UNIVERSITI TEKNIKAL MALAYSIA MELAKA

MODIFICATION OF HEADLIGHT INTENSITY CONTROL BASED ON DISTANCE BY USING BLUETOOTH

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

by

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FACULTY OF ENGINEERING TECHNOLOGY

2017

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

TAJUK: **MODIFICATION OF HEADLIGHT INTENSITY CONTROL BASED ON DISTANCE BY USING BLUETOOTH**

SESI PENGAJIAN: **2017/18 Semester 2**

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APPROVAL

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfilment of the requirements for the degree of Bachelor of Electronic Engineering Technology (Telecommunications) with Honours. The member of the supervisory is as follow:

.....

(Project Supervisor)

ABSTRAK

Lampu depan adalah penting untuk setiap kereta terutamanya pada waktu malam untuk mencahayakan sekeliling jalan raya semasa memandu. Pemandu menggunakan lampu tinggi untuk pencahayaan yang lebih jelas apabila keadaan jalan raya terlalu gelap. Sesetengah pemandu membukakannya secara tidak sengaja atau mereka terlupa untuk menukarnya kembali ke lampu rendah selepas digunakan telah menyebabkan tidak selesa kepada pengguna jalan raya yang bergerak dari arah yang bertentangan. Dalam projek ini, sistem kawalan kecerahan lampu kereta dengan menggunakan modul Bluetooth. Lampu depan akan beralih dari lampu tinggi ke lampu rendah apabila modul Bluetooth merangkaikan sambungan dengan bluetooth modul lain. Arduino UNO, modul Bluetooth, dan lampu LED telah digunakan terutamanya dalam mereka bentuk sistem ini. Perisian Arduino 1.8.3 digunakan untuk pengaturcaraan Arduino UNO. Prestasi modul Bluetooth berdasarkan kelajuan akan diuji dan dianalisiskan dalam hasil analisis.

ABSTRACT

Headlight is vital for every car especially night to illuminate the road surrounding when driving. Drivers use high beam light for a clearer illumination while the road condition is too dazzling. Some will accidently switch it on or forget to switch it back to low beam light after used which causes uncomfortable to the road users who are travelling from the opposite direction. In this project a system of car headlight intensity control by using Bluetooth is designed. The headlight will switch from high beam light to low beam light once Bluetooth detects a connection from another Bluetooth. Arduino UNO, Bluetooth module, and LEDs are mainly used in designing this system. Arduino 1.8.3 software is used for programming the Arduino UNO. The performance of the Bluetooth module based on the speed will be tested and illustrated in analysis result.

DEDICATIONS

To my beloved parents

To my respected supervisor and all lecturers

And not forgetting to all my friends

For their

Love, Sacrifice, Encouragement, and Best Wishes

ACKNOWLEDGEMENT

Firstly, I would like to express my deep sense of gratitude to my respected supervisor, Mr Win Adiyansyah Indra for the unfailing support, valuable help and guidance all along of bachelor degree project. I am thankful to him for the encouragement that he has given in completing this project. Secondly, I would like to express deepest appreciation to my entire family in encouraging and supporting me mentally and financially for the project. Furthermore, I would like to thank my dearest friends that gave advice and support in completing this project. Last but not least, I would also like to thank for the helps and cooperation of everyone who is involved in this project either directly or indirectly.

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INTRODUCTION

1.1 Background

Nowadays, technology is developing and becomes more advance to improve and comfort human lifestyle. Humans rely on technology. For instant, people use technology in communication, transportation, and entertainment. Wireless communication is one of the technology which using radio waves to transfer information without using any cable. This technology is usually used in telecommunication system for transmit and receive signals.

Bluetooth is one of the wireless technologies which can transfer information with a short range. Bluetooth is commonly used in the electronic devices such as computer, mobile device, and entertainment devices. It costs low and easy to find in the market. In this project, Bluetooth will be applied in a car to control the headlamp of the car.

Car is very common for people in this century. It can be said that there is at least one car in a family. The safety of a car is always concerned for the car buyer and the car manufacturer. Roughly one third of all traffic accidents happen after dark, even though there is considerably less traffic at night than during the day. Accidents during the hours of darkness also result in a particularly high proportion of fatalities (the risk of getting killed in an accident at night is almost twice as high as during the day) (Nutt & Kher 2012). It may cause by poor lighting condition while driving.

