UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF THIRD BRAKE LIGHT AND SIGNAL SYSTEM FOR MOTORCYCLE HELMET

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

by

MOHD HAKIM NAQIUDDIN BIN ABDUL KADIR

B071610147

940203-02-5903

FACULTY OF MECHANICAL AND MANUFACTURING ENGINEERING TECHNOLOGY

2019

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

TAJUK: DEVELOPMENT OF THIRD BRAKE AND SIGNAL SYSTEM FOR MOTORCYCLE HELMET

SESI PENGAJIAN: **2019/2020 Semester 1**

Saya **MOHD HAKIM NAQIUDDIN BIN ABDUL KADIR** mengaku membenarkan Laporan PSM ini disimpan di Perpustakaan Universiti Teknikal Malaysia Melaka (UTeM) dengan syarat-syarat kegunaan seperti berikut:

1. Laporan PSM adalah hak milik Universiti Teknikal Malaysia Melaka dan penulis.
2. Perpustakaan Universiti Teknikal Malaysia Melaka dibenarkan membuat salinan untuk tujuan pengajian sahaja dengan izin penulis.
3. Perpustakaan dibenarkan membuat salinan laporan PSM ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. **Sila tandakan (✓)

☐ SULIT	(Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia sebagaimana yang termaktub dalam AKTA RAHSIA RASMI 1972)
☐ TERHAD	(Mengandungi maklumat TERHAD yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijalankan)
☐ TIDAK TERHAD	

Disahkan oleh Penyelia:

(MOHD HAKIM NAQIUDDIN BIN ABDUL KADIR)

Alamat Tetap:

Depan Masjid Kampung Tanjung Pari

09100 Baling Kedah.

(TS. Dr MOHD ZAKARIA BIN MOHAMMAD NASIR)

Cop Rasmi:

** Jika Laporan PSM ini SULIT atau TERHAD, sila lampirkan surat daripada pihak berkuasa/organisasi berkenaan dengan menyatakan sekali sebab dan tempoh laporan PSM ini perlu dikelaskan sebagai SULIT atau TERHAD.

DECLARATION

I hereby, declared this report entitled **DEVELOPMENT OF THIRD BRAKE LIGHT AND SIGNAL SYSTEM FOR MOTORCYCLE HELMET** is the results of my own research except as cited in references.

Signature: .....

Author : MOHD HAKIM NAQIUDDIN BIN ABDUL KADIR

Date:

APPROVAL

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

Signature: .....

Supervisor : Ts Dr. MOHD ZAKARIA BIN MOHAMMAD NASIR

ABSTRACT

Road accident is one of Malaysia's leading causes of death. There are many causing factors such as driver attitude, weather, and road condition. Most of the motorcyclist is involved in one of the most casualties in the fatal accident. Due to low visibility, motorcyclists are hard to see their absence on the road, critical situation accidents could occur at night or ark condition. These situations are particularly dangerous for the road user to the motorcycle and bicycle at night. This project aims to develop an LED installer place on the helmet to ensure that another road user can easily spot motorcyclists. For Arduino controller been to design an electrical circuit for receiver and transmitter, and CAD design is updated to the latest design. The LED light will be on the back of the helmet, similar to the driver's eyes from behind. Based on the analysis, this smart helmet can improve the visibility of the other vehicle to the rider when using the helmet under low light and adverse weather conditions. The smart helmet and wireless platform design model is working and tested.

ABSTRAK

Kemalangan jalan raya adalah salah satu sebab utama punca kematian di Malaysia. Terdapat banyak faktor penyebab seperti sikap pemandu, cuaca, dan keadaan jalan raya. Kebanyakan penunggang motosikal terlibat dalam salah satu kemalangan yang menyebabkan kehilangan nyawa. Disebabkan jarak penglihatan yang rendah, di mana penunggang motosikal sukar melihat ketidakhadiran mereka di jalan raya, kemalangan keadaan kritikal boleh berlaku pada waktu malam atau keadaan cuaca buruk. Keadaan ini amat berbahaya bagi pengguna jalan raya untuk motosikal dan basikal pada waktu malam. Sistem tambahan lampu berkelip LED pada topi keledar dalam projek ini bertujuan unutk memastikan bahawa penunggang motosikal dapat dilihat dengan mudah oleh pengguna jalan raya yang lain. Mikro controller Arduino digunakan sebagai program untuk litar pemancar dan litar penerimaan di topi keledar pintar mengawal fungsi sistem. Reka bentuk prototaip direka bentuk di dalam CAD software dan di tambahbaik. Lampu LED akan berada di bahagian belakang topi keledar yang serupa dengan mata pemandu kenderaan lain dari belakang. Berdasarkan analisis, topi keledar pintar ini boleh meningkatkan keterlihatan kkenderaan lain kepada penunggang apabila menggunakan topi keledar di bawah cahaya rendah dan keadaan cuaca yang buruk. Model topi keledar pintar ini di reka bentuk dan diuji keberfungsiannya .

