with the key by breaking the key hole for example. In addition, thieves can also use the Master

Key that is easy to find in the market such as key shop or online. For motorists who have used the remote control as a vehicle security system for lock and unlock the vehicle's door, it is also pose a risk of vehicle theft. Thieves can easily copy a frequency of remote control to unlock the vehicle security system.

Therefore, to prevent theft of vehicles, a range of additional tools have been designed either inside or outside of the vehicle which is provided by the car manufacturer itself or manufacturer of auxiliary car safety device. Additional security devices included such as a steering wheel lock, brake pedal lock, gear lock, and all the security system that is built into the vehicle itself is still not guaranteed the safety of the vehicle. For example, using a steering wheel lock, brake lock, or gear lock, the vehicle still can be stolen by using bolt cutters, a hacksaw or a picklock the lock.

1.4 Objective

The objectives for this project that need to be achieved are:

1. To design and develop a model device that protects a vehicle from being used by unauthorized individuals using biometric identification methods.
2. To implement a registration system for biometric identification using vehicle owner's fingerprint and other registered user.
3. To enable vehicle owners to lock and unlock the vehicle door by using a fingerprint sensor.
4. To connect the biometric identification system to the existing alarm system if the fingerprints of an individual are unregistered in the database.

1.5 Scope of Project

The target of this project is to develop a model device in which it allows the user to install a more effective security feature on their vehicles. Generally, this device is a combination between vehicle security controls with a biometric fingerprint scanner.

This device contains a few modules that will be built by using a coding programming and database such as biometric identification, registration, by using the fingerprint of vehicle owners. Vehicle owners have to register their fingerprints first in order to store it into a database. In addition, motorists are allowed to register up to five fingerprints of different individuals to be classed as a visitor. Besides that, this device has a module where it enables vehicle owners to lock and unlock the vehicle's door by using a fingerprint that has been certified by the fingerprint database. The fingerprints will be matched with the fingerprints that are stored in the database in order to allow or disallow the access.

Finally, this device also connected to an existing automatic alarm system as additional security element of the device and vehicle. The automatic alarm will act as sounders agent which give a signal through releasing a sound in case the individual's fingerprint scanned are not matched with the fingerprints are stored in the database before.

1.6 Expected Result

Able to produce a vehicle security model device for personal vehicles where is the device allowed vehicle owners to improve the security of their vehicles. In addition, to avoid personal vehicles stolen or used by unauthorized individuals. Besides that, it can reduce the wide number of vehicle theft (Kiruthiga & Thangasamy 2015).

1.7 Importance of Project

- i. This device can give an additional guarantee to the owners of vehicles over the security of their vehicles.
- ii. Give a confidence to users that the device is a necessity and not just an extra accessory.

1.8 Structure of Project

This project consists of five chapters overall. Chapter one will be discussed about an overview of the project included background of the project, problem statement, objective of the project, scope of project, expected results and importance of the project. All the information taken from the literature view that has been done in chapter two.

Chapter two begins by discussing the previous researches regarding the project to find out all the information and theoretical info needed related to this project such as the introduction of biometrics, types of biometrics, statistic of vehicle theft, the method and hardware to be used and so on.

Meanwhile, chapter three discusses about the overall methodology employed in order to completing the project.

Chapter four is a result and discussion chapter, which is compiled and analyses the outcomes that acquired from the method constructed. Besides that, in this chapter will be discussed about the result achieved at the end of the project.

Chapter five will be the last chapter, which is stating the findings of the study and discusses about the suggestion and recommendation to make an improvement in the next study later on.