Car headlamp is designed and attached in front of the car to emit light during night time for giving illumination to the road users. A normal car should have two headlamps that attached in front of the car and the headlamp will contain high beam lamp and low beam lamp. Headlamps are typically controlled to alternately generate low beams and high beams. Low beams provide less illumination and are used at night to illuminate the forward path when other vehicles are present. High beams

provide significantly more light and are use to illuminate the vehicle's forward path when other vehicles are not present (Asaduzzaman et al. 2013).

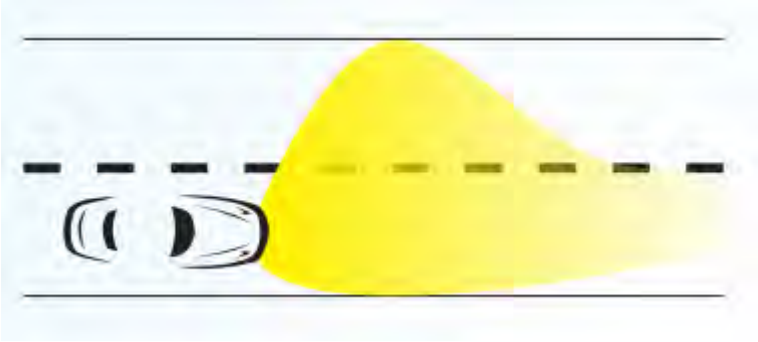

Figure 1.1: Low beam

Figure 1.2: High Beam

However, some people may accidently switch on the high beam and they do not realise. It causes other road users that opposite to them cannot see clearly due blindness while driving. It may harm others eyes and causes accident. Therefore, an automatic switching high beam and low beam is needed to improve safety to the other road users and give a convenient to the drivers.

This project will design a method to control the brightness of the car headlamp. The high beam and low beam can be switched automatically when facing cars at night to reduce harmful of eyes and gain safety of road users.

1.2 Problem Statement

Accidents on road always happen. Many lives are lost due to the careless of road users. Not only day time, accident also happens at night although there is less traffic. One of the reasons that cause accident at night is the poor lighting condition. Drivers may not have a clear illumination. Hence, headlamp is designed to improve the visibility of the drivers. The illumination had improved for the drivers but it also reduces the visibility of the opposite road users.

Drivers usually use low beam headlamp to illuminate the surroundings on the road and use the high beam headlamp while the road surroundings is too dazzling. People may accidently switch on the headlamp from low beam to high beam while driving which will actually harm the eyes of road users that are driving in front of them. This is due to people will have some moment of blindness when the facing a strong light suddenly. It makes others can't see clearly through their sight.

Table below shows that the general road accident data in Malaysia from 1997 to 2016 (Anon n.d.).

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	8,550,469.00	21,665,600.00	215,632.00	6,302.00	14,105.00	36,167.00	7.37	29.10	33.57
1998	9,141,357.00	22,179,500.00	211,037.00	5,740.00	12,068.00	37,896.00	6.28	25.80	28.75
1999	9,929,951.00	22,711,900.00	223,166.00	5,794.00	10,366.00	36,777.00	5.83	25.50	26.79
2000	10,598,804.00	23,263,600.00	250,429.00	6,035.00	9,790.00	34,375.00	5.69	26.00	26.25
2001	11,302,545.00	23,795,300.00	265,175.00	5,849.00	8,680.00	35,944.00	5.17	25.10	23.93
2002	12,068,144.00	24,526,500.00	279,711.00	5,891.00	8,425.00	35,236.00	4.90	25.30	22.71
2003	12,819,248.00	25,048,300.00	298,653.00	6,286.00	9,040.00	37,415.00	4.90	25.10	22.77
2004	13,828,889.00	25,580,000.00	326,815.00	6,228.00	9,218.00	38,645.00	4.52	24.30	21.10
2005	15,026,660.00	26,130,000.00	328,264.00	6,200.00	9,395.00	31,417.00	4.18	23.70	19.58
2006	15,790,732.00	26,640,000.00	341,252.00	6,287.00	9,253.00	19,885.00	3.98	23.60	18.69
2007	16,813,943.00	27,170,000.00	363,319.00	6,282.00	9,273.00	18,444.00	3.74	23.10	17.60
2008	17,971,907.00	27,730,000.00	373,071.00	6,527.00	8,868.00	16,879.00	3.63	23.50	17.65
2009	19,016,782.00	28,310,000.00	397,330.00	6,745.00	8,849.00	15,823.00	3.55	23.80	17.27
2010	20,188,565.00	28,910,000.00	414,421.00	6,872.00	7,781.00	13,616.00	3.40	23.80	16.21
2011	21,401,269.00	29,000,000.00	449,040.00	6,877.00	6,328.00	12,365.00	3.21	23.70	14.68
2012	22,702,221.00	29,300,000.00	462,423.00	6,917.00	5,868.00	11,654.00	3.05	23.60	13.35
2013	23,819,256.00	29,947,600.00	477,204.00	6,915.00	4,597.00	8,388.00	2.90	23.10	12.19
2014	25,101,192.00	30,300,000.00	476,196.00	6,674.00	4,432.00	8,598.00	2.66	22.00	10.64
2015	26,301,952	31,190,000	489,606	6,706	4,120	7,432	2.55	21.5	9.6
2016	27,613,120	31,660,000[e]	521466[a]	7152[a]	NA	NA	2.59	22.6	NA