DEDICATION

This project and research work are dedicated to my beloved mother and my family for their enthusiastic caring throughout my life, my loving siblings, my supervisor, and also my friends for their encouragement.

ACKNOWLEDGEMENTS

For my acknowledgment, I would like to express my gratitude and thanks to ALLAH S.W.T for the blessings given to finish up my thesis. I dedicate my dissertation work to my mother, family and all my friends. To my mother, Puan Sahidun Binti Saad, you are my inspiration and strength. Thank you for your supported and for believing in me and always prays for me. Family is always there when I was in trouble while conducting this research. An enormous thankfulness to my supervisor Ts Dr. Mohd Zakaria Bin Mohammad Nasir, for all the guidance given to me, finishes this research. All this is one of the success-key for my research. Not to forget, special thanks for all of my friends that always supported me throughout the process of finishing this thesis. All of the encouragement will always remain in my mind in order to keep moving forward. Thanks to all.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF SYMBOLS

d	-	Distance
l	-	Length
I	-	Current
m	-	Meter
m		Mass
V in	-	Input voltage
V out	-	Output voltage

LIST OF ABBREVATIONS

WHO	World health organization
PDRM	Polis di raja Malaysia
IC	Integrated circuit
USB	Universal serial bus
LED	Light-emitting diode
Wi-Fi	Wireless fidelity
RFID	Radiofrequency identification
PNP	Positive-negative-positive
ABS	Acrylonitrile Butadiene Styrene
VCC	Verified concurrent
DC	Direct current
GND	Ground

CHAPTER 1

INTRODUCTION

1.1 Background

Road accident is the leading cause of death for road users. Motorcyclists are the biggest victim in the death and serious injury accident that has always occurred today, according to Statistics. Many factors cause an accident, such as the driver's attitude, the weather, and road conditions. Accident in Malaysia is one of the leading causes of death among road users.

Motorcyclists are the greatest victim of the accident of death and serious injury that has always occurred days ago. Many factors are causing the accident, such as driver altitude, weather, and condition of the road. Based on the PDRM statistics, both at night and in heavy rainfall, the major death accident occurs. Today, the Malaysians have taken this issue seriously.

In Malaysia, reports from traffic-caused injuries and deaths have been steadily alarming for over 6000 people killed and over 25,000 injured annually over the past five years, according to Muhammad Marizwan Abdul Manan (2012), Table 1.1 show the General Accident statistics in Malaysia Data by MIROS.

Also, according to Dr. Tedros Adhanom Ghebreyesus Director-General, World Health Organization(2018), WHO is committed to working with countries to reduce the needless death and disability caused by road traffic crashes. Malaysia is the top five most popular in ASEAN countries with the higher motorcycle fatalities, and 64 % of the

total number shown in Figure 1.1 includes the bulk of road deaths in motorcycles reported by Kak D-Wing (P.Tech), Motorcycle Safety and Technology Symposium (21 October 2019) at Malaysian Institute of Road Safety Research MIROS,

