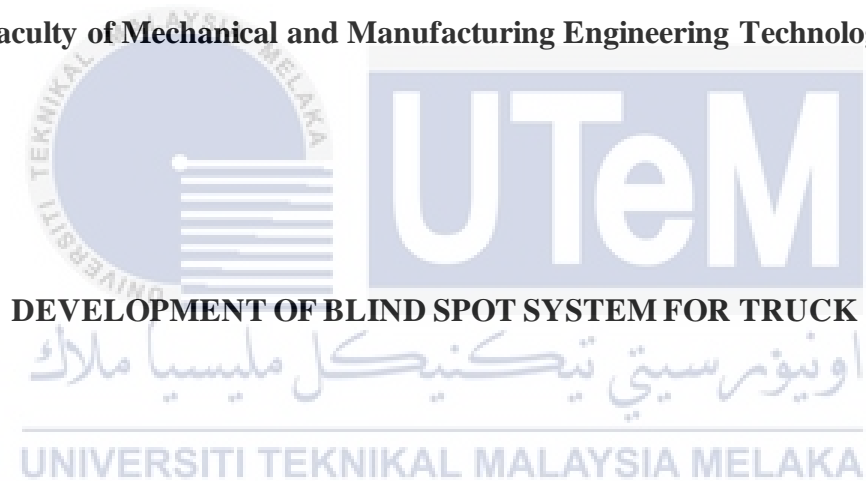




**Faculty of Mechanical and Manufacturing Engineering Technology**



**Mohamad Tajudin Bin Rukunuthin**

**Bachelor of Mechanical Engineering Technology with Honours**

**2023**

## DECLARATION

I declare that this choose an item entitled “Development Of Blind Spot System For Prime Mover Truck Drivers” is the result of my own research except as cited in the references. The choose an item has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature

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Date

: 11/1/2023



## APPROVAL

I hereby declare that I have checked this thesis, and, in my opinion, this thesis is adequate in terms of scope and quality for the award of the Bachelor of Mechanical Engineering Technology with Honors.

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Date

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: 27 JANUARI 2023



اوتيمر سیتی تکنیکل ملیسیا ملاک  
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

## DEDICATION

I want to express my deepest gratitude to my supervisor, Ts. Mohd Zakaria Bin Mohammad Nasir, for his persistent aid with my studies and research, as well as for his patience, inspiration, enthusiasm, and huge store of knowledge. His guidance was useful throughout the course of the time I spent conducting research and putting up this study. Throughout my degree program, I could not have asked for a more helpful adviser and mentor. Furthermore, my beloved parents, Rukunuthin Bin Mohd Aboo Baider and Bajarnisha Binti supported me throughout my career. Their unconditional love, encouragement, support, and sacrifices have sustained us through the years for giving their moral, spiritual and financial support and prayers with served as my inspiration to finish this piece of work. In conclusion, I would want to acknowledge my family's constant spiritual support throughout my whole life.



## ABSTRACT

There has been a recent increase in heavy vehicle accidents. This is likely due to the rise of e-commerce and the corresponding increase in the number of trucks on the road. These accidents can be very dangerous, and often result in serious injuries or even death. It is important for drivers to be aware of the increased risk on the road and take extra care when driving near trucks. Several data regarding this have been collected and most of the problem boils down to two things blind spot and turning radius. As we know since truck is huge it has a lot of blind spots thus creating various accident since another vehicle is not aware of this blind spot. This PSM aim to solve this problem by putting 4 sensors strategically positioned on the truck. The 4 sensor is positioned on the main part of the truck and two more sensor is placed in the back of the truck. The sensor will send a signal and will be displayed on the lcd and if other vehicle is dangerously close the buzzer will make a sound. Meanwhile the camera is for aiding during the truck turning.it works when the truck on the signal the corresponding camera will be toggled to ensure the drive is aware of the surrounding. This makes most of the blind spot fully visible thus reducing accident caused by blind spot.

