



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

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**FACULTY OF MECHANICAL AND MANUFACTURING ENGINEERING
TECHNOLOGY**

2019

BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

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

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

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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.

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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 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:

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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 dark 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 untuk 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 kenderaan 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

	PAGE
DECLARATION	iii
APPROVAL	iv
ABSTRACT	v
ABSTRAK	vi
DEDICATION	vii
ACKNOWLEDGMENTS	viii
CHAPTER 1: INTRODUCTION	1
1.1 Background	1
1.2 Problem statement	5
1.3 Objective	5
1.4 Scope of project	6
CHAPTER 2: LITERATURE REVIEW	7
2.0 Overview	7
2.1 Accident statistic	7
2.2 History of helmet	16
2.2.1 Type of helmet	17
2.3 Current technologies	21
2.3.1 Product design specification previous product	22
2.4 Wireless technology	25
2.4.1 History of radio frequency identification(RFID)	28

2.4.2	RFID range	29
2.4.3	Types of RFID	31
CHAPTER 3: METHODOLOGY		34
3.0	Overview	34
3.1	General methodology	35
3.2	General methodology flowchart	36
3.3	Concept design	37
3.4	Illustrated diagram of the wireless system	39
3.5	Components for the fabrication product	40
3.6	Led blinking system	41
3.7	Wireless connection	42
3.8	Electrical system fabrication process	46
3.8.1	Transmitter for motorcycle	46
3.8.2	Receiver for helmet	47
CHAPTER 4: PRELIMINARY RESULT		48
4.1	Understand the wireless system	48
4.2	Survey form	50
4.2.1	Gender survey for motorcyclist	50
4.2.2	Survey for age of motorcyclist	50
4.2.3	Addition light for motorcycle helmet	51
4.2.4	Type of light that been choose by responses	51

4.2.5.	Type of battery that been choose by responses	52
4.2 .6	Design that been choose by response	52
4.2.7	Brightness rating of the led stop light	53
4.3	Product design specifications	54
4.4	Prototype of smart helmet	55
4.5	Finite element analysis	56
4.6	Visibility test	69
4.7	Graph of visibility	64
4.8	Discussion and analysis	67
CHAPTER 5: CONCLUSION AND RECOMMENDATION		69
5.1	Conclusion	69
5.2	Recommendation	70
REFERENCES		71
APPENDIX 1		76
APPENDIX 2		78
APPENDIX 3		80
APPENDIX 4		84

LIST OF TABLES

TABLE	TITLE	PAGE
Table 1.1	General accident statistic in Malaysia data by MIROS	3
Table 1.2	The total vehicle involved in a road accident	4
Table 2.1	Comparison of road accident in Malaysia and Sweden	9
Table 2.2	Motorcycle fatalities by weather and light conditions	13
Table 2.3	Product design specification previous product	22
Table 2.4	Comparison Wireless protocols	28
Table 2.5	RFID Frequency Ranges (M. Cooney, 2007)	30
Table 2.6	Evaluation taq (Farooq et al.2014)	31
Table 2.7	Pros and cons of various RFID tags system	33
Table 3.1	List component of fabrication	40
Table 4.1	Product design specification	54
Table 4.2	Data analysis	56

LIST OF FIGURES

FIGURE	TITLE	PAGE
Figure 1.1	Fatalities by road user(sept 2018)	2
Figure 2.1	Distribution of fatality by mode of transport	8
Figure 2.2	Overall motorcycle fatalities and travelled between 1998 and 2009	10
Figure 2.3	Cumulative percentage of motorcycle fatalities by month from 2000 to 2009	12
Figure 2.4	Cumulative percentages of motorcycle fatalities by day from 2000 to 2009	12
Figure 2.5	Cumulative percentages of motorcycle fatalities by time of the day from 2000 to 2009	13
Figure 2.6	Road traffic injuries according world health organization(WHO)	15
Figure 2.7	Evolution of helmet	16
Figure 2.8	The first motorcycle helmet	17

Figure 2.9	Type of helmet	17
Figure 2.10	Full face helmet	18
Figure 2.11	Off road helmet	18
Figure 2.12	Modular helmet	19
Figure 2.13	Open face or $\frac{3}{4}$ helmet	19
Figure 2.14	Half helmet	20
Figure 2.15	LED brake light and signal light on helmet	21
Figure 2.16	Transmitter assembly of the brake and signal system	23
Figure 2.17	Receiver assembly of the brake and signal system	24
Figure 2.18	Bluetooth specification	26
Figure 2.19	Comparison Wi-Fi and Bluetooth	27
Figure 2.20	RFID over the year(Landt,2005)	29
Figure 3.1	Flowchart of the project	36
Figure 3.2	Design 1	37
Figure 3.3	Design 2	37
Figure 3.4	Design 3	38
Figure 3.5	Design 4	38
Figure 3.6	Illustrated of wireless system	39
Figure 3.7	Arduino LED blinking coding	42

Figure 3.8	NRFL24L01 connect with Arduino	43
Figure 3.9	Code for transmitter	44
Figure 3.10	Code for receiver	45
Figure 3.11	Transmitter circuit	46
Figure 3.12	Receiver circuit	47
Figure 4.1	Brake light was applied	48
Figure 4.2	Left signal light was turn on	49
Figure 4.3	Right signal light was turn on	49
Figure 4.4	Percentage of gender	50
Figure 4.5	Percentage of age	50
Figure 4.6	Percentage of prefer of additional light	51
Figure 4.7	Percentage type of light	51
Figure 4.8	Percentage of type of battery	52
Figure 4.9	Percentage of the selected design	52
Figure 4.10	Percentage of brightness	53
Figure 4.11	Final product of the smart safety helmet model system	55
Figure 4.12	Prototype model	56
Figure 4.13	Mesh model	57
Figure 4.14	Solid bodies	57

