



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**DEVELOPMENT OF VEHICLE IGNITION USING
FINGERPRINT**

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

by

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APPROVAL

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ABSTRAK

Projek ini adalah mengenai membina prototaip pencucuhan kenderaan menggunakan sensor cap jari. Sistem ini boleh menghalang kenderaan daripada dicuri. Sistem ini dibangunkan untuk mengawal pencucuhan kenderaan melalui pengimbas cap jari. Sistem ini terdiri daripada GSM SIM 900 yang menghubungkan kepada Arduino yang merupakan mikrokontroller projek. Arduino disambungkan ke sistem pencucuhan kenderaan yang membolehkan pengguna masuk dan mematikan kenderaan. Untuk memastikan sistem selamat, hanya cap jari yang dibenarkan dipasangkan dengan Arduino untuk memulakan penyalaan. Pengguna boleh mengawal dengan menambah dan memadam cap jari untuk menyalakan kenderaan. Kenderaan menyalakan apabila cap jari yang didaftarkan dipadankan dengan cap jari dalam pangkalan data manakala pengguna yang tidak sepadan dalam pangkalan data menghalang daripada menyalakan kenderaan. Cap jari yang betul akan membolehkan pencucuhan kenderaan manakala yang salah akan memberi amaran kepada pemilik kenderaan apabila aktiviti luar biasa dirasakan. Penggera kecurian dari buzzer, pemberitahuan kepada telefon bimbit pemilik melalui GSM SIM 900 dan paparan status dalam LCD adalah isyarat yang sesuai kepada pemiliknya. Artikel ini menerangkan secara ringkas secara terperinci tentang reka bentuk dan pelaksanaan sistem penyalaan.

ABSTRACT

This project is about building a prototype of vehicle ignition using fingerprint sensor. This system can prevent the vehicles from being stolen. This system is developed to control the ignition of the vehicle through the fingerprint scanner. This system consists of GSM SIM 900 that connects to the Arduino which is the microcontroller of the project. Arduino is connected to the vehicle ignition system that enables the users to on and off the vehicle. To make sure the system is secure, only authorized fingerprint is paired with the Arduino to start the ignition. User can control by adding and deleting fingerprints to ignite the vehicle. Vehicles ignite when the enrolled fingerprint is matched against the fingerprints in the database while users with no match in the database are prevent from igniting the vehicle. The correct fingerprint will allow the ignition of the vehicle while the incorrect will alert the owner of the vehicle when an unusual activity is sensed. A theft alarm from buzzer, a notification to the owner's mobile phone via GSM SIM 900 and status display in the LCD are the appropriate signal to the owner. This article describes briefly in detail about the design and implementation of the ignition system.

DEDICATION

Specially dedicated to my beloved parents, siblings and friends for your support, encouragements and understandings while developing this project.

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TABLE OF CONTENTS

TABLE OF CONTENTS	x
LIST OF TABLES	xiii
LIST OF FIGURES	xiv
CHAPTER 1 INTRODUCTION	4
1.1 Project Background	2
1.2 Problem statement	3
1.3 Objective	4
1.4 Scope	4
CHAPTER 2 LITERATURE REVIEW	5
2.1 Introduction	5
2.1.1 Vehicle Ignition	5
2.2 Facts and Finding	6
2.1.2 Domain	6
2.3 Classifications of Arduino	7
2.3.1 Arduino Yun	8
2.3.2 Arduino Mega	9
2.3.3 Arduino Uno	10
2.4 Global system for mobile (GSM)	11
2.5 Liquid Crystal Display (LCD)	14
2.5.1 Pin Modules and its functions	14
2.6 Buzzer	15
2.6.1 Comparison and decision	15
2.7 Fingerprint sensor	16
2.7.1 Classification of fingerprint sensors	18
2.7.1.1 Capacitive sensor	18

2.7.1.2 Specifications of capacitive sensor	18
2.7.1.3 Optical sensor	19
2.7.1.4 Specifications of optical sensor	19
2.7.1.5 Comparison between types of fingerprint sensor	20
2.7.2 Type of fingerprint matching	21
2.7.1.1 Flowchart of minutia extraction	21
2.8 Push Button	22
2.9 Light Emitting Diode (LED)	23
2.10 Existing Project	24
2.10.1 A Review of Face Recognition based Car Ignition and Security System	24
2.10.2 Real Time Biometrics Vehicle Security System with GPS and GSM Technology	25
2.11 Comparison Between Existing system and updated system	27
2.12 Conclusion	28
CHAPTER 3	METHODOLOGY
3.1 Methods	29
3.1.1 Planning	30
3.1.2 Project Planning	31
3.1.3 Designing	34
3.1.4 Fingerprint recognition process	34
3.1.5 Project flowchart	35
3.2 Hardware Implementation	36
3.2.1 Hardware specifications	36
3.2.1.1 Arduino Uno	37
3.2.1.2 GSM Module SIM 900A	38
3.2.1.3 Optical Scanner	39
3.2.1.4 Buzzer	39