Table 1.1: Road accident data in Malaysia from 1997 to 2016

e = estimated value from Department of Statistics Malaysia

a = media statement

NA = Not available (The official figures are not available yet)

vkt = vehicle kilometres traveled

1.3 Objectives

The objectives of this project based on the problem statement is

1. To study the concept of car headlight intensity control using Bluetooth
2. To design an automatic headlight intensity system by using Bluetooth
3. To improve the safety of road user

In this project, the objectives include of study the concept of car headlight intensity control using Bluetooth. In this part, the signal of transmitting and receiving will be demonstrated. The operation of Bluetooth in transmit and receive signal also will be shown. The second objective is to design an automatic headlight intensity system based on Bluetooth. The third purpose is to improve the safety of road user by using this product.

1.4 Scope

The project has divided into two parts. The first part of the project is to demonstrate the signal from transmitting and receiving it between both cars in a certain distance by using Bluetooth. The second part is to design an automatic lighting system after detect the signal from other cars. The project will be made in a prototype. This project will mainly use remote control cars, Bluetooth transmitter and receiver, Arduino UNO, and LEDs.

In this project, Bluetooth PAN (Personal Area Network) will be used. It can compose up to 8 devices (one-to-many network). It can be reached for about 100m

under ideal circumference. The range between Bluetooth and the time of the Bluetooth to react will be maximize and minimize.

This project will be made to be a plug and play hardware. So it can be installed in different type of car. This project is mainly concerned about installation of Bluetooth application in the car light. This project also concern about the reduction in accident rate.

CHAPTER 2
LITERATURE REVIEW

2.1 Introduction

In this chapter, literature review will be covered. All of the research and information that related to this project will be studied and recorded in this chapter. The project title is Modification of Car Headlight Intensity Based On Distance by Using Bluetooth. So in this chapter, all information and researches about history, operation, and development of Bluetooth technology and car headlamp will be listed out.

2.2 Bluetooth

Figure 2.1: The Logo of Bluetooth

Bluetooth is a wireless technology with short range radio frequency which is designed for communication between devices without using any cable or wire.

2.2.1 History of Bluetooth

Bluetooth standard's development was conceived and introduced in 1994 by Ericsson Mobile Communications (Eeson 2001). The name of Bluetooth is came from Harald Blaotland who born in AD 908. This technology was developed by 5 companies which included Ericsson, Toshiba,

IBM, Nokia and Intel (Verma et al. 2015). This five companies form a group which named the Bluetooth Special Industry Group (SIG) to build up the Bluetooth with 2.4GHz ISM (Industrial, Science, Medical) band. The Bluetooth specification was built up and introduced in 1994. The developers were Jaap Haartsen and Sven Mattisson in Sweden. Bluetooth is specified depends on frequency-hopping spread spectrum technology (Anon n.d.). The name of Bluetooth is officially adopted in 20 May, 1998. The Bluetooth 1.0 specification was released in 1999 (Anon n.d.).

2.2.2 OSI Network Model

Open Systems Interconnect (OSI) model is used to give a parameter for the development of principles for interconnecting computing devices. It separates between device to device connections into seven layers.

Table below shows the description and the standard and protocols used in each layer.

Layer	Description	Standards and Protocols
7–Application Layer	To identify the condition of service to applications	HTTP, FTP, SNMP, POP3, SMTP
6–Presentation Layer	To manage the translation of incoming and outgoing data	SSL
5 – Session Layer	To manage the communication between the presentation layers of the sending and receiving computers.	ASAP, SMB
4 – Transport Layer	To guarantee reliability of data transfers, error healing and manage data flow. All the data packets should have arrived	TCP, UDP
3 – Network Layer	To describe the management of network	IPv4, IPv6, ARP