

## Vehicle Detection Tests

### **Goal of the test**

Evaluate the ability of the car to identify other vehicles on its trajectory and off its trajectory.

These tests will place another vehicle in several areas with respect to the car's planned trajectory. The car's ability to detect whether or not these vehicles are in its trajectory, as well as its behaviour with respect to this detection will be evaluated. A variety of scenarios will be considered :

- Vehicle in the same lane
- Vehicle in opposite lane

### **Testing Area**

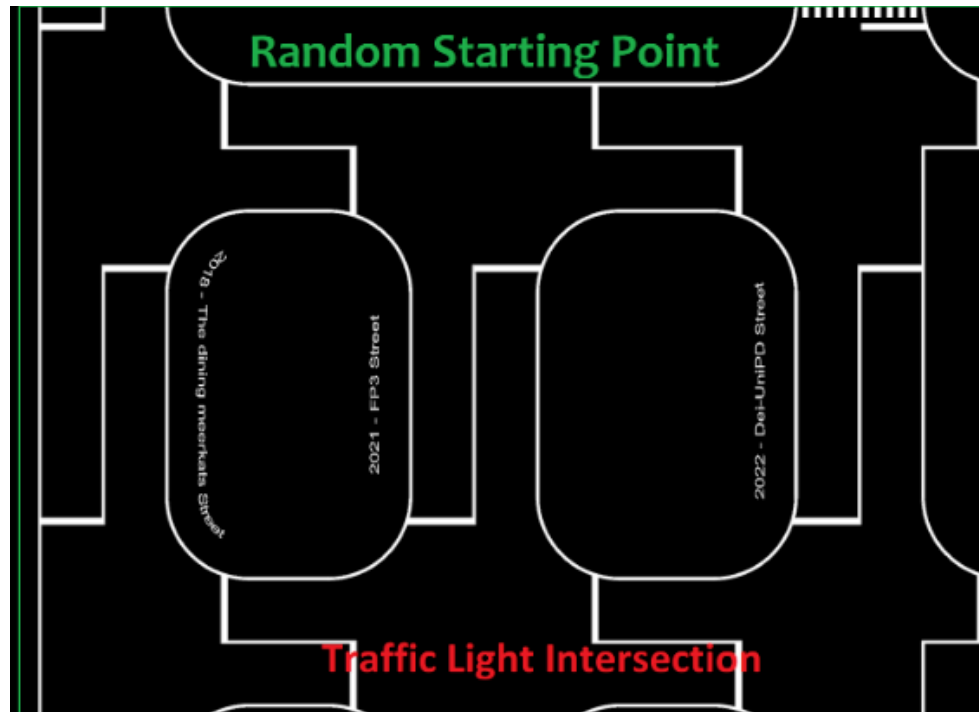


Figure 1 : Intersections to be used in the test

## Vehicle on Path of Car

### Projected Trajectory & Object Placement

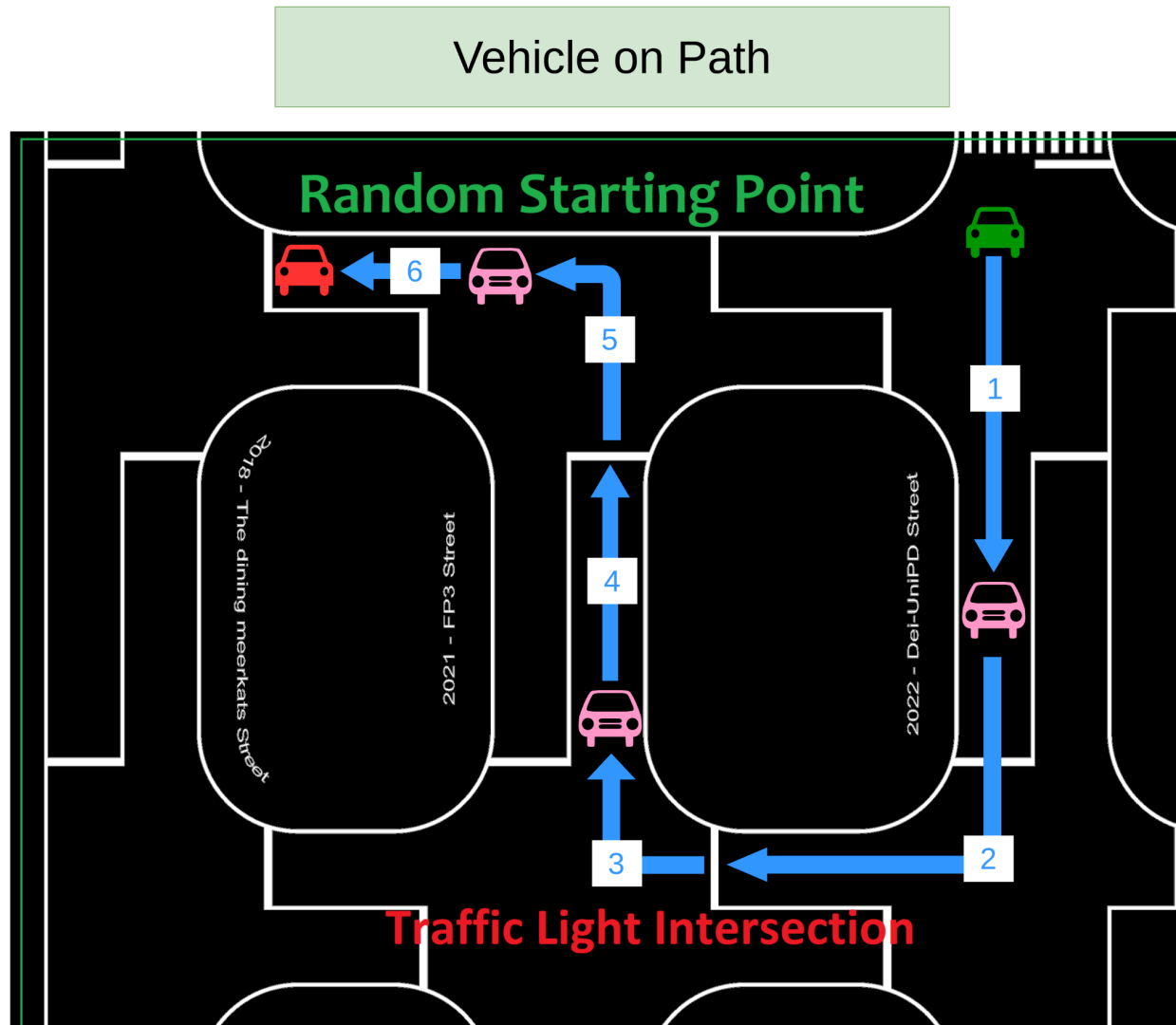


Figure 2 : Proposed trajectory, vehicles on path of car

Figure 2 shows the proposed trajectory of the car for testing out its ability to identify other vehicles on its path. The car begins by moving in a straight line and stopping when it detects the first vehicle (1). The vehicle should be placed halfway between the two intersections, as shown above. Once the vehicle has been moved out of the way, the car should execute a right turn (2), before going straight and executing another right turn at the following intersection (3). Another vehicle should be placed at the entry of the lane. The car should stop when it detects this vehicle, and should only resume its trajectory once the vehicle has been removed (4). At the next intersection, it should execute a left turn (5). Again, another vehicle will be placed at the entry of the lane. Once the vehicle is removed, the car will complete its trajectory.

### **Required Props**

For this test, which strictly evaluates the car's ability to identify other vehicles, only other vehicles (in particular the car shells) will be used. Given that the vehicles are immobile, a car shell is enough to conduct the test. If insufficient car shells are available, then the car shells should be moved proactively to its successive placements as the test is taking place.

*i.e.*

- Vehicle/Car shell (3 units)

### **Required Running Scripts**

This test will require the control algorithm to run with the car. The camera node will also have to be launched with sign detection set to true.

*i.e.*

- Controller
- Dashboard
- Camera node, sign :=true

### **Estimated Time for Completion**

A single run of this test should take no longer than 10 minutes to complete. It is recommended to run this test more than once, with various vehicle placements along the path of the car to evaluate how these slight changes affect detection and decision making. Each of these following tests should take about 5 minutes. For a total of 3 tests, this would equate to 20 minutes.

*i.e.* 20 minutes.

### **Evaluation Criteria**

- Ability for the car to identify other vehicles
- Distance from which the detection of the vehicle is done
- Distance from which the car stops with respect to the vehicle
- Influence of the position of the vehicle with respect to the car
- Influence of the orientation of the vehicle
- Influence of the position of the vehicle with respect to the planned path
- Factors that influence the detection of the vehicle