## **ABSTRAK**

*Terdapat peningkatan baru-baru ini dalam kemalangan kenderaan berat. Ini mungkin disebabkan oleh peningkatan e-dagang dan peningkatan yang sepadan dalam bilangan trak di jalan raya. Kemalangan ini boleh menjadi sangat berbahaya, dan selalunya mengakibatkan kecederaan serius atau bahkan kematian. Adalah penting bagi pemandu untuk menyedari peningkatan risiko di jalan raya dan lebih berhati-hati apabila memandu berhampiran trak. Beberapa data mengenai perkara ini telah dikumpul dan kebanyakan masalah berpunca kepada dua perkara titik buta dan jejari pusingan. Seperti yang kita tahu memandangkan lori yang besar, ia mempunyai banyak bintik buta sehingga mencetuskan pelbagai kemalangan kerana kenderaan lain tidak menyedari titik buta ini. PSM ini bertujuan untuk menyelesaikan masalah ini dengan meletakkan 4 sensor diletakkan secara strategik pada trak. Sensor 4 diletakkan di bahagian utama trak dan dua lagi sensor diletakkan di belakang trak. Sensor akan menghantar isyarat dan akan dipaparkan pada lcd dan jika kenderaan lain ditutup secara berbahaya, buzzer akan mengeluarkan bunyi. Sementara itu, kamera adalah untuk membantu semasa trak membelok. ia berfungsi apabila trak pada isyarat kamera yang sepadan akan ditogol untuk memastikan pemanduan mengetahui keadaan sekeliling. Ini menjadikan kebanyakan bintik buta dapat dilihat sepenuhnya dengan itu mengurangkan kemalangan yang disebabkan oleh bintik buta.*

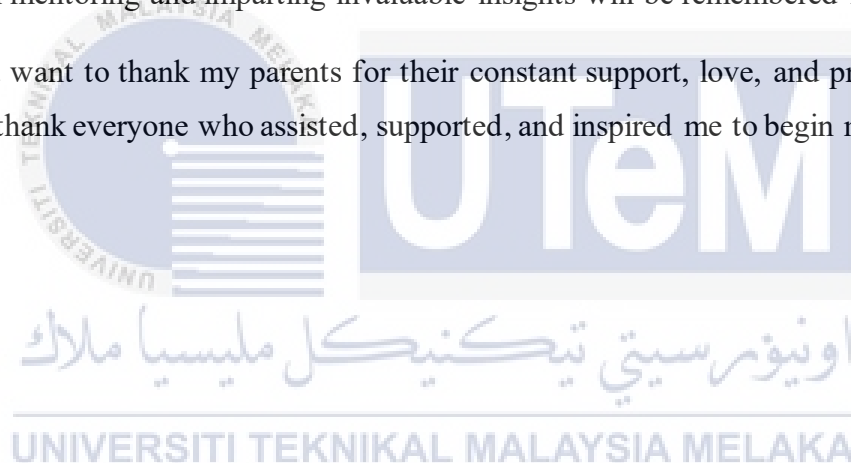
## ACKNOWLEDGEMENTS

In the Name of Allah, the Most Benevolent and Merciful

I would want to begin by thanking and praising Allah the Almighty, my Creator and Sustainer, for all that I have received since the beginning of my life. I would like to thank the Universiti Teknologi Malaysia Melaka (UTeM) for providing the platform for study.

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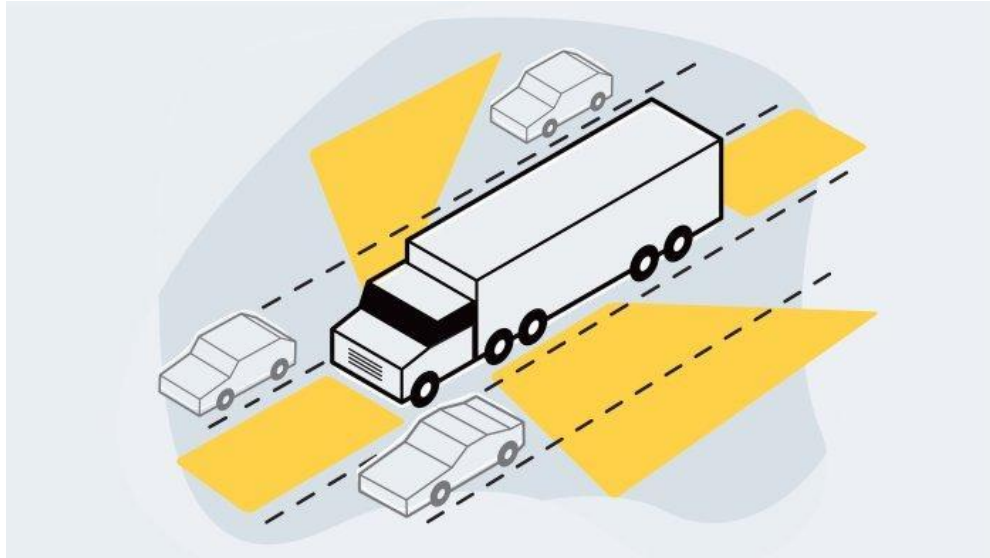
# CHAPTER 1

