UNIVERSITI TEKNIKAL MALAYSIA MELAKA

OPTIMIZING TRAFFIC LIGHT SYSTEM FOR EMERGENCY VEHICLE

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

by

SAMSIAH BINTI ABDUL HAMID

B071310201

910325025648

FACULTY OF ENGINEERING TECHNOLOGY

2016

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

TAJUK: **Optimizing Traffic Light System For Emergency Vehicle**

SESI PENGAJIAN: **2016/17 Semester 1**

Saya **SAMSIAH BINTI ABDUL HAMID**

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:

_____ _____

Cop Rasmi:

Alamat Tetap:

258, felda teloi kanan

09300 Kuala Ketil,

Kedah.

Tarikh: _____

Tarikh: _____

** 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.

FAKULTI TEKNOLOGI KEJURUTERAAN
Tel : +606 234 6623 | Faks : +606 23406526

Rujukan Kami (Our Ref) :
Rujukan Tuan (Your Ref) :

24 DEC 2016

Pustakawan
Perpustakaan UTeM
Universiti Teknikal Malaysia Melaka
Hang Tuah Jaya,
76100 Durian Tunggal,
Melaka.

Tuan/Puan,

PENGKELASAN LAPORAN PSM SEBAGAI SULIT/TERHAD LAPORAN PROJEK SARJANA MUDA TEKNOLOGI KEJURUTERAAN PEMBUATAN (Bachelor Degree of Computer Engineering Technology (Computer System) (Hons.): SAMSIAH BINTI ABDUL HAMID

Sukacita dimaklumkan bahawa Laporan PSM yang tersebut di atas bertajuk ***"OPTIMIZING TRAFFIC LIGHT SYSTEM FOR EMERGENCY VEHICLE"*** mohon dikelaskan sebagai *SULIT / TERHAD untuk tempoh LIMA (5) tahun dari tarikh surat ini.

2. Hal ini adalah kerana IANYA MERUPAKAN PROJEK YANG DITAJA OLEH SYARIKAT LUAR DAN HASIL KAJIANNYA ADALAH SULIT.

Sekian dimaklumkan. Terima kasih.

Yang benar,

_____
Tandatangan dan Cop Penyelia

* Potong yang tidak berkenaan

NOTA: BORANG INI HANYA DIISI JIKA DIKLASIFIKASIKAN SEBAGAI SULIT DAN TERHAD. JIKA LAPORAN DIKELASKAN SEBAGAI **TIDAK TERHAD**, MAKA BORANG INI **TIDAK PERLU DISERTAKAN** DALAM LAPORAN PSM.

DECLARATION

I hereby, declared this report entitled "Optimizing Traffic Light System For Emergency Vehicle" is the results of my own research except as cited in references.

Signature **:…….**
Author's Name **: SAMSIAH BINTI ABDUL HAMID**
Date **: 24 DECEMBER 2016**

APPROVAL

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

……

(Encik Zulhasnizam Bin Hasan)

ABSTRAK

Lampu isyarat merupakan satu sistem yang penting pada zaman sekarang. Ini kerana bertambahnya penggunaan penggangkutan di sesebuah negara yang memerlukan lampu isyarat sebagai satu sistem yang dapat mengawal kesesakkan lalu lintas. Bagi kenderaan kecemasan pula ia begitu sukar untuk mengatasi masalah terutama apabila berlakunya hal- hal kecemasan di kawasan simpang tiga atau empat yang sentiasa sibuk dengan kenderaan yang menuju ke destinasi masing-masing. Lebih sukar lagi laluan khas tidak disediakan untuk kenderaan kecemasan seperti ambulans, bomba, dan juga polis ketika lampu isyarat merah. Untuk mengatasi masalah ini, satu sistem baru direka bentuk untuk mengatasi masalah yang berlaku terutama pada ambulans. Dengan menggunakan sistem arduino and GPS pada aplikasi android di telefon pintar, ia akan memudahkan kawalan lampu isyarat untuk kenderaan kemasan (ambulans) apabila berlakunya kecemasan. Lampu isyarat merah akan menukar hijau sekiranya kenderaan kecemasan (ambulans) melalui jalan yang mengesan kedudukan kenderaan kecemasan (ambulans) melalui GPS butang yang di pasang pada telefon pintar. Di samping itu, sistem ini juga dapat membantu mengurangkan kesesakan dan kebarangkalian kemalangan yang berlaku di lampu isyarat simpang empat oleh kerana kenderaan lain berhimpit- himpit untuk memberi laluan kepada kenderaan kecemasan (ambulans). Oleh itu, sistem ini mampu memberi impak kepada masalah lalu lintas untuk kenderaan kecemasan dengan lebih baik malah dapat mengurangkan kesesakan yang berlaku.

