**Project working report**

1. **Problem specification**

The purpose of this project is to design a traffic simulator, which is able to implement GUI and event programming behaviors to demonstrate how the cars move on different types of roads according to the colors of traffic lights. There are three types of vehicle, which are Car, Bus and Motorbike, and the length of a car determines the length all other vehicle types. Furthermore, there are three road intersection shapes: straight, 4-way and 3-way, and each road has left and right lanes. Australian road rules should be applied to the simulator. The traffic light has two colors such as red and green. And the simulator can be used to show people how the car works in different roads.

In the assignment 2, I am going to develop my car traffic simulator with GUI and event programming and make improvements based the assignment 1. When the programming is running, the straight road, cars and traffic light will be displayed initially and they start running, there are three buttons included one-way model, three-way model and four-way models, users can click the buttons on the bottom to select the type of roads shown by simulator. In addition, as car moves to the front of traffic light, the color of traffic light changes between red and green. If the traffic light is green, cars will go through traffic light and other cars will stop, if the traffic light is red, the cars will stop, and other cars go through the traffic light. And the cars that pass through the traffic light will appear on the second road and continue to move to the end of the road, and finally disappear.

1. **Problem decomposition using UML class diagrams**

The problem is decomposed into 6 objects, which are Vehicles, Roads, TrafficLight, Main and Display.

* The vehicle class is responsible for creating the objects of bus, car, motorbike and show on the frame. The Draw method in the Vehicle class is to use JPanel to draw each vehicle, Move method can regularly change the value of x and y position and pass the value of x and y to Draw method.
* The Road class has Paint method, which is used to create and change the Road types using JPanel.
* The TrafficLight class uses Paint method to draw the different colors of light and using count down timer to control the changes of the colors of traffic light.
* The Display class uses PaintComponent method to help drawing the roads, traffic lights and vehicles and place these objects together in one frame.
* The Main class is used to call functions in each class and create a frame to show the simulator. Timer and Repaint are placed in main class to quickly redraw all the object and make these objects moving.

