

## Pedestrian Detection Tests

### **Goal of the test**

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

These tests will place a pedestrian in several different areas with respect to the car's planned trajectory. The car's ability to detect that there is or not and whether the pedestrian is in its planned trajectory or not will be evaluated first, and then its decision making based on this information will be evaluated. A variety of scenarios will be considered :

- Pedestrian on the path of the car
- Pedestrian outside of path of the car
- Pedestrian in blind spots

### **Testing Area**

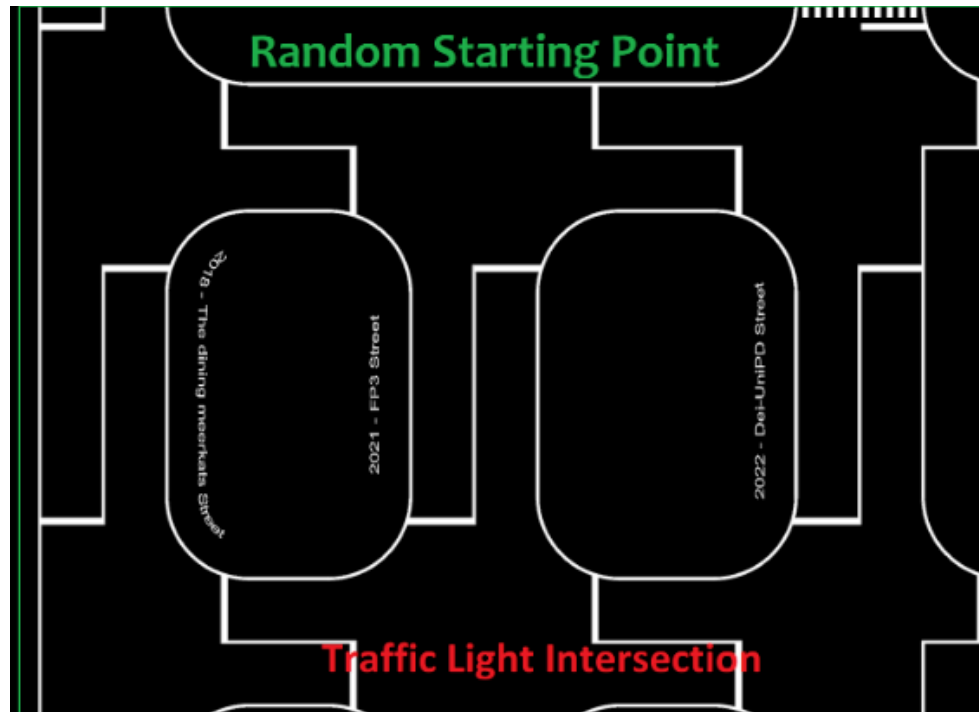


Figure 1 : Intersections to be used in the test

## Pedestrian on Path of Car

### Projected Trajectory & Object Placement

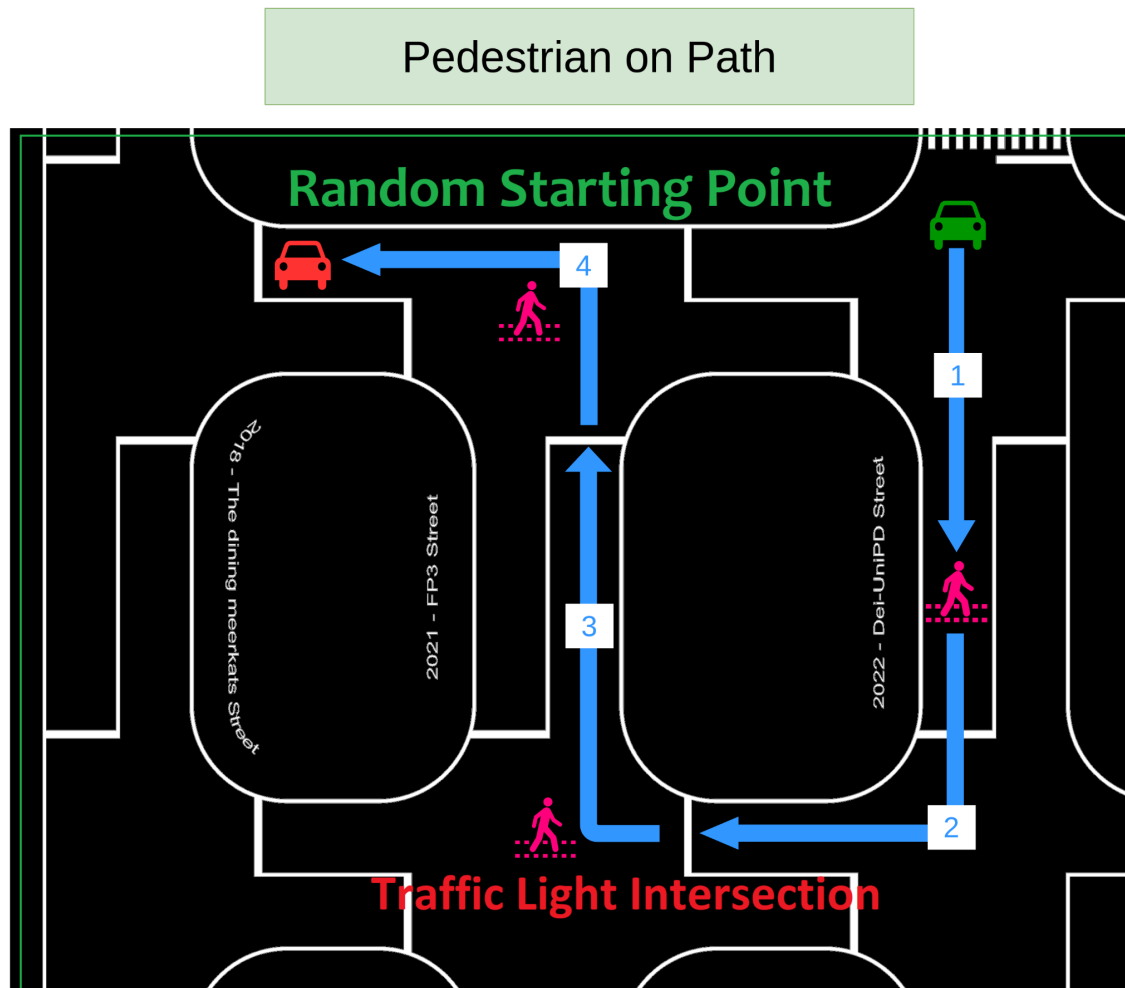


Figure 2 : Proposed trajectory, Pedestrian on path of car

Figure 2 shows the proposed trajectory of the car for testing out its ability to react when encountering a pedestrian on its path. The car begins by moving in a straight line and stopping when it encounters the first pedestrian (1). This pedestrian should be placed halfway between the two intersections, as shown above. Once the pedestrian has been moved out of the way, the car should continue its trajectory, executing a right hand turn at the intersection (2). At the following intersection, there should be a pedestrian in the middle of the intersection. The car should stop and wait for the pedestrian to be removed before performing the right hand turn (3). At the next intersection, another pedestrian will be placed in the middle of the intersection. Once again, the car should wait until the pedestrian is no longer there before attempting its left hand turn (4).

This test should be repeated multiple times with the pedestrian in different places at the intersection to evaluate the behaviour of the car. This test should also place the pedestrian in multiple different angles with respect to the car.

### **Required Props**

For this test, which strictly evaluates the car's ability to identify the pedestrian, only the pedestrian doll will be used. If no more than one pedestrian doll is available, then the doll should be moved proactively to its successive placements as the test is taking place.

*i.e*

- Pedestrian doll (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 pedestrian 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 the pedestrian
- Distance from which the detection of the pedestrian is done
- Distance from which the car stops with respect to the pedestrian
- Influence of the position of the pedestrian with respect to the car
- Influence of the orientation of the pedestrian
- Influence of the position of the pedestrian with respect to the planned path
- Factors that influence the detection of the pedestrian