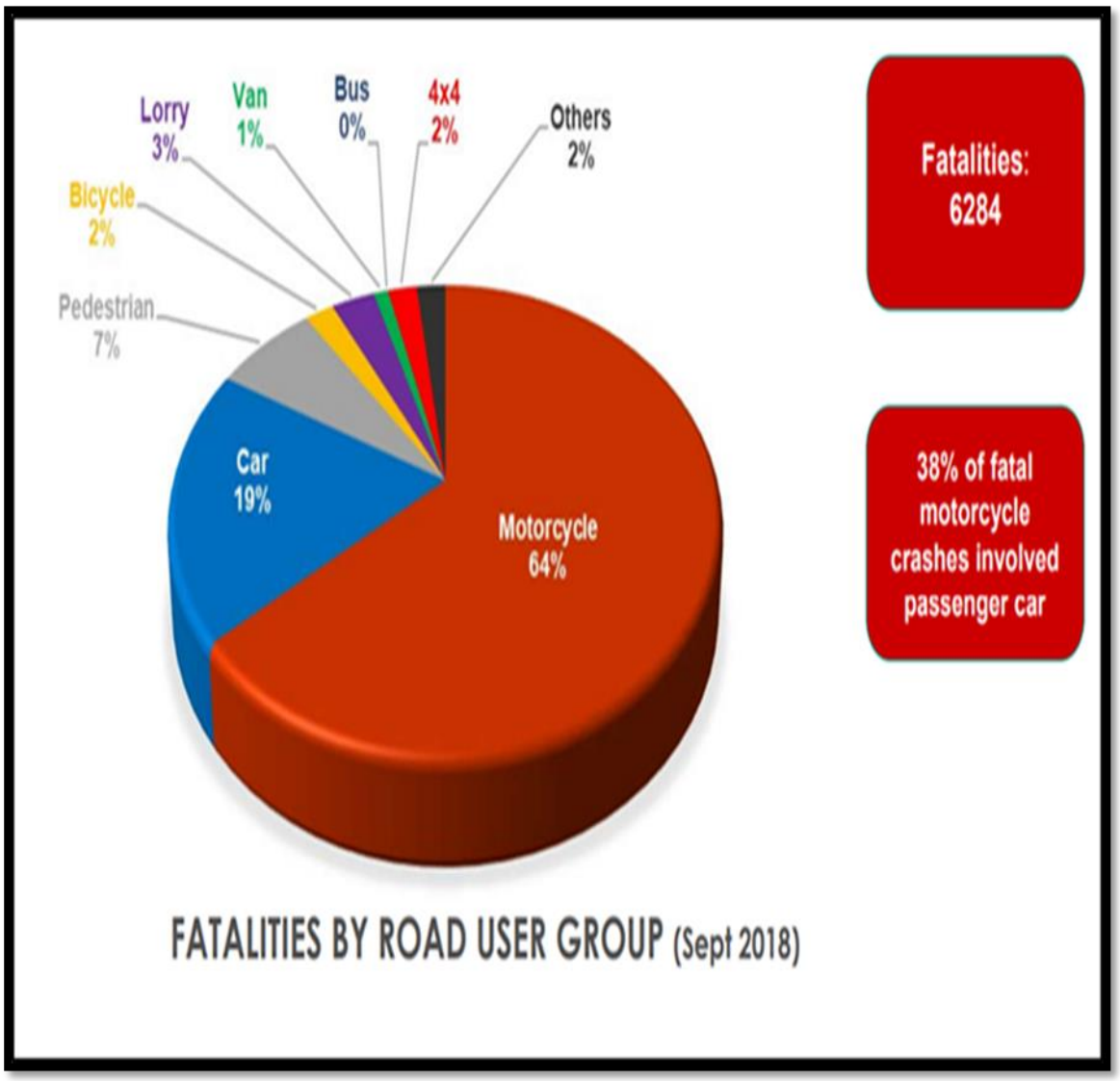

Figure 1.1: **Fatalities By Road User(Sept 2018)**

Table 1.1: **General Accident Statistics In Malaysia Data By MIROS**

GENERAL ROAD ACCIDENT STATISTICS IN MALAYSIA (1997 – 2017)

Year	Registered Vehicles	Population	Road Crashes	Road Deaths	Serious Injury	Slight Injury	Index Per 10,000 Vehicles	Index Per 100,000 Population	Indeks Per Billion VKT
1997	8,550,469	21,655,600	215,632	6,302	14,105	36,167	7.37	29.10	33.57
1998	9,141,357	22,179,500	211,037	5,740	12,068	37,896	6.28	25.80	28.75
1999	9,929,951	22,711,900	223,166	5,794	10,366	36,777	5.83	25.50	26.79
2000	10,598,804	23,263,600	250,429	6,035	9,790	34,375	5.69	26.00	26.25
2001	11,302,545	23,795,300	265,175	5,849	8,680	35,944	5.17	25.10	23.93
2002	12,068,144	24,526,500	279,711	5,891	8,425	35,236	4.90	25.30	22.71
2003	12,819,248	25,048,300	298,653	6,286	9,040	37,415	4.90	25.10	22.77
2004	13,828,889	25,580,000	326,815	6,228	9,218	38,645	4.52	24.30	21.10
2005	15,026,660	26,130,000	328,264	6,200	9,395	31,417	4.18	23.70	19.58
2006	15,790,732	26,640,000	341,252	6,287	9,253	19,885	3.98	23.60	18.69
2007	16,813,943	27,170,000	363,319	6,282	9,273	18,444	3.74	23.10	17.60
2008	17,971,907	27,730,000	373,071	6,527	8,868	16,879	3.63	23.50	17.65
2009	19,016,782	28,310,000	397,330	6,745	8,849	15,823	3.55	23.80	17.27
2010	20,188,565	28,910,000	414,421	6,872	7,781	13,616	3.40	23.80	16.21
2011	21,401,269	29,000,000	449,040	6,877	6,328	12,365	3.21	23.70	14.68
2012	22,702,221	29,300,000	462,423	6,917	5,868	11,654	3.05	23.60	13.35
2013	23,819,256	29,947,600	477,204	6,915	4,597	8,388	2.90	23.10	12.19
2014	25,101,192	30,300,000	476,196	6,674	4,432	8,598	2.66	22.00	10.64
2015	26,301,952	31,190,000	489,606	6,706	4,120	7,432	2.55	21.50	9.60
2016	27,613,120	31,660,000 e	521,466 a	7,152	4,506	7,415	2.59	22.60	10.70 a
2017	28,738,194	32,049,700 e	533, 875	6,740	3.310	6,539	2.34	21.06	TBP

