

SAFE DRIVING FOLLOWING DISTANCE MONITOR

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA
FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER

BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II

Tajuk Projek : Safe Driving Following Distance Monitor

Sesi Pengajian :

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Saya NORHAYATI BINTI HAMID

(HURUF BESAR)

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I hereby, declared this report entitle “Safe Driving Following Distance Monitor” is the results of my own research except as cited in the references

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DECLARATION

“I/ We acknowledge that I read this piece in my / our this work is sufficient in scope and quality for the award of Bachelor of Electronic Engineering (Industrial Electronic) With Honour”

Signature :

Name of Supervisor : Imran Bin Hindustan

Date :

DEDICATION

“In the Name of Allah, the most Beneficent, the Most Merciful”

*Special dedication to my beloved parents:
Sarinah Binti Hamid & Hamid Bin Aman*

*My supporting siblings:
Muhammad Hanafiah Bin Hamid
Siti Aisah Binti Hamid
Siti Zubaidah Binti Hamid*

*My respected supervisor:
Mr Imran Bin Hindustan*

My friends and my fellow lecturers

Thank you for all your care, support and believe in me

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First of all, I thank God for giving me all kinds of opportunities in completing this project. Without a long life, wisdom as well as the spirit given; I may not be able to complete this project well.

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ABSTRACT

This project is to develop a monitoring device system capable to display the current car speed, low cost and reliable. In addition, this project is to develop a monitoring tool that recommends a minimum safe driving following distance. Although there are many safe driving system introduced such as following distance chart and 5 second rules to reduce road accidents, but how many drivers take awareness when driving? In this project, microcontroller PIC18F4550 is used as the main circuit where it processes the sensed signal, speed calculation, conversion and control the displays unit. The PIC18F4550 microcontroller is written in C language using PIC C Compiler software. The LCD module is used to display the relative speed and the safe distance. Reed Switch as a sensor is used count the wheel revolution.

ABSTRAK

Projek ini adalah untuk membangunkan satu sistem peranti pemantauan mampu untuk memaparkan kelajuan kereta semasa, kos rendah dan boleh dipercayai. Di samping itu, projek ini adalah untuk membangunkan satu alat pemantauan yang mencadangkan memandu yang selamat jarak berikut minimum. Walaupun terdapat banyak sistem pemanduan yang selamat diperkenalkan seperti berikut carta jarak dan 5 peraturan kedua untuk mengurangkan kemalangan jalan raya, tetapi berapa ramai pemandu mengambil kesedaran ketika memandu? Dalam projek ini, mikropengawal PIC18F4550 digunakan sebagai litar utama di mana ia memproses isyarat dikesan, pengiraan kelajuan, penukaran dan mengawal unit memaparkan. PIC18F4550 mikropengawal ditulis dalam bahasa C dan ia menggunakan perisian PIC C Pengkompil. Modul LCD digunakan untuk memaparkan kelajuan relatif dan jarak selamat. Reed Switch digunakan untuk mengesan bilangan putaran roda dalam tempoh masa sesaat.

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LIST OF ABBREVIATIONS

JPJ	-	Jabatan Pengangkutan Jalan
MOT	-	Ministry of Transport Malaysia
PCB	-	Printed Circuit Board
ARES	-	Advanced Routing and Editing Software
OSC1	-	Oscillator 1

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Nowadays, transportation forms an integral part of social activities [6][10]. The main purpose of transportation system is to provide the efficient and safe movement of passengers from one place to another. People drive their own vehicles such as car and motorcycle to move from one destination to other destination for their daily purpose, unfortunately there are still a number of drivers who could not get or estimate a safe distance to stop their vehicles, especially when drive at nighttimes and rush hour driving [15] .

Through the existence of road networks in Malaysia, there has been various type of vehicle on the road such as car, bus, motorcycle, lorry, van and others that use road as a basis to move from one destination to other destination. Based on the statistic in year 2012 from Ministry of Transport Malaysia (MOT) [16] as shown in figure 1.1, the registered public vehicles are increasing every year in Malaysia which showed that road safety is one of the important aspect as it involves most of the people in this country which are majorly travelled by using road transportation.