3.3 Software Implementation	40	
3.3.1 Arduino IDE software	40	
3.4 Expected Result	42	
CHAPTER 4	RESULTS AND DISCUSSIONS	43
4.1 Introduction	43	
4.2 Hardware Setup	43	
4.2.1 Hardware circuit connection	43	
4.2.2 Final result of hardware	44	
4.3 Implementation Phase	45	
4.4 Project result and analysis	53	
CHAPTER 5: CONCLUSION AND RECOMMENDATION	56	
5.1 Conclusion	56	
5.2 Recommendation	57	
REFERENCES	58	
APPENDICES	59	

LIST OF TABLES

Table 2.1: Pin Modules and its functions	16
Table 2.2: Comparison and decision among buzzer	17
Table 2.3: Specifications of capacitive sensor	20
Table 2.3: Specifications of optical sensor	21
Table 2.5: Comparison between types of fingerprint sensor	22
Table 2.6: Comparison between existing system and updated system	29
Table 3.1: Gantt chart for PSM 1	33
Table 3.1: Gantt chart for PSM 2	34
Table 3.3: Specification of Arduino UNO	39
Table 3.4: Specification of GSM SIM900A	40
Table 4.1: Average fingerprint sensor reading of fingerprint ID	54

LIST OF FIGURES

Figure 2.1: Arduino Yun board	11
Figure 2.2: Arduino Mega board	12
Figure 2.3: Arduino Uno board	13
Figure 2.4: Worldwide development of mobile telephone systems	15
Figure 2.5: GSM milestone	15
Figure 2.6: GSM Network Architecture	16
Figure 2.7: LCD Display	17
Figure 2.8: Buzzer	18
Figure 2.9: Patterns of fingerprints	20
Figure 2.10: Minutiae patterns	20
Figure 2.11: Capacitive sensor	21
Figure 2.12: Optical sensor	22
Figure 2.13: Types of fingerprint sensors	23
Figure 2.14: Flowchart of minutia extraction	24
Figure 2.15: Push button	25
Figure 2.16: Light Emitting Diode (LED)	26
Figure 2.17: Architecture of face recognition-based car ignition system	27
Figure 2.18: Block diagram representation for security system	28
Figure 2.19: GPS in vehicle security	29
Figure 3.1: Flowchart of project	32
Figure 3.2: Flowchart of project planning	33

Figure 3.3: Input, output and process for vehicle ignition using fingerprint	36
Figure 3.4: Fingerprint recognition process block diagram	37
Figure 3.5: Project flowchart	38
Figure 3.6: Block diagram of project	39
Figure 3.7: GSM SIM900A module	41
Figure 3.8: Logo of Arduino IDE software	44
Figure 3.9: Sketches of Arduino	41
Figure 4.1: The connection of LCD, GSM, relay, fingerprint scanner, buzzer and push button on the Arduino Uno board	43
Figure 4.2: Complete hardware design	44
Figure 4.3: GSM SIM900 Module sent SMS to Mobile phone	44
Figure 4.4: The library of the code program	45
Figure 4.5: Components declared	46
Figure 4.6: Void Setup	46
Figure 4.7: Result of initializing system	47
Figure 4.8: Void loop	47
Figure 4.9: Void checkKeys	48
Figure 4.10: Void Enroll	48
Figure 4.11: Void Enroll continuous	49
Figure 4.12: Enroll Finger for the first time	49
Figure 4.13: Enroll Finger for the second time for confirmation	50
Figure 4.14: Fingerprints stored	50
Figure 4.15: If no fingerprint detected	51
Figure 4.16: Void Delete	51

Figure 4.17: Void Delete Continuous	52
Figure 4.18: uint8_t deleteFingerprint(uint8_t id) code	52
Figure 4.19: Fingerprint ID 1 reading	53
Figure 4.20: Fingerprint ID 2 reading	53
Figure 4.21: Fingerprint ID 3 reading	53
Figure 4.22: Fingerprint ID 4 reading	54
Figure 4.23: Fingerprint ID 5 reading	54
Figure 4.24: Fingerprint ID vs average fingerprint sensor reading	55
Figure 4.25: Final output when the authorized user is detected	55

