CP2406 2020 SP53 Project Requirements

To be released to students at the start of Week 3 (after they have had time to ask questions about it). Staff and tutors must only give them advice that are in line with the following requirements:

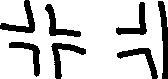
* Top-down view of the city only, no need for zooming or scrolling
* Only things simulated are roads, vehicles and traffic lights (no pedestrians)
* The only vehicle types are: Car, Bus and Motorbike
  + The length of a car determines the length all other vehicle types
  + Breadth of a car is half its length
  + len(motorbike) = 0.5 \* len(car)



* + len(bus) = 3 \* len(car)



* + The length of a car is the only vehicle configuration
  + Vehicles are self-driving 😊
* Only Australian road rules apply
* There are 3 road intersection shapes: straight, 4-way, and 3-way (rotations of these are allowed):



* Each road has two lanes (left lane and right lane)



* There are no roundabouts



* A road is at least twice the length of a bus (at most five times)
* A lane can contain some number of vehicles limited by its length



* A lane can have a traffic light only at its start or end



* The simulator application consists of a single main window that contains a menu bar and a status bar
* The application has two main modes: 1) city editing, and 2) simulation
* The menu bar contains the menu items for each mode
* In city edit mode you can: create a new city, edit a city, open a city, save a city
* In simulation mode you can: set the update rate, run the simulator, stop the simulator, set the vehicle spawn rate – popup dialog boxes are used to enter rate values
* In city editing mode, the main window displays the city and a set of road shapes and traffic lights that can be selected and placed on the city
* In simulator mode, the main window displays the currently active city and the current statistics about the number of vehicles and traffic lights, the average speed of the vehicles
* While running, the simulator randomly spawns vehicles and adds them to those roads at the edges of the city
* Vehicles move along lanes – during the update cycle the simulator asks all vehicles to move
* A vehicle decides if it needs to move – based the distance to the vehicle in front of it
* At an intersection a vehicle randomly selects if it turns and which way it goes
* A vehicle disappears from the city when it reaches the end of a road on the edge of the city
* Only one vehicle at a time can occupy some section within a lane
* Vehicles don’t move continuously over a lane – each update cycle causes the car to move some number of lane segments (based on its current speed)
* There is no need to simulate a manual clutch – a vehicle simply moves in offsets of lane segments
* The order in which vehicles are updated on a lane is from the end of the lane backwards