## 1. INTRODUCTION

### 1.1 Background

There is more transport than there is human nowadays especially in Malaysia. This transport varies from a motorcycle to a truck. Since there are a lot of transport on the street, accident is prone to happen. Most accident is avoidable and has a high survivability rate. However, when it comes to truck the survivability rate drop exponentially .to combat this issue a viable solution must be made. Since a truck is a huge medium of transport there are more than one blind spot. even though there are two sidemirror, but it just does not cut it in combating the blind spot. The issue become much more apparent since in road there are mixture of a lot of type vehicle thus creating high possibility of accident. Since this is an apparent problem, a solution should be created to reduce accident and loss of live. A solution is created to create a better experience for all road user by addressing the blind spot issue on a truck. The solution created is that 8 sensor is placed strategically to combat the blind spot issue which the sensor will send a signal to the driver near the cabin where the driver can spot it and take appropriate action.

The sensor will be position in an optimal condition where it is addressing all the blind spot of the truck thus creating no blind spot zone. The sensor sends data which is relayed and processed by the microprocess where the data is process and led indication is turned one if anything is in the blind spot. other than that buzzer also will be sound if any car or motorcycle is way too near the truck which could cause an accident.



**Figure 1.1 Truck Blindspot**

The figure show the blind spot of a truck which can be mitigated if a sensor is optimally place in set area where an indication is created.

## 1.2 Problem Statement

Nowadays innovation in the automotives industries have been grown exponentially however same couldn't be said in the aspect of truck system innovation. The innovation on truck technology has been stagnant, even though truck has a higher chance in making a fatal accident happen. time and time again news about truck and car colliding or truck and motorcycle colliding is becoming more common. So, to combat this problem a root cause must be identify as for now the clearest root cause of why truck accident happens is because the huge blind spot around the truck.

Blindspot on a truck is significant enough since the blind spot of a truck is huge compared to another vehicle. This become more of a problem when in motorways there no segregation of transport and every type of transport is mixed. This combine with a truck huge blind spot create a problem.

Motorcycle has the highest risk in colliding with a lorry/truck since motorcycle is consider small then lorry. If a motorcycle enter the blind spot of the lorry it could be invisible for the lorry/truck.

### 1.3 Research objective

The aim of the research is to create a blind spot system for truck which could minimize the risk of truck being on an accident. the objective of the research is as followed: -

- a) To create a device which could reduce lorry/truck blind spot
- b) Creating a design which could be optimize
- c) Develop an electronic and control system for the entire system

### 1.4 Scope of Research

The scope of the research are as follow :

- a. Finding out the root cause of truck accident on the street
- b. Create a device to reduce the blind spot on the truck/ lorry
- c. Create a prototype
- d. Test and analyze the range of the electronic system and the sensor
- e. A warning will be display when a vehicle enter the blind spot area.
- f. Comparing expected result and the actual result.
- g. Identify if all the problem has been addressed.



## Chapter 2

### 2. Literature review

#### 2.1 introduction

This section is a compilation of all the relevant information found for the entire project. This section works as a bread butter in understanding the problem and comparing relevant information to create the possible solution on designing process.

#### 2.2 Road condition in Malaysia

Transport has been an essential part of a person daily life but as more and more transport enters the road the more dangerous its become. A road is a linear channel for transporting traffic that often has an enhanced surface for automobiles and pedestrians. Contrary to streets, the primary purpose of roads is transportation. Transport is the movement of individuals, animals, and products from one point to another. In other terms, transport is defined as the specific movement of an organism or object from point A to point B. Transport modes include the air, land, sea, cable, pipeline, and space.