## Vehicle not on Path of Car

### Projected Trajectory & Object Placement

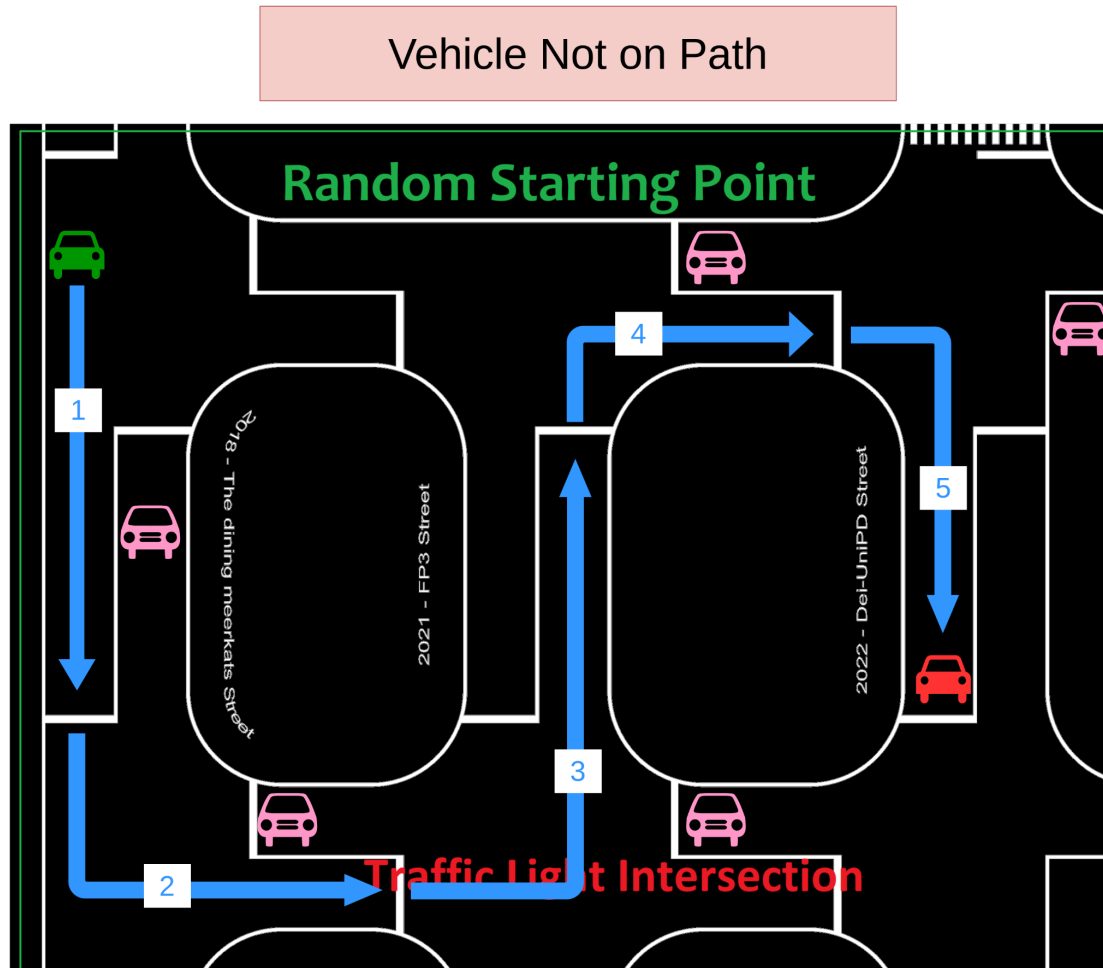


Figure 2 : Proposed trajectory, vehicles not on path of car

Figure 2 shows the proposed trajectory of the car for testing out its ability to identify other vehicles when they are not on its path. The car will start by moving straight until it reaches the first intersection (1). There will be a car placed in the opposite lane. At the intersection, the car will make a left turn (2). As it enters the lane, another car will be in the opposite lane once again. When it reaches the next intersection, it is to make another left turn (3). A car will be placed on the opposite side of the intersection. At the following intersection, the car will make a right turn (4). Once again, there will be a car in the opposite lane. Finally, the car will make one last right turn (5). A car will be across from it, out of bounds. The car will finish its path once it reaches the last intersection.

### **Required Props**

For this test, which strictly evaluates the car's ability to identify other vehicles, only other vehicles (in particular the car shells) will be used. Given that the vehicles are immobile, a car shell is enough to conduct the test. If insufficient car shells are available, then the car shells should be moved proactively to its successive placements as the test is taking place.

*i.e.*

- Vehicle/Car shell (5 units)

### **Required Running Scripts**

This test will require the control algorithm to run with the car. The camera node will also have to be launched with sign detection set to true.

*i.e.*

- Controller
- Dashboard
- Camera node, sign :=true

### **Estimated Time for Completion**

A single run of this test should take no longer than 10 minutes to complete. It is recommended to run this test more than once, with various vehicle placements along the path of the car to evaluate how these slight changes affect detection and decision making. Each of these following tests should take about 5 minutes. For a total of 3 tests, this would equate to 20 minutes.

*i.e.* 20 minutes.

### **Evaluation Criteria**

- Ability for the car to identify other vehicles
- Distance from which the detection of the vehicle is done
- Appropriate behaviour to not stop when not needed
- Influence of the position of the vehicle with respect to the car
- Influence of the orientation of the vehicle
- Influence of the position of the vehicle with respect to the planned path
- Factors that influence the detection of the vehicle