



**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

**DESIGN AND DEVELOPMENT OF SECURITY  
SYSTEM FOR MOTORCYCLE**

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

by

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Tajuk: DESIGN AND DEVELOPMENT OF SECURITY SYSTEM FOR  
MOTORCYCLE

Sesi Pengajian: 2019

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## APPROVAL

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

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Co-supervisor: TS. RAMLAN BIN LATIP

## **ABSTRAK**

Pada zaman moden sekarang dengan adanya sistem anti kecurian kenderaan adalah merupakan perkara yang sangat penting. Daripada itu, projek ini direka bentuk untuk mencipta penyalaan palam pencucuh berasaskan cap jari di motosikal yang merangkumi pacuan dua roda. Menurut indeks jenayah terkini, rekod jenayah kecurian motosikal adalah sangat tinggi berbanding dengan kes jenayah jenis penganagkutan seperti kereta. Kunci biasa yang terdapat di motosikal tidak memberikan keselamatan yang mencukupi kepada pemilik motosikal. Kunci tradisional yang terdapat di motosikal itu terkenal dengan pencuri dan mereka dapat mengetahui dengan mudah cara untuk mencurinya. Oleh itu, perlunya adan lebih banyak pilihan keselamatan yang tersediadi pasaran untuk motosikal yang unik dan mesti berbeza dari kunci utama tradisional. Maka sistem biometrik boleh digunakan sebagai pilihan keselamatan yang baik dan berkesan. Kaedah pengenalan manusia yang penting dan sangat dipercayai adalah identifikasi cap jari. Oleh kerana cap jari setiap orang unik, ia boleh digunakan dalam pelbagai pilihan keselamatan. Dalam projek ini, hanya memberi tumpuan kepada penggunaan untuk pengenalan cetakan cap jari untuk memulakan atau menyalakan motosikal terhadap penggunaan kaedah konvensional kunci utama. Pengkajian berkaitan projek ini akan dilakukan, termasuk meningkatkan keselamatan motosikal dengan menambah jenis kunci dan pengesan yang akan memaklumkan pemilik motosikal sekiranya berlaku kehilangan iaitu bunyi penggera. Hasil daripada analisis pada projek ini adalah tindak balas terhadap keadaan sensor cap jari menunjukkan fakta penting yang boleh menjejaskan kecekapan masa dalam tindak balas sensor. Sementara itu, Arduino UNO

lebih sesuai sebagai alat kawalan untuk projek ini berdasarkan fakta kos rendah dan pengguna yang mesra. Untuk keputusan percubaan, masa tindak balas kecekapan terbaik untuk mengesan keadaan jari adalah dalam keadaan normal atau bersih pada cetakan jari. Ia adalah kerana corak penyimpanan mudah dibaca tanpa ada gangguan modul cap jari sensor biometrik atau kehilangan bentuk gambar cap jari yang telah di daftarkan di programming Arduino..

## **ABSTRACT**

In the modern days a vehicle anti-theft system is of prime important. From that moment, this paper is designed to create the fingerprint based ignition in motorcycle which includes all two wheelers. According to the latest crime index, motorcycle theft crime records were high compared with the criminal cases of other type of vehicle such as car. Normally available locks in the motorcycle do not provide enough security to the motorcycle owners. Traditional locks available in the motorcycle are well known to thieves and they can be easily broken by them. Thus there is need for more security options to be available for the motorcycle which is unique and must be different from the traditional key locks. Biometrics system can be used as a good and effective security option. An important and very reliable human identification method is fingerprint identification. As fingerprint of every person is unique thus it can be used in various security options. In this project, only focusing on the use to finger print recognition to start or ignite the motorcycle against the use of conventional methods of key locks. Related work include enhancing the security of the motorcycle by adding different type of locks and alarming unit to alert owner of the motorcycle in case of danger. The analysis on the response time against fingerprint sensor condition shows a significant fact that may affect the time performance in term efficiently sensor response. Meanwhile, Arduino UNO was preferred as the core controller for this project by virtue of the low cost and user friendly facts. For the experimental result, the best performance response time detect is normal or clear type condition of the finger print. It is because



the pattern of storage easily read by the biometric fingerprint sensor module disturbance or lost some data.