Transporting or delivering commodities and resources through road can be classified as road transportation. Road transportation is advantageous because it can move goods and components inexpensively and door-to-door. Transporting commodities to and from remote locations that are uninterested in train, boat, or air is the primary focus. There will be affordable street transit between metropolitan regions, cities, and small communities. Despite its benefits, road transportation has considerable disadvantages. In the case of road transport, the likelihood of accidents and breakdowns is greater. Other kinds of transportation are more secure than engine transportation. In addition, street transportation is less coordinated than other modes. It lacks consistency and efficiency. The public transportation rates are disproportionately erratic and crooked, and the public transportation speed is modest and restricted, which is a considerable disadvantage. Transporting big products across long distances is inefficient and costly. Currently, street transportation has a substantial detrimental effect on the environment. (Lum, 2019)



**Figure 2.1 Total Number Of Transport Registered in Malaysia**

As of 2020 ministry of transport Malaysia has release a statistic of all of transport register which use road/land ( as shown in figure 2.1) . The total amount of transport that is register in Malaysia for the year 2020 is around 32 million which is approximately 1 million more than previous year. This shows a good side toward the growth of economy in Malaysia. However new registered commercial vehicle shows a very different picture.



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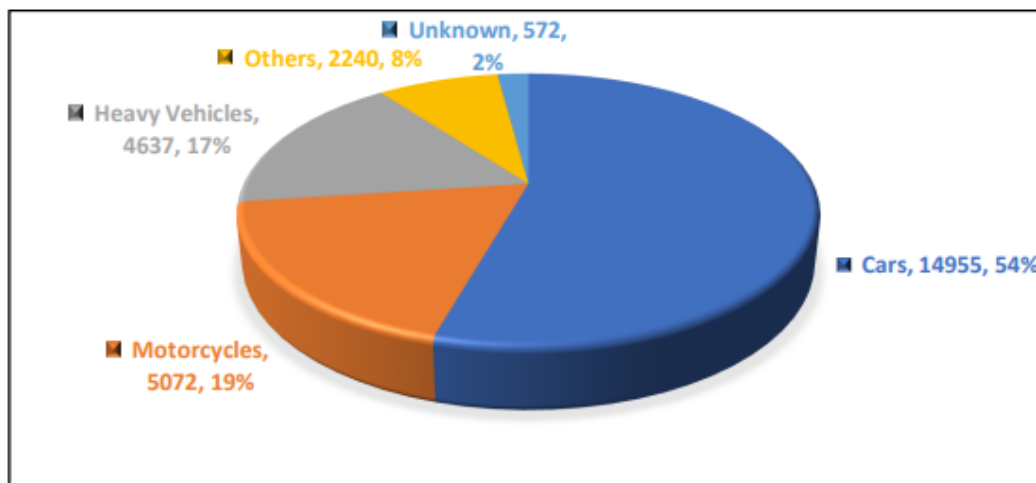
**Figure 2.2 Comparison Of Registered Vehicle for the year 2019 vs 2020**

As shown from figure 2.2, the number of register truck declined from 2019 to 2020. eventhought it went down through a bit it doesn't change the fact from the grand scheme of things. Since one of the crucial components in growing a country's economy is its transportation infrastructure. Rapid monetary expansion would result in a higher national wage. The growth in the level of life influences the amount of transportation requests needed to satisfy business and daily demands.

