

UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

TRAFFIC LIGHT CONTROL USING FUZZY LOGIC

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## ABSTRACT

The number of cars at traffic light keep increasing especially during peak hours. Peak hours usually happen when most of employee going and coming back from work. This can cause traffic congestion. Therefore, Fuzzy Logic Controller System is used in this study in order to reduce total waiting time of vehicles at the traffic light by extending the green light phase. When the green light phase become longer, many cars will be able to exit the traffic light successfully. As a result, traffic congestion can be reduced. In this project, we consider the quantity of cars at queue side and arrival side as our input and the extension time of green light as output. The extension time of green light is obtained by using MATLAB (Fuzzy Logic Mamdani Toolbox). Simulation results show the time (in seconds) of green light that should be extend from the original time, vary according to the number of cars available at the traffic light. In this project, three methods were chose to compare the extension time of green light phase at Jalan Kota Bharu-Kuala Krai. From the graph in MATLAB Toolbox, it shows that Centroid and Bisector method has a better performance compared to Smallest of Maximum (SOM) method. However, Centroid method were chose since it is the famous method and quite natural from the point of view of common sense.

# 1 INTRODUCTION

## 1.1 Introduction

Traffic light is a signal light to control the traffic on the road. According to the Free Dictionary by Farlex, traffic light or traffic signal is one of the set of coloured light placed at cross roads, junctions, for example is to control the flow of traffic. Traffic signal control is one measure that is commonly used at road intersections to minimize vehicular travel times and delays and usually the movements of vehicle is been controlled by allocating time intervals (Mehan, 2011).

In this era, the monitoring and controlling of city traffic is becoming one of the biggest problem face by many countries around the world (Salehi et al., 2014). According to Mehan (2011), the number of vehicular travel is increasing throughout the world especially in large urban areas causes the traffic congestion to be occurred. In Malaysia, there are already more than 10 million vehicles on the road and before the economic crisis in 1997; the annual increment of vehicles was about 20% (Khalid et al., 2011). These increasing numbers of vehicles have led to traffic congestion problems. Salehi et al. (2014) also state that, when the number of road users constantly increases, the resources provided by current infrastructures become limited and the Traffic Monitoring Authority or the Transport Ministry as the authority is known in Malaysia need to find new solutions or measures of overcoming such a problem. As a result of traffic congestions, time to travel, environment quality, life quality and road safety will be affected. Besides that, delays due to traffic congestions also indirectly affect productivity, efficiency and energy losses.

Chou & Teng (2002) state that most of the traffic junction signal controllers are fixed-cycle type, which means green phase is constant for each traffic signal cycle and this operation mode has it weakness which it has poor performance when the traffic flow is heavy. They suggested one alternative way which is to assign policemen to control the traffic flow by direct the drivers and this action is completely relies on the performance of the policemen's experiences which