## **DEDICATION**

This thesis is dedicated to:

To my beloved parents

My Supervisors,

My Lectures,

And all my friends,

Thank you for the nice support and powerful encouragement.

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“Rome wasn’t built in a day” and this idiom describe immensely appropriate to achieve the goal. The success and final outcome of this project required a lot of guidance and assistance from many people and I am extremely privileged to have got this all along the completion of my project. Firstly, I would like to express my special thank for gratitude to Mr.Ts. Sulaiman Bin Sabikan who accept the request to become my supervisor for monitoring me within this two semester. I extremely thankful to him for spending precious time and lead me on the right track until complete the project duty, although he had busy schedule managing the academic affair.

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## TABLE OF CONTENTS

|   | <b>PAGE</b> |
|---|-------------|
| ABSTRAK   | vi          |
| ABSTRACT  | viii        |
| DEDICATION                                      | x           |
| ACKNOWLEDGEMENTS                                | xi          |
| TABLE OF CONTENTS                               | xiii        |
| LIST OF TABLES                                  | xvii        |
| LIST OF FIGURES                                 | xviii       |
| LIST OF APPENDICES                              | xx          |
| LIST OF ABBREVIATION, SYMBOLS AND NOMENCELATURE | xxi         |
| <br>  |             |
| <b>CHAPTER 1      INTRODUCTION</b>              | <b>1</b>    |
| 1.0    Introduction                             | 1           |
| 1.1    Background                               | 3           |
| 1.2    Problem Statement                        | 5           |
| 1.3    Objective                                | 6           |
| 1.4    Scope                                    | 6           |
| 1.5    Organization                             | 6           |
| <br>  |             |
| <b>CHAPTER 2      LITERATURE REVIEW</b>         | <b>8</b>    |

|       |  |    |
|-------|--|----|
| 2.0   | Introduction   | 8  |
| 2.1   | Related Works  | 8  |
| 2.1.1 | PIC Based with GSM Motorcycle Security system            | 8  |
| 2.1.2 | Motorcycle Security System using RFID and GSM            | 9  |
| 2.1.3 | Improving Motorcycle Anti-Theft System                   | 10 |
| 2.1.4 | The MTAS Based QR Code for Addressing Motorcycle Theft   | 12 |
| 2.1.5 | NFC technology for Motorcycle Security System            | 12 |
| 2.2   | Security System for Motorcycle                           | 13 |
| 2.2.1 | Type of Motorcycle Security System                       | 14 |
|       | 2.2.1.1 Factory installed Anti-Theft equipment or system | 14 |
|       | 2.2.1.2 User-Installed Anti-Theft                        | 15 |
| 2.2.2 | Optical Fingerprint Reader Sensor Module                 | 16 |
|       | 2.2.2.1 Fingerprint Sensor                               | 16 |
| 2.2.3 | Sensor features  | 18 |
| 2.2.4 | Working Principle  | 18 |
| 2.2.5 | Hardware connection                                      | 19 |
| 2.3   | Hardware specification                                   | 21 |
| 2.3.1 | Arduino Nano   | 21 |
| 2.3.2 | Relay  | 23 |
|       | 2.3.2.1 Single Relay Module                              | 24 |

|                  |   |           |
|------------------|---|-----------|
| 2.3.3            | Buzzer  | 25        |
| 2.4              | Previous Work   | 25        |
| <b>CHAPTER 3</b> | <b>METHODOLOGY</b>  | <b>27</b> |
| 3.0              | Introduction  | 27        |
| 3.1              | Project Work Flow   | 27        |
| 3.1.1            | Planning  | 28        |
|                  | 3.1.1.1 Flow Chart of Project Methodology                   | 29        |
| 3.1.2            | Research and Data Collection                                | 29        |
| 3.1.3            | Designing the Motorcycle Security System                    | 30        |
|                  | 3.1.3.1 System Operation Flow Chart                         | 32        |
| 3.2              | Implementation and circuit connection Hardware              | 33        |
| 3.2.1            | Connection of Buzzer with Arduino Nano                      | 33        |
| 3.2.2            | Connection of Biometric Fingerprint Sensor                  | 33        |
| 3.2.3            | Circuit connection of Single Relay Module with Arduino Nano | 35        |
| 3.3              | Software configuration                                      | 35        |
| 3.3.1            | Writing and Uploading the Sketches in Arduino IDE           | 36        |
| <b>CHAPTER 4</b> | <b>RESULT AND DISCUSSION</b>                                | <b>41</b> |
| 4.0              | Introduction  | 41        |
| 4.1              | Hardware Development and Experimental Work                  | 41        |