ABSTRACT

Traffic light is an important system today. This is due to the increasing use of transport of in a country that needs a traffic light system that can control traffic congestion. For emergency vehicles is it so difficult to overcome, when there is an emergency matter on busy junction with vehicles heading to their destinations. Besides that, the special lanes are not provided for emergency vehicles such as ambulances, fire brigade and police when the traffic light in the red condition. To overcome this problem, a new system designed to solve the problems which occur driving emergency on the road. By using Arduino Uno and GPS from mobile phone using android application, it will make it easier to control traffic lights for vehicle emergency (ambulance) upon the occurrence of an emergency. The system would made red traffic light green if the emergency vehicle (ambulance) in range of detecting the position of the emergency vehicle (ambulance) by GPS via "press" button has installed on the smartphone. In addition, this system can also help reduce congestion and the probability of an accident occurring at a traffic light junction as another vehicle had to huddle to give way for emergency vehicles (ambulance). Therefore, this system could have an impact on traffic problems for emergency vehicles and even better to reduce congestion.

DEDICATION

To my beloved parents Abdul Hamid Bin Hussin and Fatimah Binti Abdullah and for my beloved family with support me, also do not forget to any person help to settle my project. Finally, thanks to my supervisor always guide me until the completion of the project.

ACKNOWLEDGEMENT

In the name of Allah S.W.T, the most merciful and compassionate, praise to Allah the lord of universe and may blessing and peace of Allah be upon his messenger Muhammad S.A.W. First, and foremost thank to Allah for giving me wellness and ideas to do this project. Without any of it, I surely cannot complete this project in the time given.

I would like to express my appreciation to my supervisor of the project, Encik Zulhaznizam Bin Hasan and lecturers who help and guide to provide sound advice and guidance to me and also the provision of valuable time management, motivation and patience in the time period for the completion of this project.

Finally, I would like to express my grateful and sent a friend to thank my family and above all moral and financial support. For those who I forgot to mention, please forgive me. I appreciate everything you've done for me.

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

GPS	-	Global Positioning System
SMS	-	Short Message Service
GPRS	-	General Packet Radio Service
TCP	-	Transmission Control Protocol
USB	-	Universal Serial Bus
GSM	-	Global System For Mobile Communications
IDE	-	Iintegrated Development Environment
DC	-	Direct Current
WEP	-	Wired Equivalent Privacy
WPA	-	Wi-Fi Protected Access
SPI	-	Serial Peripheral Interface
FTDI	-	Future Technology Devices International
ICSP	-	In-Circuit Serial Programming
PHP	-	Personal Home Page
RFID	-	Radio-Frequency Identification
FPGA	-	Fin Eld-Programmable Gate Array
FSM	-	Finite-State Machine
PLC	-	Programmable Logic Controller
WSN	-	Wireless Sensor Networks

CHAPTER 1

INTRODUCTION

1.0 Background

According to statistics released by the JPJ Malaysia in 2012 vehicles increased by 8% from 2011(Jalan 2012). The number of New Registered Motor Vehicles by State, 2011-2012 is 155,611 vehicle then increase to 172,608 vehicles in 2012. Statistic shows that the total of motor vehicles by type and state in Malaysia at 2013 was increase. From statistics in figure 1.0, the number of drivers accumulated by Year was increase. The increases number of vehicles is estimated to complicate traffic movement in the country. It also will increase the traffic congestion especially in the city. However, there also many factors of traffic congestion including people's behaviour or attitude, the behaviour of the general public and also the traffic light system.