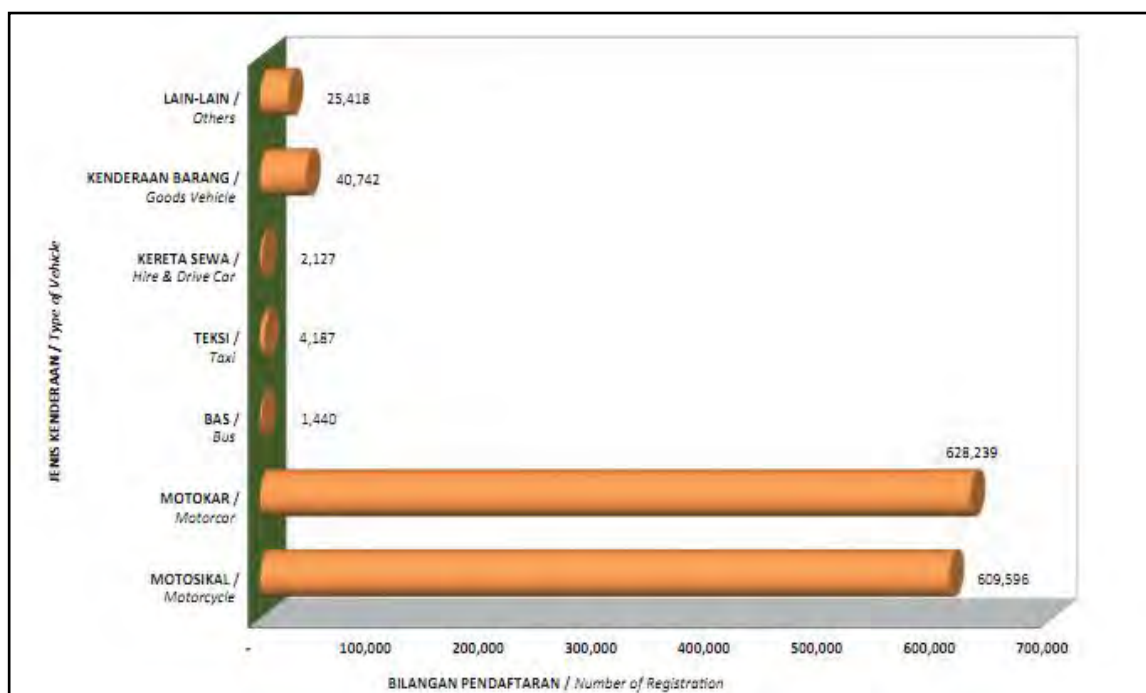


Figure 1.1: Chart of New Registered Motor Vehicles by Type, Malaysia, 2012 [12]

According to the Ministry of Transport Malaysia, in their transportation statistic report in 2012, every year traffic accident in Malaysia constantly increases year by year as shown in figure 1.2. There were 462,463 cases of accidents reported in 2012 [16]. The accident problems in Malaysia are getting more critical every year as it increases in numbers of road accidents. It is also making Malaysia as the highest ranking of road accidents among developing countries around the world. One of the main factors is that the driver cannot estimate exactly the distance during speeding and brake system malfunction before it crash or hit any object. Due to these factors they could not be able to make immediate action. Therefore, the aim of this research is to mitigate and reduce the severity and the number of road accident by introducing a safe driving following distance monitor.

In this paper the distance monitoring system could warn the driver to take immediate action on approaching objects before collision encounter. By having this kind of mechanism, it could help to reduce the number of car accident on the road.