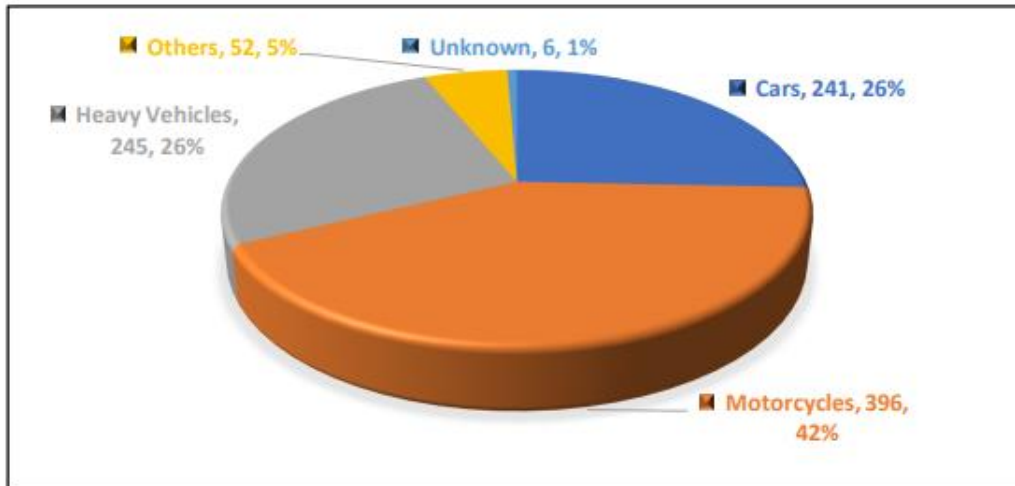
## 2.3 Road Accident

### 2.3.1 Road Accident In Malaysia

A road accident, also known as a traffic collision, automobile accident, or car crash, takes place when a vehicle collides with another vehicle, person, animal, road debris, or other stationary barrier, such as a tree, pole, or structure. Accidents happen all the time and are highly prevalent in Malaysia, especially road accidents. Every day, traffic accidents occur, killing and hurting people. The number of fatalities climbs every year, particularly around Malaysian holidays like Hari Raya Aidilfitri, Chinese New Year, and Christmas Day. The collision resulted in both deaths and injuries. A group interested in resolving the issue would find it difficult to remedy this tragedy. Road accidents occur due to causes, comprising numerous parties, and have diverse repercussions, necessitating fast responses. Accidents commonly happen in Malaysia, and they can occur at any time and in any place. A range of reasons of accidents in Malaysia. Drivers who lose control of their vehicles, such as automobiles, buses, or motorbikes, are first. Drivers that want to get to their destination fast might speed on the highway. Second, drivers should not adhere to traffic regulations. They drive when the traffic signal is red, for example. This mindset demonstrates that individuals are brazen enough to flout traffic regulations while understanding the repercussions and fines. Third, mishaps often occur owing to aggressive drivers, some of whom may be inebriated while on the road. One tragedy will certainly emerge. Accidents may also happen owing to irresponsible drivers who drive recklessly and show little concern for others. These drivers are arrogant and do not regard the safety of individuals on the lane. (Marks, 2017)



**Figure 2.3 Percentage Of Accidents By Vehicle**



**Figure 2.4 Percentage Of Fatalities By Vehicle**

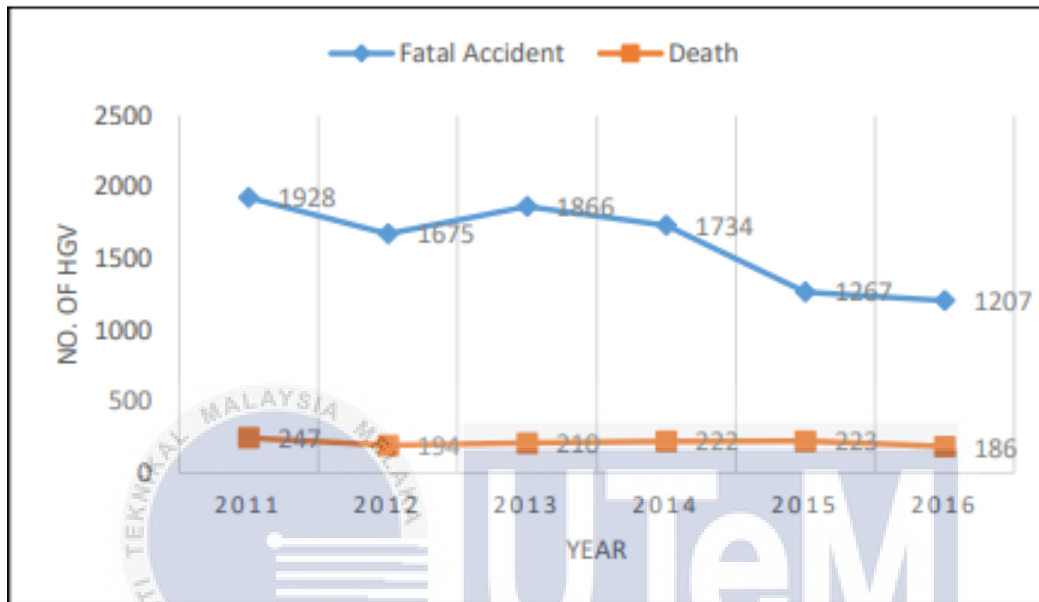
The data shown was extracted from Malaysian Highway Road Accident Analysis & Database System (MHROAD). this data is collected in 2019 which clearly indicate how heavy vehicle involve more of fatal accident then car. Heavy vehicle percentage of accident is 17% but the fatality rate is 26%. Meanwhile, cars fatality rate is 26 % which is almost half the percentage of accident. It is also noticed that motorcyclists are the most susceptible users of the expressways where 42 percent of the fatal incidents included motorcyclists even though they make up just 19 percent of all road accidents. Figures 2.3 and 2.4 provides the breakdown of the percentage of accidents cases by vehicle and the percentage of deaths by vehicle. (N manap, 2021)