|                   |  |           |
|-------------------|--|-----------|
| 4.1.1             | Experiment 1: Authorized Accessibility             | 42        |
| 4.1.2             | Experiment 2: Unauthorized Accessibility           | 44        |
| 4.2               | Result Analysis                                    | 45        |
| 4.2.1             | Number of trial versus Response Time (Millisecond) | 45        |
| 4.3               | Discussion   | 47        |
| <b>CHAPTER 5</b>  | <b>CONCLUSION</b>                                  | <b>50</b> |
| 5.0               | Introduction                                       | 50        |
| 5.1               | Summary of Research                                | 50        |
| 5.2               | Achievement of Research Objective                  | 50        |
| 5.3               | Suggestion for Future Work                         | 51        |
| <b>REFERENCES</b> | <b>52</b>  |           |
| <b>APPENDIX</b>   | <b>54</b>  |           |



## LIST OF TABLES

| <b>TABLE</b> | <b>TITLE</b>  | <b>PAGE</b> |
|--------------|---|-------------|
| Table 2.1:   | Fingerprint sensor features                                   | 18          |
| Table 2.2:   | Specification of Arduino Nano                                 | 22          |
| Table 2.3:   | Summarize type of security system of Motorcycle               | 26          |
| Table 3.1:   | Pins connection of Biometrics Fingerprint Sensor with Arduino | 34          |
| Table 3.2:   | Pins connection between relay modules with Arduino            | 35          |
| Table 4.1:   | Number of trial versus Response Time (Millisecond)            | 45          |

## LIST OF FIGURES

| <b>FIGURE</b> | <b>TITLE</b>   | <b>PAGE</b> |
|---------------|--|-------------|
| Figure 1.1:   | The number of vehicles stolen within January to June 2015-2016 | 2           |
| Figure 2.1:   | Fingerprint Sensor Model FPM10A                                | 16          |
| Figure 2.2:   | Three pattern of Ridges  | 17          |
| Figure 2.3:   | Identification of Fingerprint Ridges                           | 17          |
| Figure 2.4:   | Dimension motherboard (mm)                                     | 20          |
| Figure 2.5:   | Biometric Fingerprint Sensor Dimension                         | 20          |
| Figure 2.6:   | Front view of Arduino Nano                                     | 21          |
| Figure 2.7:   | Rear view of Arduino Nano                                      | 22          |
| Figure 2.8:   | Arduino Nano Structure (theengineeringproject.com.2018)        | 23          |
| Figure 2.9:   | An example of wiring diagram using relay                       | 24          |
| Figure 2.10:  | The SRD-5VDC Relay Module (GI Electronic,2011)                 | 24          |
| Figure 2.11:  | Buzzer (SFM-27 DC3-24V) (GI Electronic,2011)                   | 25          |
| Figure 3.1:   | Project Flow Chart   | 28          |
| Figure 3.2:   | Project Flow Chart   | 29          |
| Figure 3.3:   | Fingerprint sensor for Motorcycle Security System              | 31          |
| Figure 3.4:   | Process Flow Motorcycle Security System                        | 32          |