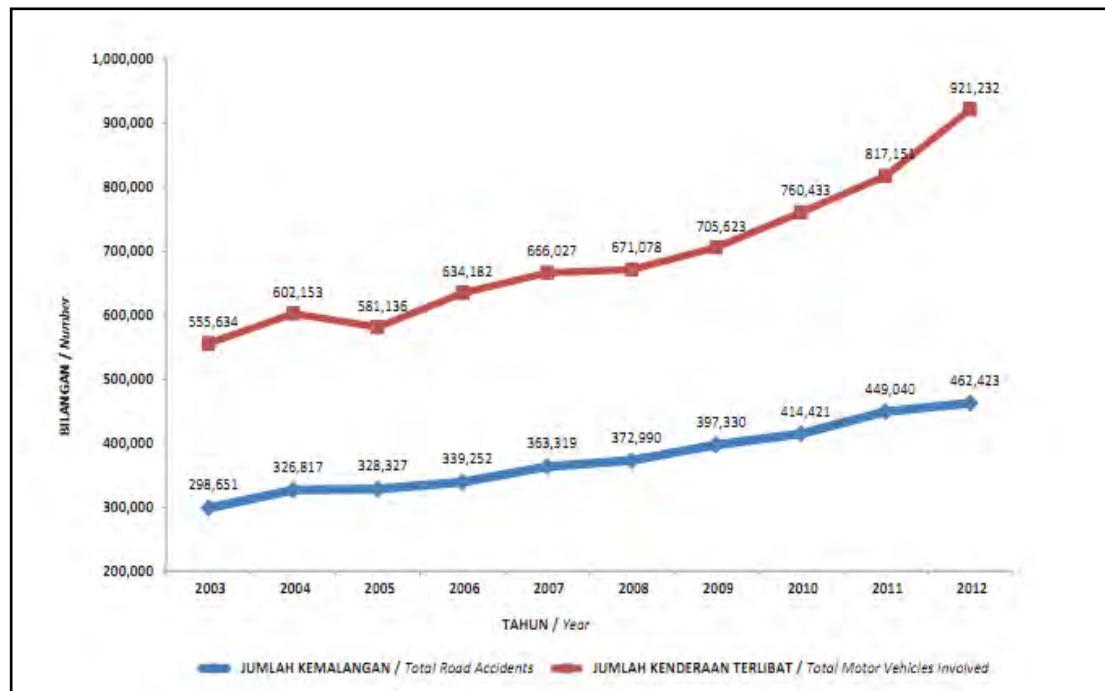


Figure 1.2: Total Road Accidents and Motor Vehicles Involved, Malaysia, 2003–2012 chart [5]

Figure 1.2 shows the total road accidents and motor vehicle involved from 2003 until 2012 and it is quite concerning. This is because, in line with diversity development of motor vehicle on the road, accident rate which occurred in Malaysia also pitched in increase. This situation needs to be investigated and research must be done to know the main problems that causes the accident and it also important to ensure that the existing transportation system in Malaysia are in perfect condition in serving various types of vehicle users.

Factors that affect the risk of increased injury of occupants in the event of an automotive accident include behavioural characteristic of the person (age, gender, drug and alcohol when driving), environment factors, road conditions at the time of accident occurrence (weather, surface or light conditions) and technical characteristics of the vehicle (vehicle age and body type)[19].

1.2 Problem Statement

The number of deaths from automobile accidents is declining [6] due to the efforts of automobile manufacturer to improve the safety of vehicles, but the number of accidents is on an increasing trend [6]. Among the reasons of the increasing number of accidents is due to the driver's failure to keep a minimum safe driving distance. It can cause fatal accidents. Distance charts and 5 second warning system rules help drivers to judge the minimum safe following distance. It is to help and avoid collisions under ideal driving condition and. Although various driving safety system were introduced, but how many drivers take awareness, recall and memorize the warning system when driving?

1.3 Objectives

The objectives of Safe Drive Following Distance Monitor project are:

- a) To develop a device that able to display current car speed, low cost and reliable.
- b) To develop a monitoring device system that able to suggest the minimum safe driving following distance.