CHAPTER 1

INTRODUCTION

1.0 Introduction

Biometric technology is a method that requires the physical presence of the identified person. It is a new state of art method for security systems. Fingerprint recognition is one of the most widely used biometric system and also the oldest method which is dated back to 2200 BC (Omidiora *et al.*, 2011). The use of fingerprints as personal code was also in tradition method. Developing a prototype with biometric system will serve a robust and embedded real time fingerprints-based ignition systems in vehicle.

This project focuses about developing a prototype of vehicle ignition using fingerprint. According to (Kumar and Engineering, 2017) this system has a potential to avoid the vehicle from being stolen. This lock security is developed to control the ignition of the vehicle by using fingerprint. The existing lock at the vehicle is not highly secured which consist of handle lock and standard switch lock. To overcome this, there are variety of security lock system that can be added to the vehicle. By creating this prototype, security level of the vehicle ignition is highly protected and could help to decrease theft. The main idea of this project is a fingerprint scanner will detect the authorized or an unauthorized user and alert the user via GSM.

In the current era, there is high demand for robust security systems in vehicles. So, the designing and developing a biometric security system using fingerprint technology to prevent unauthorized vehicle is easy and very useful.

1.1 Project Background

Biometric systems are a method used to recognize the identity of a person with the use of physiological characteristics. This recognition system also offers a great security and convenience. It is used in schools, colleges, universities, banks and many more places. One of the major industry is the automotive industry. In the case of this project, fingerprint identification is used. A fingerprint is determined by the pattern of ridges. Finger print images are rarely perfect of quality since it is determined by the pattern of ridges, furrows and minutia points as well.

This project focuses on the use of fingerprints for vehicle ignition. The fingerprint analyzes the finger print images followed by hardware interface module and ignition system module. Before any user can access the vehicle, his or her fingerprint image must be matched with the fingerprints in the database. Those users with no match in the database are restricted from igniting the vehicle. System allows multiple users to register as authorized users. A GSM module plays an important role in this project. Whenever a user with no match tries to scan his or her fingerprint a message is sent to the registered user.

1.2 Problem Statement

Malaysia is one of the top ten countries in the world with the highest number of vehicle thefts. According to Mark Lim the chief executive of General Insurance Association of Malaysia's, (NABIL BASARUDDIN, 2018) 60 vehicles get stolen everyday averagely from all over the country. As per report, Malaysia is ranked as the 6th country globally for auto theft last year. Among the car models getting stolen are Proton Wira, Toyota Hilux Proton Iswara, Perodua Myvi, Perodua Kancil, Proton Saga followed by the least is Toyota Vios.

All the cars are attached together with the traditional locks which are very well known to the thieves. Those locks are not very tough to crack. Chances of duplicating a vehicle key are very high. Thus, traditional locks can be easily unlocked by professional thieves. Many vehicles are getting stolen and couldn't be found back. To protect the theft, first vehicle should be restricted from starting of the vehicle. Vehicle security is more important these days.

Even without the access of keys, vehicles are easily getting stolen by either breaking and entry, hotwiring, tampering methods to start the vehicle or else towing. Another way of theft is when a user has left unattended with the keys visibly present. Devices used to lock part of the vehicle are also easily broken and this leads the thieves to runaway the vehicle easier.

Regarding to this problem, a secure locking system based on fingerprint is developed with an affordable cost. A microcontroller accompanied by an interface circuit has been used to igniting based on fingerprint is stored in the microcontroller so that only the authorized user will be able to access the security lock. This new invention of prototype will be a highly secured security system to prevent vehicle from theft and a.

1.3 Objectives

The main objectives of this projects are

- 1) To develop a prototype of vehicle ignition using fingerprint.
- 2) To develop a notification system for the user through SMS.
- 3) To reduce the occurrence of vehicle from theft and burglaries.

