INTELLIGENCE RF TRAFFIC LIGHT CONTROL FOR AMBULANCE

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Dedicated to my beloved family especially and also to all my friends.

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All praise to ALLAH because of Him, I manage to complete this report. First, I want to thanks my family members for all their support. I also would like to thanks to my supervisor, Engr. Siti Fatimah Bte Sulaiman to all her guidance in completing this project. Without her guide, this report cannot be completed. Furthermore, I would like to thanks to all my friends with their help in finishing this report. With all the help from involves parties, I manage to finish this report and project of "Intelligence RF Traffic Light Control for Ambulance".

Thank you.

ABSTRACT

The Intelligence RF Traffic Light Control for Ambulance is a device that can allows an ambulance and emergency vehicles to pass through traffic light that remotely. So, it minimizes the number of accidents involving emergency vehicles nowadays during emergency case. The Radio Frequency (RF) transmitter and receiver circuit is the main circuit in the system. The RF transmitter circuit has the transmitter module and encoder to send the signal to the RF receiver circuit. The RF receiver circuit has a receiver module to receive the signal and decoder to convert the signal into original signal and send it to the output. The RF receiver circuit is combining with the traffic light circuit control by Programmable Interface Controller (PIC16F877A) microcontroller. The advantage of using this device is the ability of the signal to pass through objects, low cost and can transmit the signal about 30 meters.

ABSTRAK

Alat kawalan ini adalah alat yang digunakan untuk membenarkan kenderaan kecemasan seperti kereta ambulans dan lain-lain kenderaan kecemasan untuk melalui lampu isyarat walaupun dalam keadaan lampu merah dengan menggunakan alat kawalan jauh RF. Sehubungan dengan itu, ia mampu mengurangkan bilangan kemalangan yang melibatkan kenderaan kecemasan semasa kes kecemasan. Litar pemancar dan penerima Frekuensi Radio (RF) adalah litar utama dalam sistem ini. Litar pemancar RF mempunyai modul pemancar dan pengekod untuk menghantar isyarat kepada litar penerima RF. Litar RF penerima mempunyai modul penerima bagi menerima isyarat dan penyahkod untuk menukar isyarat kepada isyarat asal dan menghantar kepada output. Litar RF penerima digabungkan dengan litar kawalan trafik dan dikawal oleh mikropengawal PIC16F877A. Kelebihan menggunakan alat ini adalah kemampuannya menghantar isyarat kira-kira 30 meter, menembusi objek dan juga kos yang rendah.

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LIST OF SYMBOLS AND ABBREVIATIONS

PIC	-	Programmable Interface Controller
RF	-	Radio Frequency
V	-	Voltage
A	-	Ampere
Ω	-	Ohm
F	-	Farad
PCB	-	Printed Circuit Board
UV	-	Ultraviolet
DC	-	Direct Current
GPS	-	Global Positioning System
LED	-	Light Emitting Diode
PSM	-	Projek Sarjana Muda

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CHAPTER I

INTRODUCTION

1.1 Overview

Traffic lights are the signalling devices that are placed on the intersection points and used to control the flow of traffic on the road. An ambulance is a vehicle for transportation of sick or injured people from any place to the hospital. Normal traffic light systems operate on timing mechanisms that change the light after a given interval[1]. This project purposed to give facilities and make easier for vehicle in emergency case especially for ambulance and other vehicle such as police and fire brigade.

Emergency case situation are using the transmitter and receiver circuit which is used the Radio Frequency (RF) respectively. The transmitter will send the signal to the receiver that placed at every single traffic light to turn the traffic light from red to green light to easier they passed through the traffic light will operate as usual until emergency vehicle press the button reset passing through it. This project is a good and effective project because it design intelligent traffic light that allows emergency vehicles to pass through by halting traffic in case of emergencies. The project proposed will minimize the number of accidents involving emergency vehicles nowadays during emergency case and make the traffic flow smoothly.

1.2 Objectives

The objectives of this project are:

- To design intelligent RF traffic light that allows emergency vehicles to pass through by halting traffic in case of emergencies.
- To ensure a warning signs will give a warning during an ambulance pass through the traffic lights.
- To minimize the number of accidents involving emergency vehicles nowadays during emergency case.

1.3 Problem of Statement

Nowadays, world health hazards are a major concern. Especially people in the older age group are the victims and moreover the traffic conditions are worsening day by day, which results in traffic jams[3]. Many important jobs get delayed due to these traffic jams. Ambulance service is one of the major services which get affected by traffic jams. In the present scenario most of our precious time is wasted due to fixed time limit. Due to the wastage of time we lose precious life because delay in reaching the hospital on time. To solve this problem it can be overcome by using of "Intelligence RF Traffic Light Control for Ambulance".

1.4 Scope of Project

The scopes of project are divided into two parts:

1.4.1 Software used:

- Proteus 7.2
- C Program
- Software CCS C Compiler

- PIC Bootloader

1.4.2 Hardware used:

- RF transmitter module
- RF receiver module
- Power supply standard type 5V and 9V DC
- RS232 for Serial Communication
- PIC16F877A

1.5 Project Methodology

To design Intelligence RF Traffic Light Control for Ambulance, ones must have good understanding about the theory of the Radio Frequency (RF). It includes the connection between RF transmitter and RF receiver to understand how it works.

