

**ANALYSIS AND DEVELOPMENT OF A SELF-DIMMING
MODULE FOR ROAD TRAFFIC SIGNALS**

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**ANALYSIS AND DEVELOPMENT OF A SELF-DIMMING
MODULE FOR ROAD TRAFFIC SIGNALS**

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I hereby declare that I have read this thesis and in my opinion, this thesis is sufficient in terms of scope and quality for the award of Bachelor of Electronic Engineering with Honours.

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DEDICATION

I dedicated this thesis for my beloved mom and dad.

ABSTRACT

Nowadays, we often see more and more of the various types of lights in urban areas, especially in road areas, either regarding the use of traffic lights or streetlights that serve as guides and signals to maintain road safety. Typically, the lamps use LED-based lamps as they can increase the rate of high savings. This LED conceptual light helps reduce energy wastage by using less power and reducing the consumption of heat and is suitable for day-to-day operation. The addition of ordinary LEDs to self-dimming systems based on the intensity of light around is more likely to increase the savings rate and is more environment-friendly. The scope of this project includes analytics data from the use of standard traffic lights and LED signal lights that are self-concept in dimmer systems. This project uses the IoT concept that is applied to the traffic system and uses solar energy which is indeed renewable natural energy and can affect the green earth concept to the traffic control system on the road.

ABSTRAK

Pada masa kini, sering kita lihat semakin banyak kewujudan pelbagai jenis lampu di kawasan-kawasan perbandaran terutamanya di kawasan jalan raya samada dari segi penggunaan lampu isyarat ataupun lampu jalan yang berfungsi sebagai panduan dan isyarat bagi mengekalkan keselamatan pengguna jalan raya. Kebiasaannya, lampu-lampu tersebut menggunakan lampu berlandaskan LED kerana mampu meningkatkan kadar penjimatan yang tinggi. Lampu yang berkonsepkan LED ini membantu mengurangkan pembaziran tenaga dengan cara menggunakan kuasa yang sedikit dan mengurangkan kadar penggunaan haba dan sesuai untuk beroperasi sepanjang hari. Penambahan LED biasa kepada sistem malap sendiri berdasarkan keamatan cahaya di sekeliling lebih membantu meningkatkan kadar penjimatan dan lebih mesra alam. Skop projek ini merangkumi data analisis daripada penggunaan lampu isyarat biasa dan lampu isyarat LED yang berkonsepkan sistem malap sendiri. Projek ini menggunakan konsep IoT yang diaplikasikan ke dalam sistem trafik dan menggunakan tenaga solar yang sememangnya merupakan tenaga semula jadi yang boleh diperbaharui dan dapat menerapkan konsep bumi hijau ke dalam sistem kawalan trafik di jalan raya.

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LIST OF SYMBOLS AND ABBREVIATIONS

A	:	Ampere
AC	:	Alternating current
ALS	:	Ambient light sensor
DC	:	Direct current
IC	:	Integrated circuit
IoT	:	Internet of things
I/O	:	Input /output
kWh	:	Kilo-watt hour
MOSFET	:	Metal oxide semiconductor field effect transistor
LDR	:	Light-dependent resistor
LED	:	Light emitting diode
PCB	:	Printed circuit board
PIC	:	Peripheral interface controller
PLC	:	Programmable logic controller
PWM	:	Pulse width modulation
R	:	Resistance
USB	:	Universal serial bus

V	:	Voltage
W	:	Watt
Wi-Fi	:	Wireless fidelity
TCP/IP	:	Transmission control protocol/ internet protocol

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CHAPTER 1

INTRODUCTION

This work is about the analysing and developing the self-dimming module for road traffic signals for road users. This chapter covers work background, problem statement of work, objectives of work, the scope of work and organisation of the report.

1.1 Background

The traffic light is one of the traffic infrastructure facilities designed to control traffic at every intersection of roads so that vehicle movement can move smoothly. This traffic light function is to prevent the collisions between road users by sending signals to road users using three different colours. These three colours give different signals consisting of green colours that mean go, amber colours

indicate ready to stop, and red mean stop. Through the three colours control of this traffic light, any incidents can be avoided, and road traffic operates smoothly and systematically. Besides, the traffic light also allows pedestrians to cross the road safer by pressing the push button and cross the over when green light for pedestrians was turned on.

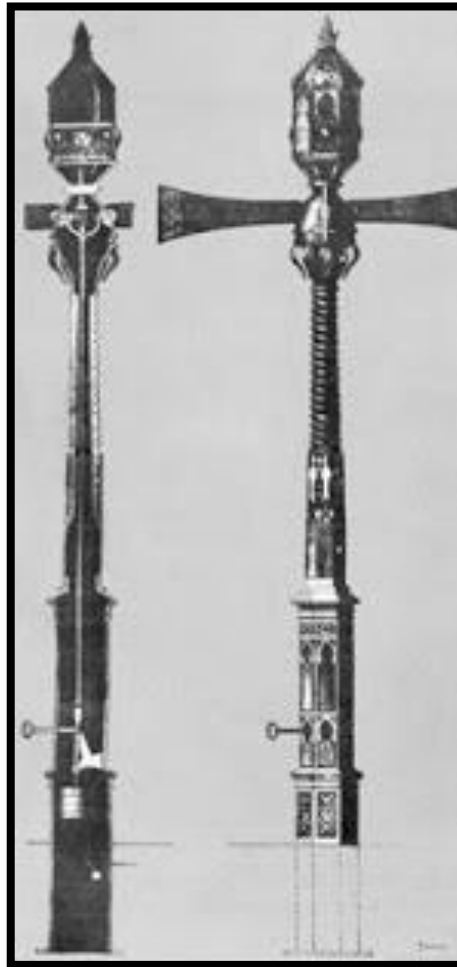


Figure 1.1: Non-electric gas traffic light by J.P Knight

Before traffic light have been introduced, traffic was only controlled by traffic police around 1722 at London Bridge [1] [2] by controlling the movement of two-way traffic either to London or Southwark. Then the first traffic was introduced

on December 9, 1868, by John Peake Knight, a railway engineer. This traffic light does not use electric but uses gas and is installed around the outside of the Houses of Parliament in London. The idea comes from the signalling system for the railway that has been constructed by Saxby and Farmer who are railway signal engineers [2]. In that time, the traffic light operates by having a pole with 22-feet high and two semaphore arms that have been positioning 45 degrees for “caution” signal and will rise horizontally for “stop” [2]. During the night, there will be a policeman handling the traffic by placing the red lamp on the top of the pole to “stop’ and change to the green lamp to signal “go”. But, this traffic light did not last long when the incident caused a policeman who was injured due to a gas lamp explosion [2].



Figure 1.2: The kerosene lamp traffic light 1908

The first creation of traffic light by J.P.Knight inspires others to improve the traffic light system in a better direction. Thus, in 1908, traffic light began to be used in Toledo, Ohio, which utilises kerosene lamps that show "stop" and "go" on a green

background and have red and green light lenses [7]. The traffic light system is widespread throughout the country and operates according to its design. At this point, traffic light only uses green and red to signal to road users. The traffic light with three colours bulbs was developed in 1920 [8] used in Detroit, Michigan. The first electric traffic light was introduced in 1924. Then there is a traffic light system for pedestrians to make it easier for them cross the road safely behind the road congestion. A countdown system also has been developed as it displays digital numbers to road users to show the amount of time during red and green lights as the users can quickly get ready whether they have to stop or move.



Figure 1.3: The first electric traffic light in 1924

There are various types of lamps used in everyday life to make it easier for us to see things more clearly as well as the traffic light system. Traffic light consists of