CHAPTER 1

INTRODUCTION

1.1 PROJECT MOTIVATION

Shock absorber is one of the important elements in a car that contributes to both driving safety and comfort. It is a device that controls unwanted spring motion through a process known as dampening. Shock absorber slow down and reduce the magnitude of vibratory motions by changing the kinetic energy into heat energy that can be transferred through a hydraulic fluid. The existence of vehicle dampers, or called shock absorber is difficult to estimate with accuracy, the existence of shock absorber rises as the production of the vehicle. First suspension system was invented by the Truffault before 1900 with using the concept of scissor action friction disc system using bronze discs. Over recent years interest has grown in suspension systems which can improve comfort and stability compared with passive system. The improvements are achieved by making the suspension system can make their own decision by electronic control. This system will be adjusted automatically when it goes from one road condition to others. The main objective for this is to obtain a good isolation of the body.
The production of the damper is probably around 50-100 million units per annum with a retail value well in excess of one billion dollar per annum. A typical European country has a demand for over 5 million units per year on new cars and over 1 millions replacement units. The need for dampers arises because of the roll and pitches associated with vehicle maneuvering, and from the different roughness of roads. In the mid nineteenth century, road quality was generally very poor. During that time in order to improve the comfort the better horse drawn carriage at that period therefore had soft suspension, achieved by using long bent leaf spring.

Development of the dampers has occurred tremendously. Although there will keep continue to be differences between each other but now the suspension system reach at a level of a mature products. Fully active suspension system offers some advantage between others but it is not very suitable for passenger cars due to higher money consumption. Nowadays, it is very clear that different country was producing their own technology in suspension system; we believe that Germans have different driving expectations to other Europeans. Most German manufacturers like Audi and BMW therefore differentiate themselves from other manufacturers through high performance ride control. Yet in markets like the US, France or Japan, ride performance is not significant criteria of differentiation.

1.2 PROJECT BACKGROUND

The vehicle suspension system provides the driver with driving comfort and safety. Driving comfort can be defined as reducing the disturbance factor such as vibration, noise, and climatic condition as low as possible, while driving safety can be defined as result of harmonious suspension design in terms of wheel suspension, springing, steering and braking and is reflected in an optimal dynamic behavior of the vehicle. Suspension system act as medium to transmits all forces between the body and the road. Suspension system
can be divided into three main parts which are spring, damper and wishbones. For this project it will focus on damper system only. Damper function is to slow down the oscillations of body and wheel, this oscillation is produce from the dissipation of energy by the spring. For the good damper it must contain the criteria where it can split between the body and the wheel also called as sprung mass when the absorber experience factor that can give effect to the absorber such as road disturbances. In this modern technology there are three types of vehicle suspension system used which are passive, semi active and active. All system normally used hydraulic or pneumatic operation but recently a new system was found which used electromagnetic in suspension system.

People require high quality for everything. Certainly, the comfort in the moving vehicles is people’s concern so it is desirable to have high performance suspension system for vehicles. In the environment of a moving vehicle, passenger often feels uncomfortable due to the vibration of the vehicle body. Vibration control techniques have classically been categorized into two areas, namely passive and active controls. In a passive system the parameters are synthesized through off-line design techniques and no on line feedback actions are used. Since passive systems produce fixed designs, the control will not be optimal when the system or the operating condition changes. Active approach is a vibration control technique that can adapt for system variations and can be much more effective than passive system. Based on vibration control techniques, technology nowadays has grown in suspension systems which can offer improved and stability over the performance provided by conventional passive systems. The improvements are achieved by making the suspensions has a brain which can alter their characteristics based on the road structure.

In order to get the functionality and to reduce cost, this project will use semi active system. These enable the suspension system to adapt to various driving condition suitable with driver’s need. Driver can manually adjust the absorber suitable with their needs.