## Pedestrian not on Path of Car

### Projected Trajectory & Object Placement

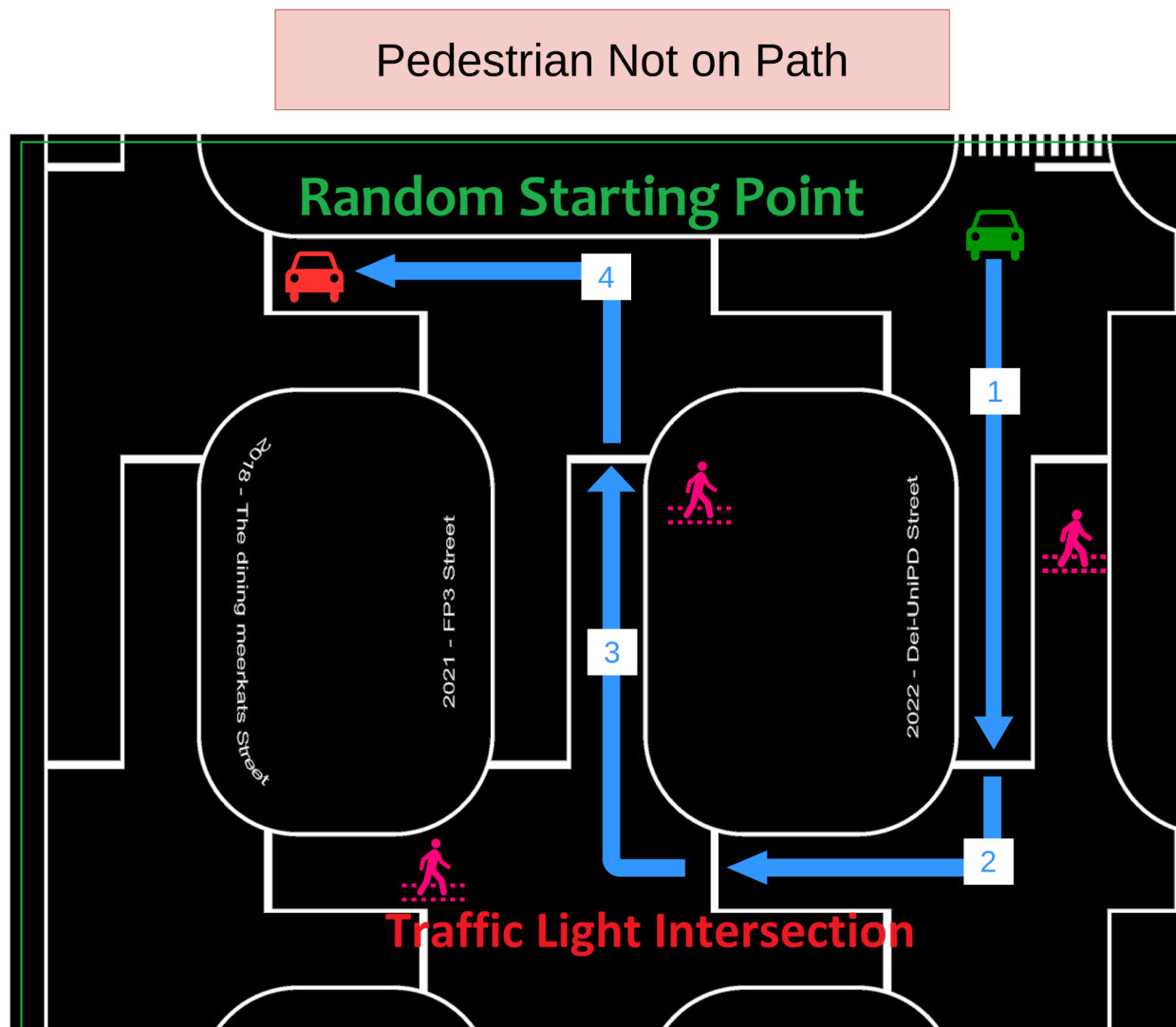


Figure 3 : Proposed trajectory. Pedestrian not on path of car

Figure 2 shows the proposed trajectory of the car for testing out its ability to react when encountering a pedestrian on its path. The car begins by moving in a straight line until it reaches the first intersection. On its way to the intersection, it should cross a pedestrian which is not in its lane but in the opposite lane (1). Upon reaching the intersection, it will make a right turn before reaching the next intersection (2). At this intersection, a pedestrian will be on the far side. The car will be making a right turn (3), so this pedestrian is not in its path. After this right turn, it will reach the following intersection, where a pedestrian will be placed outside of the lane on the car's right hand side. At this point, it will execute a left hand turn before ending the test at the following intersection (4).

This test should be repeated multiple times with the pedestrian in different places at the intersection to evaluate the behaviour of the car. This test should also place the pedestrian in multiple different angles with respect to the car.

### **Required Props**

For this test, which strictly evaluates the car's ability to identify the pedestrian, only the pedestrian doll will be used. If no more than one pedestrian doll is available, then the doll should be moved proactively to its successive placements as the test is taking place.

*i.e.*

- Pedestrian doll (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 pedestrian 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 the pedestrian
- Distance from which the detection of the pedestrian is done
- Decision of the car to stop or not
- Influence of the position of the pedestrian with respect to the car
- Influence of the orientation of the pedestrian
- Influence of the position of the pedestrian with respect to the planned path
- Factors that influence the detection of the pedestrian