Many effects was obtained because problem of the traffic light. Among that can focus is the issue of emergency vehicles. Emergency vehicles can categorize as ambulances, police cars, fire engines and also royal vehicles. As is common knowledge, the use of emergency vehicles on the road is not as often as private vehicles. This is because their uses are required when there are things emergencies only such as ambulance vehicles. Their use it is important in terms of time because it involves life and should be sent immediately to the hospital for emergency treatment.

Add a complicate, with existing traffic light system, a lot of the time allocated for allows ambulances to reach the destination .Therefore, a new system of traffic light in Melaka must create to solve that problem when ambulance have

emergency situation by using using Arduino Uno and monitor by android application by install software of MIT Invertor Application.

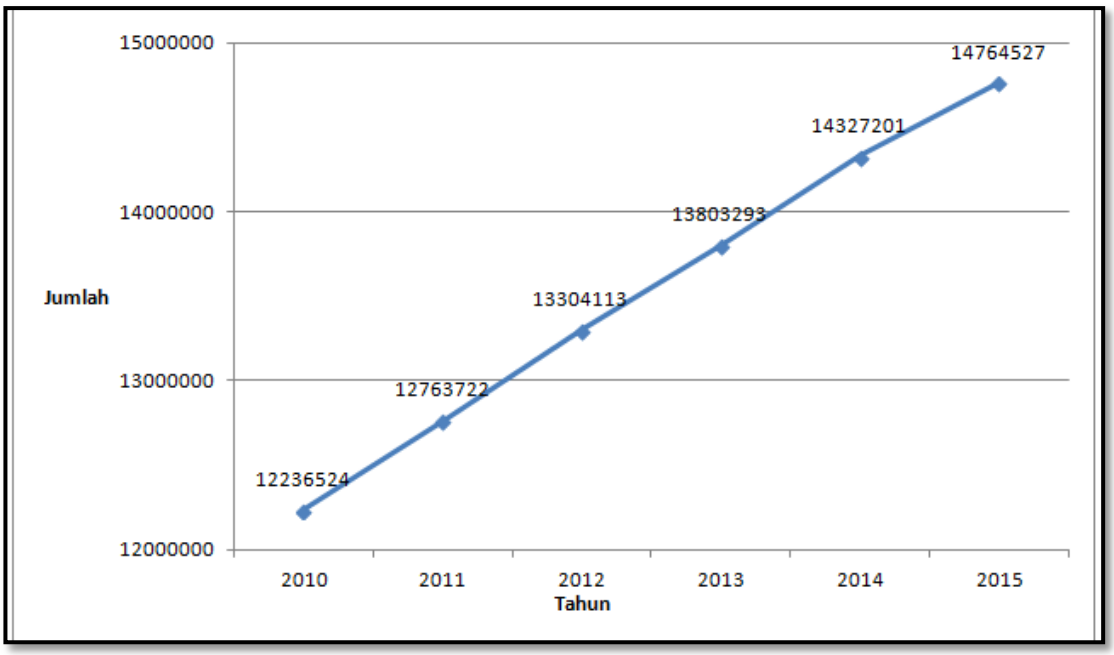

Figure 1.0: Statistics Number of Drivers Accumulated by Year

1.1 Objective

Therefore, many ideas ensued to overcome problem traffic congestion a worsening congestion can be reduced particularly because emergency vehicles. In addition, many facilities are also obtained. Such as:

1) To study problems related the traffic light around the road when the ambulance is have emergency situation
2) To develop new traffic light system and give smooth road to ambulance along the road
3) To analyze the possible time of ambulance when arrive at destination.

1.2 Scope of project

The scope of this project is include some sections such as equipment, place and what emergency vehicle those focus for this project.