Before start the project, study and reading must done to get the correct view of RF theory. Later, literature review important to compare this project with previous experiments and project related to this title. The review based on journals, reports and books as its main reference.

After that, the RF transmitter and RF receiver circuit construct by using Proteus 7.2 software. Through this software, the circuit are translating into PCB layout. Next, both circuit need to on Printed Circuit Board (PCB). Then the circuit must be applying at the traffic light, so the connection between RF receiver and traffic light circuit will construct first. PIC16F877A are use to control the output of traffic light.

1.6 Report Structure

Overall of this report is divided into five chapters. The chapters are organized as follow:

Chapter 1: INTRODUCTION
This chapter includes the project background, problem statements, scope of project and briefly discuss about methodology.

Chapter 2: LITERATURE REVIEW
This chapter explain and discuss about project, other research according to this project and the component used in this project.

Chapter 3: METHODOLOGY
This chapter explain about approach taken in order to achieve the objectives of this project and how the project is completed.

Chapter 4: RESULT AND ANALYSIS
This chapter describe and discuss the final outcome of this project and analysis that have been done to justify its function and to make sure it meets the objectives of project.

Chapter 5: CONCLUSION AND RECOMMENDATION
This chapter conclude the project and how it can be improved for further development.

CHAPTER II

LITERATURE REVIEW

2.1 Overview

This chapter explain the research related to the wireless communication system and how the knowledge can be manipulated to develop the “Intelligence RF Traffic Light Control for Ambulance”. Next, the basic information about component parts will be discussed briefly. This chapter increase deeper understanding about basic wireless communication system and several component parts are use according this project.

2.2 Current Study of Traffic Light

Road signs in Malaysia are standardized road signs similar to those used in other nations but with certain distinctions. Until the early 1980s, Malaysia closely followed Australian and Japanese practice in road sign design, with diamond-shaped warning signs and circular restrictive signs to regulate traffic. Signs usually use the series fonts (Highway Gothic) typeface also used in the United States, Canada, and Australia, although some signs on recently completed expressways use transport heavy (the second image shown to the right). Malaysian traffic signs use Malay, the official and national language in Malaysia.

The use of traffic lights to control the movement of traffic differs regionally and internationally in certain respects. In Malaysia, flashing red is the equivalent of a stop sign while flashing yellow indicates that the opposing traffic may enter the intersection at any time, but drivers should exercise caution. This may be used when there is a malfunction with the signals, or late at night when there is little traffic. A single four-way flashing yellow light (with no red light above or green below) may be used at more major intersections on otherwise fast, low traffic rural roads (where full traffic lights or four-way stop signs may not be entirely appropriate, and static Stop/Yield signs may be ignored, obscured, or even stolen) as an advanced warning to slow down and proceed across with caution.

In the typical sequence of colour phases:

- Illumination of the green light allows traffic to proceed in the direction.
- Illumination of the orange light denoting for prepare to stop.
- Illumination of the red signal prohibits any traffic from proceeding.

Traditionally, incandescent and halogen bulbs were used. Because of the low efficiency of light output and a single point of failure (filament burnout) municipalities are increasingly retrofitting traffic signals with LED arrays that consume less power, have increased light output, last significantly longer, and in the event of an individual LED failure, still operate albeit with a reduced light output. With the use of optics, the light pattern of an LED array can be comparable to the pattern of an incandescent or halogen bulb.

The low energy consumption of LED lights can pose a driving risk in some areas during winter. Unlike incandescent and halogen bulbs, which generally get hot enough to melt away any snow that may settle on individual lights, LED displays – using only a fraction of the energy – remain too cool for this to happen[4]. In traffic control, simple and old forms of signal controllers are what are known as electro-mechanical signal controllers. Unlike computerized signal controllers, electro-mechanical signal controllers are mainly composed of movable parts (cams, dials, and shafts) that control signals that are wired to them correctly. Aside from movable

parts, electrical relays are also used. In general, electro-mechanical signal controllers use dial timers that have fixed, signalized intersection time plans. Cycle lengths of signalized intersections are determined by small gears that are located within dial timers. Cycle gears, as they are commonly known as, range from 35 seconds to 120 seconds. If a cycle gear in a dial timer results in a failure, it can be replaced with another cycle gear that would be appropriate to use. Since a dial timer has only one signalized intersection time plan, it can control phases at a signalized intersection in only one way. Many old signalized intersections still use electro-mechanical signal controllers, and signals that are controlled by them are effective in one way grids where it is often possible to coordinate the signals to the posted speed limit. They are however disadvantageous when the signal timing of an intersection would benefit from being adapted to the dominant flows changing over the time of the day[5]. Dynamic, or actuated, signals are programmed to adjust their timing and phasing to meet changing traffic conditions. The system adjusts signal phasing and timing to minimize the delay of people going through the intersection. It is also commonplace to alter the control strategy of a traffic light based on the time of day and day of the week, or for other special circumstances such as a major event causing unusual demand at an intersection.

The controller uses input from *detectors*, which are sensors that inform the controller processor whether vehicles or other road users are present, to adjust signal timing and phasing within the limits set by the controllers programming. It can give more time to an intersection approach that is experiencing heavy traffic, or shorten or even skip a phase that has little or no traffic waiting for a green light. Detectors can be grouped into three classes: in-pavement detectors, non-intrusive detectors, and detection for non-motorized road users.