**CP2406\_Programming 3\_Assignment 1**

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**Problem Specification**

The problem is the requirement to make a functioning traffic simulator that does not violate the Australian road rules and must be designed to use at least 3 vehicles including Car, Buses and Motorbikes. The program must showcase roads with working traffic lights and that will allow the simulated cars to move through the intersections.

**Problem Decomposition**

There are several objects, but they can be divided into three main groups. These include 1.

* Cars
* Roads
* Traffic Lights

**The car object** will be used as the main vehicle type that will be used for adjusting length of other vehicles such as Buses and Motorbikes and for tracking the position.

**The road object** will be divided into segments that allow the car to drive along the road until it meets an intersection.

**The traffic light** object will include strings that will help determine car object to cross to another road object.

**The main class**. The main class locates where the program will be executed. This includes controls vehicle movement, and declaration of road objects, car, and light spawns in the simulation. The main class interacts with all the other classes to ensure that classes are interconnected to run the programs.

**The Car class** is the main class among the vehicles that helps the other classes for their adjustments and thus requires multiple attributes (Length, speed, position and much more.), including the current road the vehicles are on and its position.

**The Road class** includes attributes such as length, the start location, end location and speed limits that will help determine the location of the vehicle is on the road. The road class will also be able to determine the information of the road using its attributes.

**The Traffic Light class** has attributes such as state, CHANGE\_GREEN, position, to help determine whether the traffic light attached at the end of the roadAttachedTo t is ‘GREEN’ or ‘RED’ to allow the car to cross to another road object.

**The Bus** and **The Motorbike** are subclasses of the car and thus inherit its attributes and behavior from the car except the length itself the Bus will be 3 times the car’s length while the Motorbike is half the length of the car.

**User Stories**

**User 1**

**Name:** Noelle

**Age:** 18

**Purpose:** The user wanted to test out a vehicle of her choice to see how it would run in a simulation. She also wanted to know if this simulated car would be nice for her neighborhood.

**Priority:** High

**Test:** The user will provide us with the specifications of her type of car, length, and the simulation such as the roads and the traffic lights will be implemented as like her neighborhood to see how her car would run.

User 2

Name: Jason

Age: 20

Purpose: He wants to make the simulation so that we can locate at what part of the road the simulated road the car is at and when it will reach the traffic Light.

Priority: High

Test: The road will be able to track the car by knowing where the road starts and where it ends as well as the number of cars on the road and how much the car has travelled after entering the start of the road.

User 3

Name: Michael

Age: 30

Purpose: He came with a suggestion that after creating a map he wants to have the option to save his progress and map simulation so that he can use the data when he wants to test in the future with the same location.

Priority: Low

Test: Could be implemented by save buttons that will allow the parameters to be saved and reused in the future.

User 4

Name: Jonathan

Age: 24

Purpose: Came with a suggestion to add multiple vehicles including bikes, bicycles and buses in the simulation so that vehicles other than cars can be tested in the simulation.

Priority: High

Test: This can be done by making the Car the default class among other vehicles and making it so that the specification of the other vehicles can be implemented using the car class.