### 2.3.2 Accidents involving trucks or heavy vehicles

Heavy goods vehicles (HGV) are enormous trucks used to transport goods on the road. Trailer, rigid lorry (2 or more axles lorry with larger than 2.5 ton's permissible gross weight), and small lorry (2 axles small truck or pick-up with less than 2.5 ton's legal gross weight) are the three basic classifications of HGVs in Malaysia. The Malaysian HGV fleet consists of around one million vehicles (2016 statistics), which travel a total of 200 kilometres per day and an average of 70,000 kilometres annually. The rise of the ecommerce industry in Malaysia is anticipated to increase the distances travelled by heavy-duty vehicles.

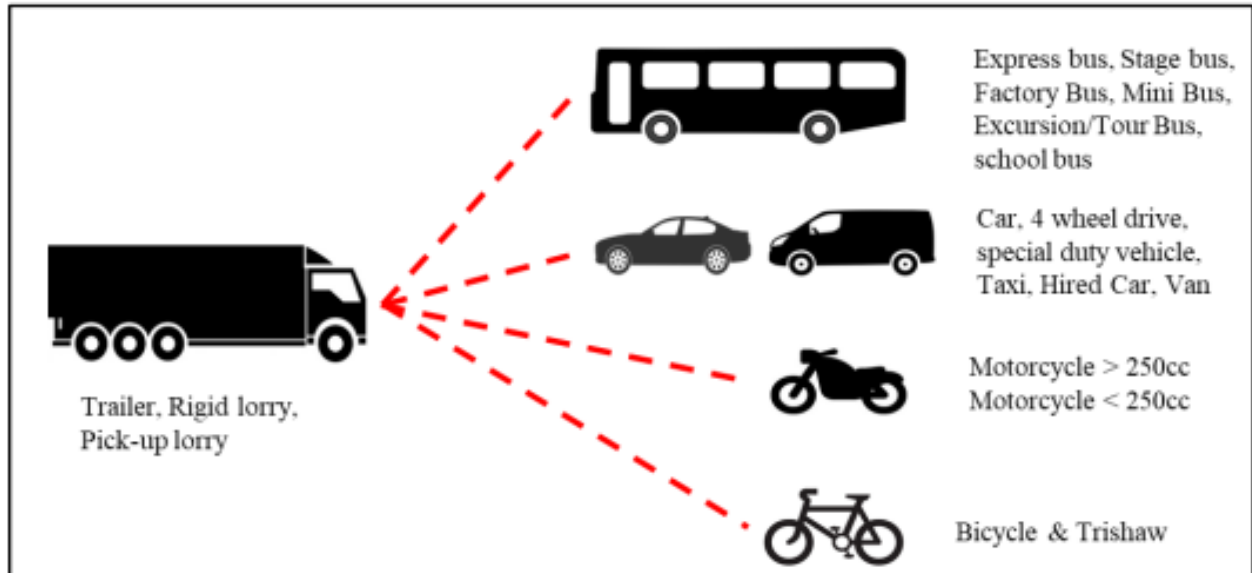
The development of HGV accidents in Malaysia has showed a continual up-and-down pattern. Figure 1 below depicts the five years' trend of traffic accidents involving HGV in

Malaysia. Despite having a modest number of HGV in traffic volume, accident involving HGV results in more than 1000 deaths each year in Malaysia. Out of such figures, involvement of HGV in collision producing more than 80 percent of second vehicle deaths. This illustrates that HGV collision has a considerable influence on the safety of other road users.