The ambulance vehicle is use as main part of this project. Ambulance often travels on the road with an emergency situation to take or bring patient to hospital as soon as possible. However, ambulance can easily pass through the traffic jam when new intelligent system using Arduino Uno and GPS using android application.

This project aim when the ambulance through road with traffic lights area, the light will change to green (running) automatically within 2km to give space to ambulance to arrive at hospital as soon as possible. The ambulance comes through road at traffic lights, then with using button on android application to send location as longitude and latitude to the server. GPS sent location to server and the server request from GPS coordinate to calculate distance between traffic light and ambulance. Then, if distance between traffic light and ambulance is 2km the lane of traffic light will change red light to green light. Using Arduino Uno to activate traffic light system based on lane priority. After that, traffic light will change to normal at the certain time.

1.3 Problem Statement

The number of vehicles in Malaysia, increase every day. Traffic congestion and transportation delay especially on urban became big issue today. Therefore it is important to develop, verify simple and powerful systems that help the ambulance through along the road without risk to drive and patient inside emergency vehicle. One of the important parts along the road is traffic light which uses to control the traffic on the road. It also makes the traffic run smoothly and prevent congestion. However, there has a problem on traffic when any vehicles that have emergency such as ambulance, fire brigade and police will be stuck especially at the traffic light

junction. Sometimes ambulance cannot pass through the traffic light because of the traffic light still red and it make congestion happen.

The other problem is can be dangerous to ambulance such as incident with another vehicle in different lane when chasing time to quickly bring patient to hospital. Ambulance had also problems to take more time to get space when other vehicle in front of traffic light.

Therefore, the problem can be solve by make the new system on traffic light which is the traffic light will automatically change to the green light when emergency vehicle want to pass through it. This can be the best way to reduce congestion problem when emergency vehicles want to pass through the traffic light.

1.4 Significant of Study

According to increasing of vehicle in Malaysia, the effect will increase on the traffic congestion especially in the city. However, there also many factors of traffic congestion including people's behavior or attitude, the behavior of the general public and also the traffic light system. Many effects was obtained because problem of the traffic light. Among that can focus is the issue of emergency vehicles. Therefore, a new system of traffic light in Melaka must create to solve that problem when ambulance have emergency situation.

1.5 Structure of thesis

Chapter 1: Introduction

This chapter describes the intro about project. This chapter also include the initial overview of the project, the problem statement, objective project and also the project scope.

Chapter 2: Literature review

This chapter describe about journals that have been study and analysis to be made of research.

Chapter 3: Methodology

This chapter was explaining about method and process and component that needed for the project that will be create.

Chapter 4: Result and Discussion

This chapter was explaining about the success of the system depending on the experiment done at the previous chapter.

Chapter 5: Conclusion and Recommendation

This chapter discuss about the conclusion and suggestion for future prototype.

CHAPTER 2
LITERATURE REVIEW

This chapter is to consider about the article or journal that are linked about this project. This chapter covers the theory and applications of the project hardware, software, equipment and programming language that used in previous project that already done. There is some journal analysed to see a comparison between systems or application that use and has been created or will be create.