|   |    |
|---|----|
| Figure 3.5: Connection of Arduino Nano with Buzzer                  | 33 |
| Figure 3.6: Connection of Arduino with Biometric Fingerprint Sensor | 34 |
| Figure 3.7: Connection of SRD-5VDC module with Arduino              | 35 |
| Figure 3.8: Basic function in IDE environment                       | 36 |
| Figure 3.9: Selecting Arduino/Geuino Nano board                     | 37 |
| Figure 3.10: Selecting the desired port                             | 38 |
| Figure 3.11: Uploading the code in IDE                              | 39 |
| Figure 3.12: Complete uploaded to Arduino Nano                      | 39 |
| Figure 3.13: Software design flow chart                             | 40 |
| Figure 4.1: Prototype of the Motorcycle Security System             | 42 |
| Figure 4.2: Initial State   | 42 |
| Figure 4.3: The stop blink light indicates an authorized accessible | 43 |
| Figure 4.4: Authorized number of response time in serial monitor    | 43 |
| Figure 4.5: The ignition key start motor turn ON                    | 43 |
| Figure 4.6: The alarm will be triggered ON                          | 44 |
| Figure 4.7: The ignition motorcycle not able to turn on the motor   | 45 |
| Figure 4.8: Data collection time against type of finger             | 46 |
| Figure 4.9: USB 2.0 cable type A/B                                  | 49 |

## LIST OF APPENDICES

| APPENDIX | TITLE                         | PAGE |
|----------|-------------------------------|------|
|          | Appendix 1 Coding Fingerprint | 54   |

## LIST OF ABBREVIATION, SYMBOLS AND NOMENCELATURE

|               |   |   |
|---------------|---|---|
| <b>JPJ</b>    | - | Royal Transport Department                          |
| <b>RMP</b>    | - | Royal Malaysia Police                               |
| <b>GPS</b>    | - | Global Positioning System                           |
| <b>RFID</b>   | - | Radio Frequency Identification Detection            |
| <b>MAA</b>    | - | Malaysia Automotive Association                     |
| <b>GSM</b>    | - | Global System for Mobile Communication              |
| <b>QR</b>     | - | Quick Response                                      |
| <b>BLE</b>    | - | Bluetooth Low Energy                                |
| <b>NFC</b>    | - | Near Field Communication                            |
| <b>SMS</b>    | - | Short Message Service                               |
| <b>GPRS</b>   | - | General Packet Radio Service                        |
| <b>IDE</b>    | - | Integrated Development Environment                  |
| <b>AT</b>     | - | ATTENTION   |
| <b>PWM</b>    | - | Pulse Width Modulation                              |
| <b>RXD</b>    | - | Receive Data  |
| <b>TXD</b>    | - | Transmit Data                                       |
| <b>AVR</b>    | - | Automatic Voltage Regulator                         |
| <b>USB</b>    |   | Universal Serial Bus                                |
| <b>SRAM</b>   |   | State Random Access Memory                          |
| <b>EEPROM</b> |   | Electrically Erasable Programmable Read Only Memory |