**Figure 2.5 Fatal Accident Cause By HGV**

The massive dimensions of these HGV, and their great masses add considerably to the severity of their contact with other vehicles engaged in the road accidents. Since HGV frequently move at lower speeds than other vehicles, the disparity in speed may potentially lead to rear-end collisions.



**Figure 2.6 Lorry Collision Possibilities**

Due to big dimension, HGV have operational restrictions such as large blind spots, long stopping distances, and limited agility that make it vital for other vehicles to place extra attention on safety. HGV involvement in fatal incidents generating a huge need to better understand the impact of this vehicle type to other road user. Thus, this study seek to evaluate the typical HGV accidents and its associated causes resulted in deaths to other road users.( Hamidun , 2019)



## 2.4 Trailer Design Flaws

### 2.4.1 Trailer Blind Spot

A blind spot is an area surrounding a car in which the driver cannot see other vehicles using the side-view or rear-view mirrors. Although most passenger cars have blind spots placed at a 45-degree angle behind the driver, big commercial trucks often have greater and longer blind spots. Depending on the size and form of the truck, blind spots may also exist in front of and behind the vehicle.

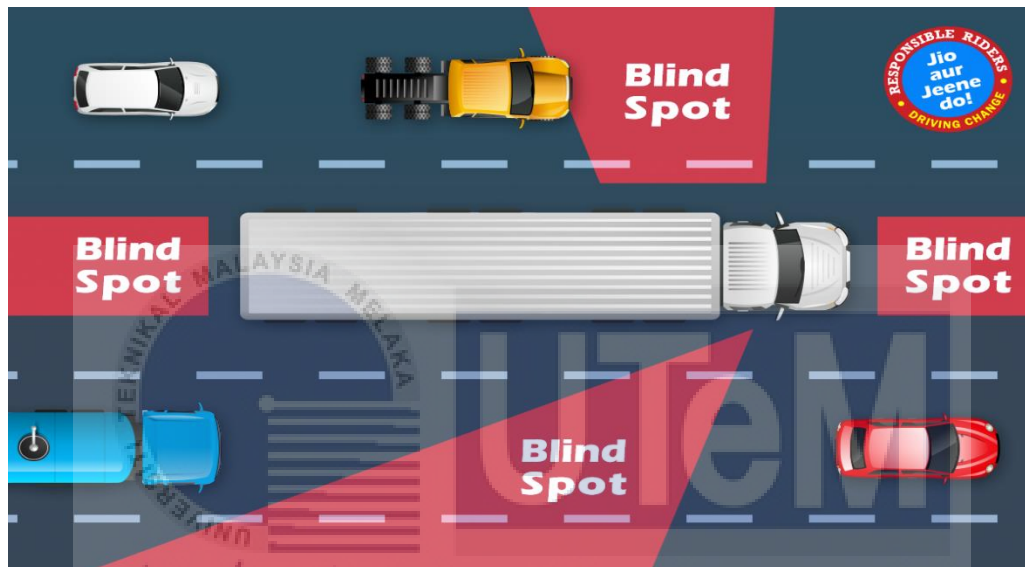


Figure 2.7 Truck Blindspot Visualized

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Most drivers take their time overtaking trucks, unknowing that they are placing themselves in risk by remaining in the truck driver's blind area. Unfortunately, a truck driver cannot be held accountable if they are unable to notice another vehicle and move lanes or make a changeover that causes a truck collision. (Attorney, 2016)

### 2.4.2 Trailer Turning Radius

The turning diameter of a vehicle is the minimum diameter (or "width") of available space required for that vehicle to complete a circular turn. Therefore, the expression refers to a theoretically smallest circle in which an aircraft, ground vehicle, or watercraft may be rotated. Turning radius and turning circle are commonly used interchangeably, however they can have distinct meanings. According to the Oxford English Dictionary, a turning circle is "the smallest