2.0 Hardware Implementation

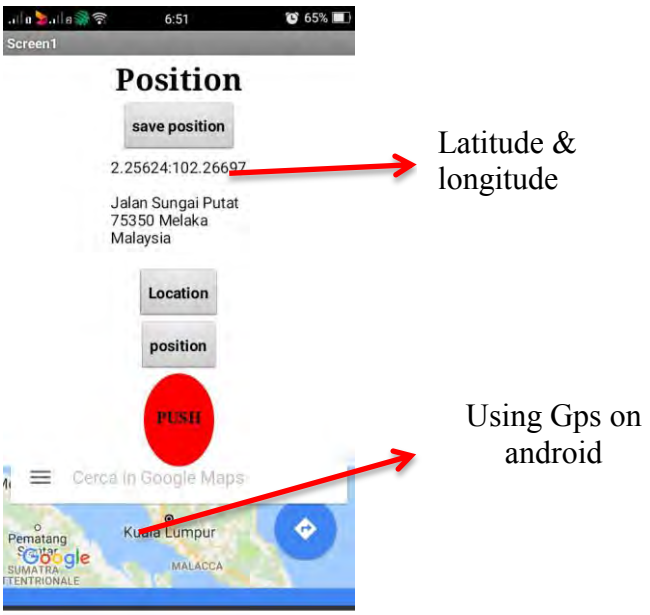

Figure 2.1: screenshot at android

GPS stands for Global Positioning System. Created by the US military and then made available for commercial use, it uses a series of satellites that allow the receiver to calculate its position on earth extremely accurately. A typical GPS receiver calculates its position using signals from four or more GPS satellites. This value is then changed into a form that is more user-friendly, such as latitude / longitude or location on a map, then displayed to the user.

One type of GPS is installed in a car / vehicle functioned to send the vehicle position data to HP the owner of the vehicle. Besides that, the GPS functions to secure the assets of our vehicles from theft through existing facilities. After that, the cars or vehicles can knows directly and in real time just passing hand phone us even though we are far away from our car and the heart will feel calmer left us a valuable asset.

Figure 2.2: Process GPS work

The advantages for GPS Tracker are Level high sensitive GPS chipset. Then, content location information via SMS and GPRS. Besides that, can improving vehicle safety, including the risk of theft can happened. Then, the owner can monitor the vehicle position whenever and wherever in real.

2.0.1 Arduino Uno

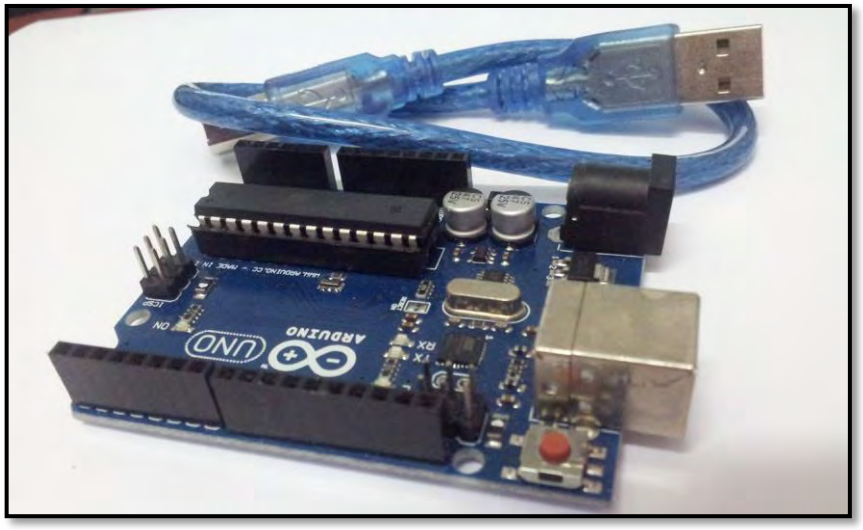

Figure 2.3: Arduino Uno

Arduino Uno is operator of micro single-board that is open-source for easy to use electronic in many fields. Besides that, the hardware of Arduino Uno have processor Atmel AVR and the software has a own programming. Arduino Uno is also platform hardware and software is easy to use. Have many type of arduino, but on this project use Arduino Uno.

The Arduino Uno has an 14 pin digital input / output, 6 analog inputs, a 16MHz ceramic resonator, USB connection, power input jack, ICSP header, and a reset button. With Arduino board, both the Arduino Uno, an Arduino Mega 2560, Arduino Nano, and Arduino Pro Mini, all this help to simplify the process of creating a series of microcontrollers. For example, suppose to are trying to do the programming to make led flashes every 1 second. It is enough to connect the cable from led to the terminal pin I / O is provided, do programming in software Arduino IDE (via Windows, Mac or Linux), and then upload it via USB, and you've managed to program the ATmega328 chip to do the job led light flashes every 1 second.