# GUI-based Coding Challenge working document

1. Problem specification

The purpose of this project is to continue create the traffic lights simulator by using GUI programming and Model view control design pattern to make the design is more logical and be able to display vehicles run on the different roads within a time frame. The simulator has functions to open a city, save a city and load a city. And user be able to adjust the size of roads.

First of all, I created model and view packages to divide project into two parts, in the model package I used Main class, Vehicle class, Road class and TrafficLights class from first assignment and I created classes for simulator and simulator test. For view package, I created classes to display frame of the simulator, the map of the project, and three rectangle classes to display for vehicle, traffic lights and road. Secondly, I created controller to run the simulator. In the controller I have improvement method by using the key listener to make the project more creativity so the road object could be able to move around the screen by press the arrow keys and change the road size by press plus and minus keys.

During the design it was quite challenging, because each component of the project involved lots of logical thinking.

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

There are 12 classes involved in this project, the controller class has main responsible to run the project, Mapview class and Simulator class has methods to start, stop, save and load the project. In the UML diagram below displayed methods in other classes and also shows the relationships between each other.

A close up of text on a white background

Description automatically generated