1.4 Scopes of project

In order to achieve the objective of the project, several scopes have been outlined. The main scope of Safe driving following distance monitor is that it can recommend the speed range from 32 to 120km/h, and the system can be applied to all transportation. This system consists a number of elements input, output and controller. The input element consists of reed switch which is used to counts the revolutions of the transmission or current speed. The output element used in this system is an LCD, which is used to display the relative speed and minimum safe distance to alert the drivers on stopping distances based on its current speed. This is controlled by the main circuit. PIC18F4550 is used as the main circuit where it

processes the sensed signal, speed calculation, and suggest minimum safe driving following distance at LCD screen.

1.5 Report Outlined

This report has five chapters. Chapter 1 describes the background, problem statement, objectives and scope of the project. Chapter 2 presents the brief theory of Safe Drive Following Distance Monitor and related literature review in designing the speedometer circuit. Chapter 3 describes the methodology of the project which includes the design specification and procedure flow process. Chapter 4 presents the simulation and measurement results. The results obtained are analyzed and discussed. The last chapter concludes the report.

CHAPTER 2:

LITERATURE REVIEW

2.1 Introduction

In this chapter, method, theory and the information about the accident statistic in Malaysia, factor of accident contribution will be discussed regarding to this project which reveals the knowledge that gained via resources such as references book, journal, articles and documentations regarding application and research work.

2.1.1 Factor of accident contribution

Road accidents can be defined as the creation of the Road Test due to several factors such as carelessness or negligence of the user, maintenance of vehicles and road conditions factors. There are two main factors causing accident which are driver related factors and vehicle factors [17].

2.1.1.1 Driver behaviour (speed)

The speed of motor vehicles is at the core of the road traffic injury problem. Speed influences both crash risk and crash consequence. The risk of accident and accident injury is the effect also from speed. It is becoming more difficult and shorter time for a driver to stop and avoid an accident when the vehicle is at a higher speed. Accident risk increases as speed increases, especially at road junctions and while overtaking as road users underestimate the speed and overestimate the distance of an approaching vehicle.

2.1.1.2 Vehicle factors

A small percentage of accidents are caused by mechanical failure of a vehicle, such as some form of tire failure, brake failure, or steering failure [18]. Faulty brakes can cause accident between vehicles or vehicle with other things. Worn tires also can cause the vehicle involve in an accident. The vehicular faults have the tendency in resulting higher severe crashes in urban roadways and include faults in tires, wheels, brakes, and windshield. Vehicle maintenance is very important to make sure the vehicle is in safe condition. Many of drivers give reason that they did not have time to look upon their vehicle's condition before driving which can put their life in danger.

2.1.1.3 Age

Old driver which is in ages of 60 above, have a bad vision which were not clear and they tend to drive slowly. While younger driver which is in ages of 16 to 25 year is tend to drive fast and have lack of experience in driving which lack of skill in handling motor vehicle especially when they are facing an accident [17].

2.1.1.4 Alcohol and drugs

When alcohol or drugs are involved in the crash, it is more likely to be ended as a high severity crash in both types of highways as the relevant variables has positive parameter in both of the case. The alcohol involvement has been recorded as whether alcohol presented or alcohol contributed towards the crash based on the judgment made by the police officer.

The risk of accident and accident injury is the effect from alcohol. Drivers and motorcyclists with any blood alcohol content greater than zero are at higher risk of an accident than those whose blood alcohol content increases from zero. Many type of drugs detected in accident victims are liable to impair driving skills, there is still uncertainty as to whether this translates to an increased accident risk.

2.1.1.5 Driver fatigue

Fatigue or sleepiness is associated with range of factors. This factor always happened when the driver are in long distance driving. This case happened often when drivers are driving while sleepy, driving after five hours of sleep which is the recommendation for the driver to take a break while driving is two hours. Drivers should take a break after every two hours of driving to avoid exhaustion and sleepiness while driving.

2.2 Road factors

The condition and quality of the road, which include the pavement, shoulders, intersection and the traffic control system, can be a factor in accident. The road must be designed to provide adequate sight distance at the design speed or motorists will be unable to take remedial action to avoid an accident. The roadside equipment such as, street lightning, makings or signs and all equipment for road also must be provided to ensure safety for the road users. Traffic signals must provide adequate