# CHAPTER 1

## INTRODUCTION

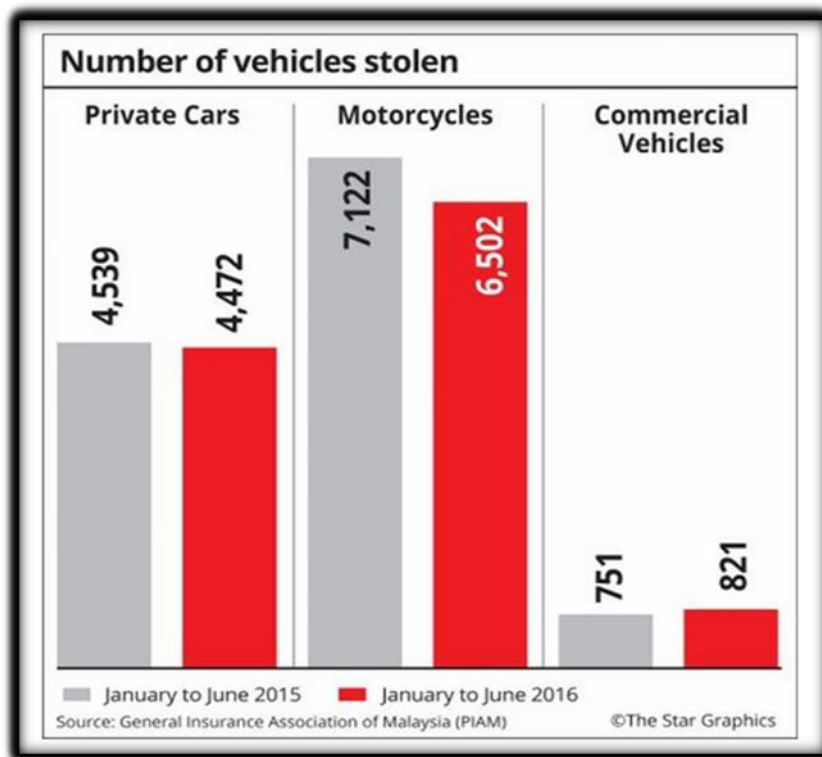
### 1.0 Introduction

Motorcycle is one of the popular transportation for citizen in Malaysia. The reasons motorcycle becomes the favorite due to convenience during the traffic congestion and also save cost in term of fuel and maintenance. According to the Malaysia Automotive Association (MAA) has released Malaysian vehicle registration data up to June 30, 2017, with the total number of 12,933,042 motorcycles registered (Jonathan Lee,2017) The type of motorcycle in Malaysia such as Moped Bike, Scooter, Naked, Sport Bike, Touring, Cruiser and Dual Sport

However, motorcycle rank at the top of the property crimes due to lack of security system and also the careless of the owner. Nowadays, the growing number of property crimes gives large impact on the overall of Malaysia crime index. As claimed by reporter Ani Shamira (2016), where the total crime index has been raised about 4.5 per cent which basically due to the escalating ratio of property crime. Among the categories in property crime, motorcycle theft is ranked at top of crimes happened compared to others. There are 12,216 motorcycle theft cases has been reported in last year 2016 where an average of 33 motorcycle has been stolen every day across the country as shown in figure 1.1. The number shows that the motorcycle theft issue reached a critical level and become prime target for robber. Even though Royal Malaysia Police (RMP) has launched few strategies or program to combat the issue however it seems like doesn't work effetyly. This kind of cases happened mostly relate

to some formidable factors such as high levels unemployment, high population density, low income and unstable of economic. A study by Zulkifli et.al (2015) where applying negative binominal regression model analysis on vehicle theft crime in peninsular Malaysia show that high population density such as Klang Valley, Johor Bahru, and Penang having the highest crime rate of the theft motorcycle. Other reasons, it might be also occurring due to lack of their security system on motorcycle and also personal problem such as negligent attitude of the owners.

Due to this threat, many motorbike security system manufactures are claiming to provide a better protection system. It's no doubt some are genuine while other are unreliable. Therefore, the importance of increasing the security system level of the motorcycle for prevents risk of theft.



**Figure 1.1: The number of vehicles stolen within January to June 2015-2016**

## 1.1 Background

Since from the last past century, transportation becomes a vital object that needed by human. Historically, bicycle has been invented in 18<sup>th</sup> century by Pierre Michaux (Mary Bellis, 2004). But some of the brilliant scientist still keep trying so hard on development and searching the way to make a transport used on public roads that are more automated and faster to full fill what human needs. Basically, a transport which able to helps them to work more efficient, travel father as well as explore more territory in daily are very important. Based on the objective and goals in mind, finally the first steam-powered motorcycle was being invented at 1867. Nowadays, motorcycle has been one of the main popular transportation that broadly used in Malaysia. According in statistic diagram (2011) showed by Road Transport Department (JPJ) where Johor Bahru, Kuala Lumpur, Penang are the top three state which have the largest population number of Motorcycle among 13 states in Malaysia. Not surprisingly, motorcycle was the primary selection used during on heavy traffic furthermore it saves the cost in terms of fuel and maintenance compared to motorcar. Therefore, motorcycle has been the most preferable, convenient and affordable mode transport in most of the city in Malaysia.

Nonetheless, the motorcycle becomes properties that frequently target by the theft due to easily on trading and lack of security system (Ouyang et al. 2011). Based on the New Straits Time (2016) reported that there are 12,216 motorcycle theft cases happened in last year 2016 moreover it recorded the highest quantity among others automobile. This criminal issue has attracted the attention of the entire citizen in Malaysia and some of the motorcycle biker started worried about when their vehicle will become one of the victims. Our national Royal Malaysia Police (PDRM) has