CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Over the years of continuous revolution in the automotive vehicles, autonomous features have been the key in advancing the automotive technology. According to NHTSA of US, autonomous or self-driving vehicles are defined as the vehicle that can operate without the needs of direct input or manipulation from the driver [1]. Lately, many self-driving vehicles have been developed for industries and factories. For example, Google has been working on developing autonomous or self-driving vehicle. The vehicle will take the passengers to the place that they want to be with just a press of a button. Figure 1.1 below illustrates how the self-driving vehicle developed by Google.
Moreover, a Canadian company which is in expertise maker of field and service robots, Clearpath Robotics, has successfully developed new self-driving car named OTTO. The moving platform is specially designed for carrying load in industrial environments like factories and warehouses [2]. Hence, it is believed that the revolution that will be implemented on the vehicle is the autonomous feature.

Other than autonomous features, another revolution that has been made over automotive vehicle is the technology of omnidirectional driving. Compared to conventional automotive vehicles, Omni-Directional Vehicles can change the travel direction without steering the rear and front wheels. Omnidirectional driving has featured the vehicles relatively lower turning radius in comparison to conventional vehicles. This makes the Omni-Directional vehicle (ODV) ultimately helpful in tight environment especially in floor of factory or any other manufacturing environments [2]. This can be supported by the fact that omnidirectional driving has also been implemented on forklift.
Figure 1.2 below shows the figure of omnidirectional forklift. Thereby, it is noticeable that the popularity of omnidirectional driving is increasing especially in the field of industry.

![Omnidirectional forklift](image)

**Figure 1.2:** Omnidirectional forklift

Source: Oemoffhighway 2015

In this research, an image based automatic indoor parallel parking assist system is to be developed for the Omni-Directional vehicle (ODV). As a part of autonomous features, automatic parking is necessary to be implemented onto the vehicles. This is because autonomous or self-driving vehicle will definitely need to be able to perform the automatic parking. The vehicle will need to determine the availability of the parking lot and perform the parking. In general, the car park can be mainly categorized into outdoor and indoor car parks. There are also various types of parking methods that a vehicle can perform. For example, there are angular parking, perpendicular parking, parallel parking.

In this paper, the discussion will only focus on how the Omni-Directional vehicle (ODV)