e = Estimated value from Department of Statistics Malaysia
a = Media Statement
NA = Not Available (The official figures are not available yet)
TBP = To Be Published

In Malaysia's road accident involving the motorcycle is the highest number compared to other vehicle types such as a car, taxi, truck, bus, and a lorry. By the way, the road accident involving motorcyclist fatalities can occur in many kinds of factors such as riding patterns such as perception, carelessness while driving, and defective motorcycle operation and no less involved in illegal racing. However, it does not matter if the improvement between the motorcyclist and the motorcycle system is to be applied.

The total number of motorcycle accidents occurring each year is increasing from 0.05 percent in 2007-2008 to 9.5 percent in 2015-2016, according to the traffic branch Bukit Aman. That means that from 2007-2016, the total motorcycle accident is increasing by 1 percent each year. In Malaysia 2007-2016, Table 1.2 revealed total vehicles involved in road accidents by type of vehicle.

Table 1.2: **The Total Vehicle Involved In Road Accident**

TAHUN *Year*	MOTOSIKAL *Motorcycle*	MOTOKAR *Motocar*	VAN *Van*	BAS *Bus*	LORI *Lorry*	PEMACU 4 RODA *Four Wheel Drive*	TEKSI *Taxi*	BASIKAL *Bicycle*	LAIN-LAIN *Others*	JUMLAH *Total*
2007	111,765	426,941	21,109	10,285	47,696	21,823	8,809	2,690	14,909	**666,027**
2008	111,819	435,665	20,392	9,356	48,250	22,793	8,769	2,463	11,571	**671,078**
2009	113,962	472,307	19,220	9,380	46,724	23,581	8,669	2,486	9,294	**705,623**
2010	120,156	511,861	18,788	9,580	50,438	25,777	9,899	2,178	11,756	**760,433**
2011	129,017	546,702	17,916	9,986	53,078	30,828	11,197	2,033	16,394	**817,151**
2012	130,080	655,813	15,143	10,617	42,158	32,891	11,680	1,310	21,540	**921,232**
2013	121,700	632,602	17,148	10,123	39,276	52,512	11,651	1,370	15,441	**901,823**
2014	125,712	617,578	15,041	9,193	37,481	41,464	10,856	1,275	27,743	**886,343**
2015	123,408	625,758	14,565	8,804	34,942	46,163	9,591	1,119	29,924	**894,274**
2016	135,181	670,935	14,470	9,462	35,064	48,907	8,399	1,318	36,833	**960,569**

Source : Traffic Branch Bukit Aman

1.2 Problem statement

An accident occurred mostly at night and during heavy raining conditions when the driver's view was disturbed by the environment, and the motors are invisible to find from a distance beyond sighting by tail light. Average sighting distance is 10 to 20 meters, less than 10 meters rain, and less than 3 meters of heavy rain or storm. The safety helmet that been sell in the market was purposed to protect the head only.

Today's helmet that only protects the head and face against injuries does not function sufficiently. Reflected helmet or brightly color helmet are not interested in young people whose simples, dark color helmet always wants to be used mainly in black. It is not advisable to wear a Black and Dark Helmet because the motorcyclist cannot find the driver at night or in low light.

Other than that, there are always accidents following the first accident. As is known, if the other driver can see the signal light from the accident area, the other road user will decelerate the speed of the vehicle, then the following accident can be prevented.

1.3 Objective

The objectives of this project are:

a) To design improvement of third brake and signal system using RFID and Arduino

b) To fabricate the brake and signal system for a smart helmet.