1.4 Scope

This project has scopes of developing a high security prototype of a vehicle ignition using fingerprint to prevent theft. This consists of Global System for Mobile (GSM) module that acts as platform, Arduino Uno microcontroller will connect with the buzzer, LCD to display the status and an optical sensor as a biometric reader will be utilized as part to assemble the hardware. By using Global System for Mobile communication (GSM), the prototype will provide an alert message via SMS and send it user's registered mobile number. GSM module can notify the authorized user when any unauthorized user tries to access the vehicle.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter discusses the technology that is being implemented in the project and the background of biometric technologies. Reviews about the previous work related to this project is discussed in this chapter. Information's gathered in this part are collected from journals, internet resources, books and article. GSM technology, Arduino and fingerprint is been discussed briefly in this topic. All the researches have been further used in the studies of vehicle ignition using fingerprint.

2.1.1 Vehicle Ignition

Ignition system basically is used to initiate a car's 12-volt battery and send it to each sparkplug in turn, starting the air fuel mixture in the engine's combustion chamber. It then produces high voltage arcs at the spark plug electrode. By using ignition coil, high voltages are produced where it is supplied with lower voltage battery. the Basically, ignition system consists of ignition switch, relay, starter motor, battery and fuse.

The ignition system works when low voltage in the battery goes through the primary coil. Wire connects to the kick starter using a wire from the battery while the other wires attach to the kick starter to the key system. When the car key switch on the system once, two wires from the kick starter to key system are connected. This results the engine to be in on condition. Followed by the next turning of the key is where the third wire connects the other two joined wires which cause the voltage to flow from the battery to the respected vehicle parts so that the vehicle gets to move.

2.2 Facts and Finding

2.2.1 Domain

Vehicle ignition using fingerprint system is known as security system to prevent vehicle theft. Vehicle usage is basically a necessity for everyone in current era. Nowadays, vehicle security system depends on sensors that are way too costly and high efficient. This system is developed to cut cost for the technology like only the premium car makers are imposing this in the market. Thus, developing vehicle ignition using fingerprint would be efficient and low cost for users who own vehicle to keep secure their vehicle without any worries. Based on (Arora and Kumar, 2015), fingerprints biometric system are cheaper compared to the rest of the biometrics and there is also high usage among users.

The purpose of this project is to prevent vehicle theft. If an unauthorized person tries to access the car without the knowledge of the authorized user, a SMS will be sent to the authorized user to alert. Arduino UNO will be used as the platform of this project to monitor the input and output of the system. In this system, GSM module will be implemented to notify the authorized user. Besides SMS, a buzzer will make sound as a warning to the unauthorized person and alerts people around. This situation makes the unauthorized person nervous and to failed to steal the vehicle. In addition, LCD display is used to display the status of the fingerprint. In case of any fingerprint is added or deleted it will display as Fingerprint Added or Fingerprint Deleted. When an unauthorized user accesses the vehicle, it will display status as Invalid Access.

2.3 Classifications of Arduino

Arduino is one of the platform used for this project. It is a software feature which enables experienced programming designers to utilize the Arduino code to converge with the current programming language libraries can be broadened and changed. It is an awesome tool for individuals with all ability levels. Both physical programmable circuit board and programming is in Arduino. It continues running on PC which is utilized to compose and exchange PC code to the physical. Arduino has capacity such as interacting with light on a sensor, a finger on a button, running a motor, switching on an LED and distributing something online. In addition, Arduino doesn't need a separate piece of hardware, to load a new code onto the board since it can utilize it with a USB cable. The most utilized ones are Arduino Uno and Arduino Mega. Arduino IDE is utilized to program an Arduino and it utilizes a straightforward version of C++. This makes the program to be learnt less demanding. Based on (Rajan *et al.*, 2015) the product is good with a wide range of working frameworks like Windows, Linux, and Macintosh and so on indistinct vague unclear vague.

2.3.1 Arduino Yun

Arduino Yun is a board that is based on Atmega32u4. It is the first member of a Wifi products combining with Linux. According the AVR enhanced the RISC architecture, this board is a CMOS 8-bit microcontroller with a low power. This board installs Linux machine directly on PCB of the Arduino Leonardo. Then both are connected so that from Arduino is not complicated to run the commands at Linux side. Then, it is used as an Ethernet and Wifi interface. Three reset buttons, Wi-Fi support and ethernet, USB -A port, micro-SD card slot, 20 digital input and output pins where 7 of the pins are used as output of PWM and 12 as analog inputs, 16 MHz crystal oscillator, a micro USB connection, an ICSP header. Wifi, AR9331 processor and Atmega32u4 all have their own reset buttons. Arduino Yun is not built in with 5V regulator, if is powered more than 5V it will most likely damaged. In the case of the board is not powered from micro-USB connection, then power can be applied to Vin and 5V pins on the board.



Figure 2.1: Arduino Yun board