Project Title:	Analysis of vertical dynamics for passenger cars subjected to transient and random road excitations
Synopsis:	The project aims at ascertaining ride performance of passenger vehicles (luxury, mid size saloon, lightweight), namely body acceleration, suspension working space, and dynamic tire loads. It can be achieved by examining the simulation of quarter vehicle models (QVM) when traversing transient and random roads (ISO 8608) at various constant forward velocities. Vehicle model validation and sensitivity analysis (different vertical tire models) are required in the analysis. The candidate must be familiar with MATLAB/Simulink and other MATLAB toolboxes such as Vehicle Dynamics and SimMechanics (multibody dynamics).
Objectives:	1. To examine ride dynamics of passenger vehicles subjected to transient and random road excitations. 2. To evaluate the sensitivity of vertical tire models in ride performance 3. To assess the ride performance at various constant forward velocities.
Equipment required:	None
Software required:	MATLAB/Simulink, and other MATLAB toolboxes (Vehicle Dynamics & SimMechanics)
Supervisor(Department):	Assoc. Prof. Ir. Dr. Rahizar Ramli
Program:	Master of Mechanical Engineering
Duration:	Maximum 2 consecutive semesters

Project Title:	Cornering stability of various passenger cars at selected speeds and road conditions
Synopsis:	Road accidents involving passenger cars, especially in Malaysia, are quite alarming despite presence of advanced safety features and control systems. One of the main cause of these accidents is due to unsafe driving maneuvers particularly at curved road sections. The project evaluates lateral dynamics of passenger vehicles (luxury, mid size saloon, lightweight), namely understeer, normal steer, and oversteer at selected cornering speeds and road conditions. Sensitivity analysis of the lateral dynamic parameters such as lateral acceleration, roll angle, yaw rate, etc. will be carried out to ascertain cornering stability. The candidate must be familiar with MATLAB/Simulink and other MATLAB toolboxes such as Vehicle Dynamics and SimMechanics (multibody dynamics).
Objectives:	1. To analyze cornering stability of passenger vehicles subjected to selected cornering speeds and road conditions. 2. To examine the effect of front wheel drive (FWD) and rear wheel drive (RWD) on the vehicle's lateral dynamics. 3. To evaluate influence of side slips of several lateral tire models.
Equipment required:	None
Software required:	MATLAB/Simulink, and other MATLAB toolboxes (Vehicle Dynamics & SimMechanics)
Supervisor(Department):	Assoc. Prof. Ir. Dr. Rahizar Ramli
Program:	Master of Mechanical Engineering

Project Title:	Effects of modelling fidelity on longitudinal dynamics of passenger vehicles
Synopsis:	Longitudinal vehicle motion particularly involving acceleration and braking has been widely studied. Aspects of vehicle control systems such as adaptive cruise cruise control, anti-lock brake systems, traction control systems, collision avoidance systems, and many others are among the key research areas over the past several decades. To ensure reliable prediction of these advanced control systems, the plant models (i.e.: vehicle models and control models) need to be accurately modelled. The dynamic models for the longitudinal motion of the vehicle comprise of two major elements, namely the vehicle dynamics and the powertrain dynamics. The vehicle dynamics are influenced by longitudinal tire forces, aerodynamic drag forces, rolling resistance forces and gravitational forces. Whilst, the longitudinal powertrain system of the vehicle consists of the internal combustion engine, the torque converter, the transmission and the wheels. The aim of the project is to examine the longitudinal dynamics of the vehicle when different modelling fidelity (degree-of-freedom) are chosen, ranging from a bicycle model to full vehicle model with increasing DOFs. The candidate must be familiar with MATLAB/Simulink and other MATLAB toolboxes such as Vehicle Dynamics and SimMechanics (multibody dynamics).
Objectives:	1. To examine longitudinal dynamics of passenger vehicles due to various modelling fidelity. 2. To analyze the effect of front wheel drive and rear wheel drive on the longitudinal vehicle dynamics. 3. To evaluate the rolling resistance of longitudinal tire models.