## Pedestrian in Blind Spots

### Projected Trajectory & Object Placement

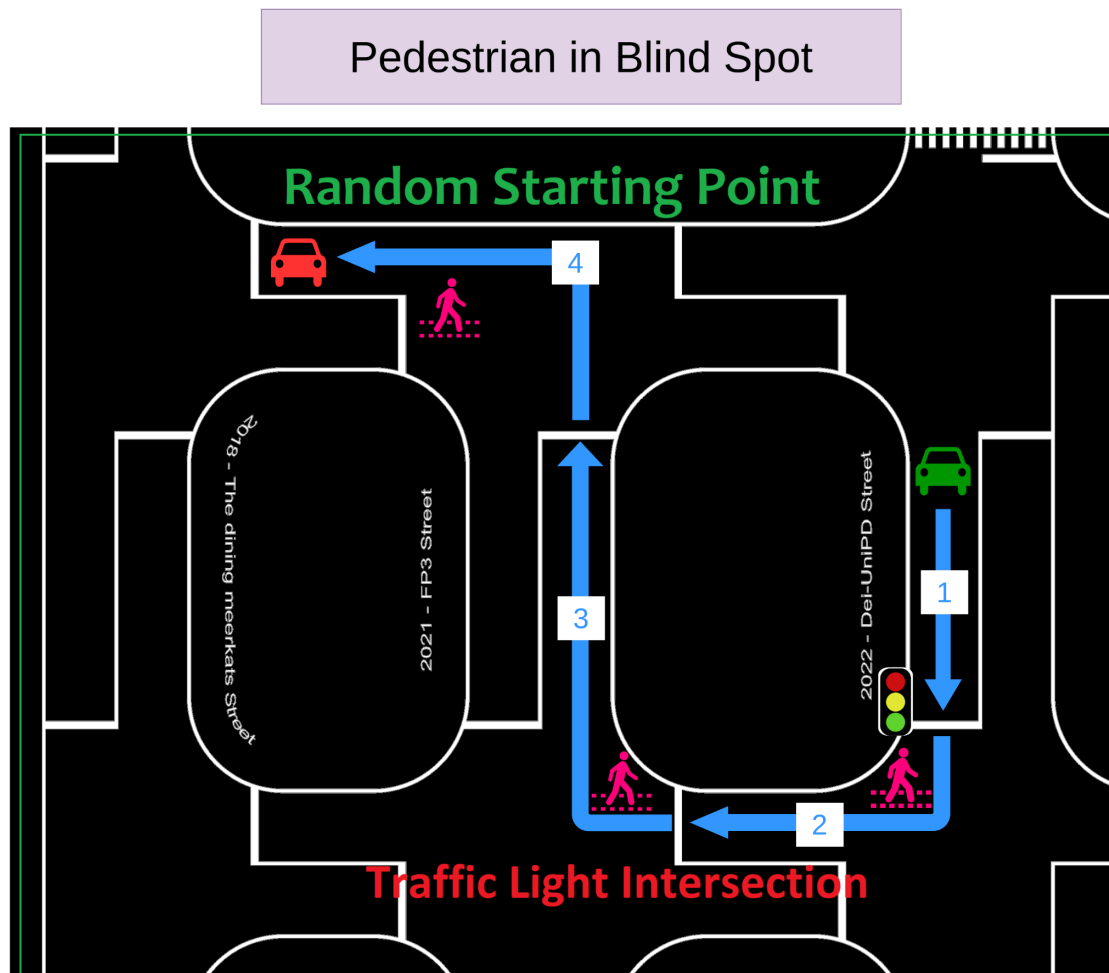


Figure 4 : Proposed trajectory. Pedestrian in blind spots

The car will begin with a straight line trajectory before stopping at the intersection because of the traffic light (1). It will then initiate a right hand turn (2). On the inside of this turn and behind the traffic light will be a pedestrian. This pedestrian may be in a blind spot for two reasons : the inside of the turn is not covered by the camera feed, or the traffic light is an obstacle to the detection. It should be able to detect the pedestrian and wait for it to be moved before continuing to the following intersection. It will initiate another right hand turn at this time (3), and another pedestrian will be placed on the inside of the turn. As with before, it should be able to detect this pedestrian before continuing its course. At the following intersection, it will execute a left hand turn (4). At the edge of this turn there should be a pedestrian which is not initially in the camera feed. The car should stop before hitting it and resume its course once it is removed.

As shown in the figure, the test should be repeated by replacing the traffic light by a stop sign, and then by a priority sign. The placement of the pedestrian should also be slightly tweaked.

### **Required Props**

For this test, which evaluates the car's ability to identify the pedestrian when it is placed in potential blind spots, the pedestrian doll will be used as well as the traffic light, a stop sign and a priority sign. If no more than one pedestrian doll is available, then the doll should be moved proactively to its successive placements as the test is taking place.

*i.e*

- Pedestrian doll (3 units)
- Traffic light (1 unit)
- Stop sign (1 unit)
- Priority sign (1 unit)

### **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 pedestrian 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 the pedestrian
- Distance from which the detection of the pedestrian is done
- Decision of the car to stop or not
- Distance from which the car stops with respect to the pedestrian
- Influence of the position of the pedestrian with respect to the car
- Influence of the orientation of the pedestrian
- Influence of the position of the pedestrian with respect to the planned path
- Factors that influence the detection of the pedestrian
- How do the signs influence the detection of the pedestrian?