Figure 4.15	Material properties	58
Figure 4.16	Von misses stress	58
Figure 4.17	Resultant displacement	59
Figure 4.18	Equivalent strain	59
Figure 4.19	Normal condition in fine weather with tail light	60
Figure 4.20	Rainy condition when brake light been applied	61
Figure 4.21	The brake been applied at night with road lamp condition	61
Figure 4.22	The brake been applied at night without road lamp condition	62
Figure 4.23	Right signal been applied	62
Figure 4.24	Left signal been applied	63
Figure 4.25	Graph distance Vs visibility fine condition at afternoon	64
Figure 4.26	Graph distance Vs visibility fine condition at evening	65
Figure 4.27	Graph distance Vs visibility fine condition at night without road lamp	65
Figure 4.28	Graph distance Vs visibility fine condition at night with road lamp	66
Figure 4.29	Graph distance Vs visibility fine condition at rainy condition	66
Figure 4.30	Graph distance Vs visibility for overall conditions	67

LIST OF APPENDICES

APPENDIX	TITLE	PAGE
Appendix 1	Gantt chart for PSM 1 and PSM 2	76
Appendix 2	Transmitter code	78
Appendix 3	Receiver code	80
Appendix 4	Sample data collection for visibility test	84

LIST OF SYMBOLS

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

LIST OF ABBREVIATIONS

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,

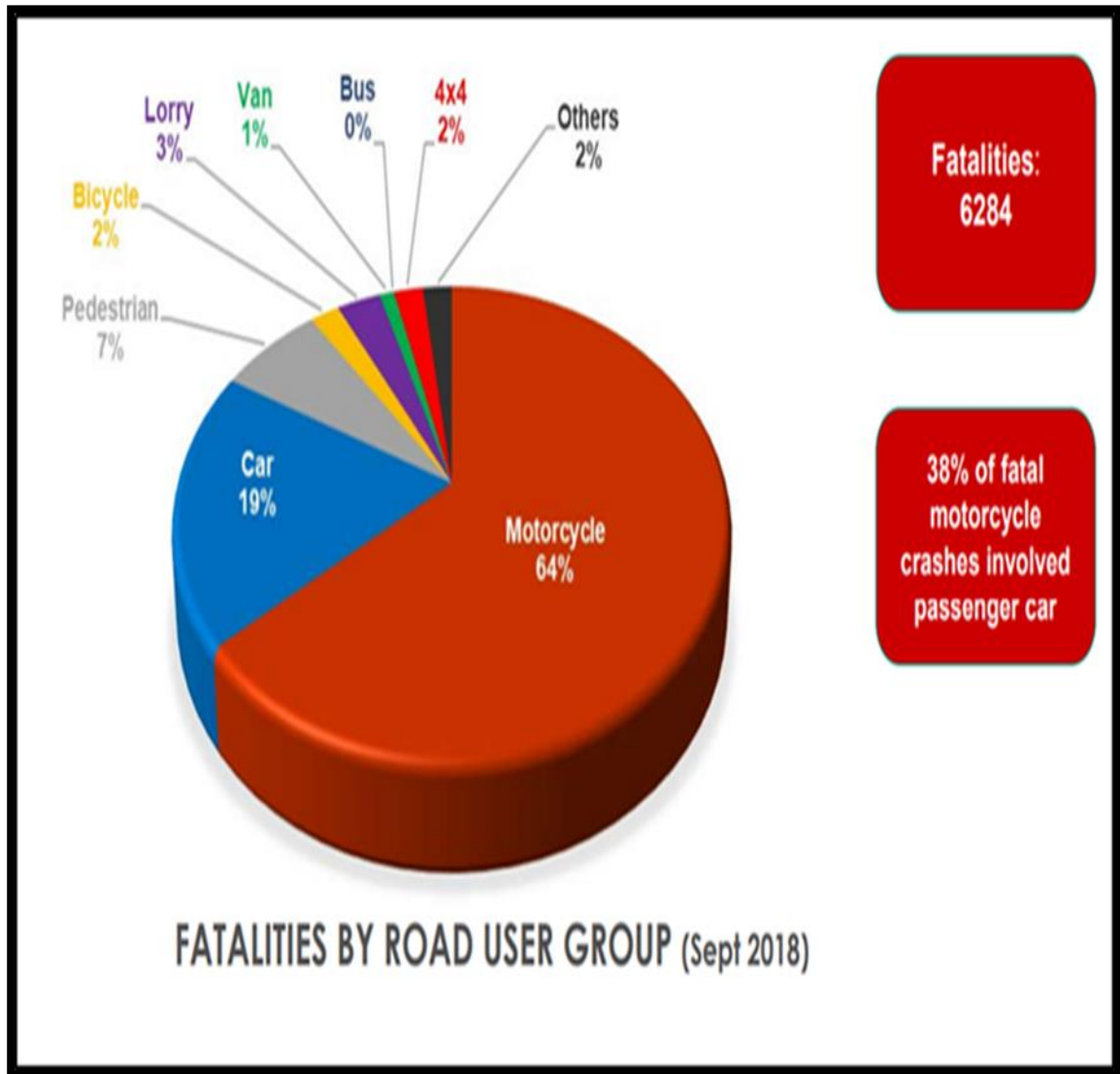


Figure 1.1: Fatalities By Road User(Sept 2018)

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	MOTOSIRAL Motorcycle	MOTORAR Motocar	VAN Van	BAS Bus	LORI Lorry	PEMACU 4 RODA Four Wheel Drive	TERSI Taxi	BASIRAL 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.