

UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

**AN APPLICATION OF GRAPH THEORY IN PLACE
A SENSOR AT TRAFFIC LIGHT**

NUR SHAMIMI SALEH HUDDIN

2013656384 K15/24

NURUL NADIAH ABD GHANI

2013480958 K15/24

WAN NUR HAFAWATI WAN HASSAN

2013250036 K15/24

**Report submitted in partial fulfillment of the requirement
for the degree of
Bachelor of Science (Hons.) Mathematics
Center of Mathematics Studies
Faculty of Computer and Mathematical Sciences**

JULY 2016

ACKNOWLEDGEMENTS

IN THE NAME OF ALLAH, THE MOST GRACIOUS, THE MOST MERCIFUL

Alhamdulillah, we are very grateful to Allah S.W.T for His Faithfulness, blessings, provisions and favour and sustaining us throughout this Final Year Project, MAT 660 (An Application of Graph Theory In Place A Sensor At Traffic).

We would like to express our sincere appreciation and deepest gratitude to our dearest final year project supervisor, Madam Firdawati Mohamed and coordinator project, Madam Wan Khairiyah Hulaini Wan Ramli, for their continued support, encouragement and generous guidance in overseeing the progress of our project from its initial phase till its completion. The knowledge that they shared with us, valuables, guidance, and sharing in valuable time and their willingness to never give on us ease the completion of Final Year Project.

Deepest thanks and appreciation to our parents for their cooperation, encouragement, constructive suggestion and full support for the report completion from beginning till the end. We would also like to take this opportunity to thank each other for sacrifice the time use in doing this project memorable.

Last but not least, thanks to all our friends and everyone, those have been contributed by supporting us to complete this project.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS	ii
TABLE OF CONTENTS	iii
LIST OF FIGURES	v
ABSTRACT	vi
1 INTRODUCTION	1
1.1 Introduction	1
1.2 Problem Statement	3
1.3 Objective of Study	3
1.4 Significant of Study	3
1.5 Scope of Study	3
1.6 Definitions And Terms	4
1.7 Literature Review	5
2 METHODOLOGY	9
2.1 Learning and Understanding the concept of graph theory	10
2.2 Identify The Traffic Streams	10
2.3 Develop The Compatibility Graph	10
2.4 Determine The Minimal Edge Control Set	11
2.5 Draw the Connectivity Graph	11
3 IMPLEMENTATION	12
3.1 The basic concept of graph theory	12
3.2 Identifying the traffic streams	12

ABSTRACT

Placing a sensor at traffic light is currently an important issue to avoid collision among the transportation on the road. The sensor need to been placed at a right way so that the sensor will collect the information needed by Jabatan Kerja Raya to take action on any problem involved. In this study, the basic application of Graph Theory for Traffic Control is used to develop the compatibility graph, find the minimal edge set and draw the connectivity graph. We consider the streams at Jalan Membunga, Machang to be focus on in this study. The purpose of developing the compatibility graph is to obtain the minimum edge control set and draw the connectivity graph. The compatibility graph is obtained where there are 12 labeled vertices and 36 edges that connect the vertices. Next, it was found that the set of edge control of compatibility graph is not unique. Then, it is important to get the set of minimal edge control by using an algorithm. We got 4 edges connectivity of compatibility graph which are (a,c), (b,c), (c,g), (c,j) means that the sensors can be placed on the first, third, and fourth phase in the traffic light streams. After that, we obtained the connectivity graph by removing the 4 minimal edges connectivity from compatibility graph. As a conclusion, developing the compatibility graph is important in finding minimum edge control set and connectivity graph so that we can place the sensors in the right place at the traffic light.

1 INTRODUCTION

1.1 Introduction

Nowadays, a modern city need an efficient traffic management to make sure the smooth traffic flows in their city. So, one of the main keys to have an efficient traffic management is by having efficient traffic light control. Traffic light is a system that have 3 colours which are red, green and yellow where its represent to stop, to go, and to get ready respectively. According to Badon (2010), red and green has been chosen because people already familiar with its meaning which are red is seen to represent danger while green is the colour of nature and has a meaning close to the safety.

The first non-electric traffic light was installed in London at the intersection of George street and Bridge street in 1868. According to Arun (2014), since the first traffic light was installed in London, the crucial evolution of traffic control systems using traffic lights has been achieved. In 1914, the first electric traffic light that used red and green colours was installed in Cleveland, Ohio at the corner of East 105th Street and Euclid Avenue. Then, in 1960, Toronto is the first city that introduce traffic controller system.

Niky & Arun (2012a) stated that at the beginning, electromechanical devices were used to control traffic movement. After that, Intelligent Transportation System (ITS) were introduced to control traffic at an intersection especially in urban areas and extensively using it up till now. According to Arun (2014), ITS refers to information and communication technology applied to transport infrastructure and vehicles that enhance transport outcomes such as transport safety, transport productivity, environmental performance etc. ITS vary in technologies applied, from basic management system to monitor applications and to more advanced applications that integrate live data and feedback from other sources. Wireless communication, computational