Sign Detection Tests

Goal of the test

Evaluate the ability of the car to identify various signs along its trajectory. This test aims to see if all signs can be identified at all potential positions they could be with respect to the car. It also aims to see if the car can correctly identify pedestrians and other vehicles. Finally, it verifies if the correct decision is taken based on the identified object and its position relative to the car.

Given the expansive goals of the test, it will be split up into several smaller procedures that enable the individual evaluation of each aspect of object detection. These test are the following :

- Pure Sign Detection
- Sign Detection : Left Hand Turns
- Sign Detection : Right Hand Turns

Testing Area

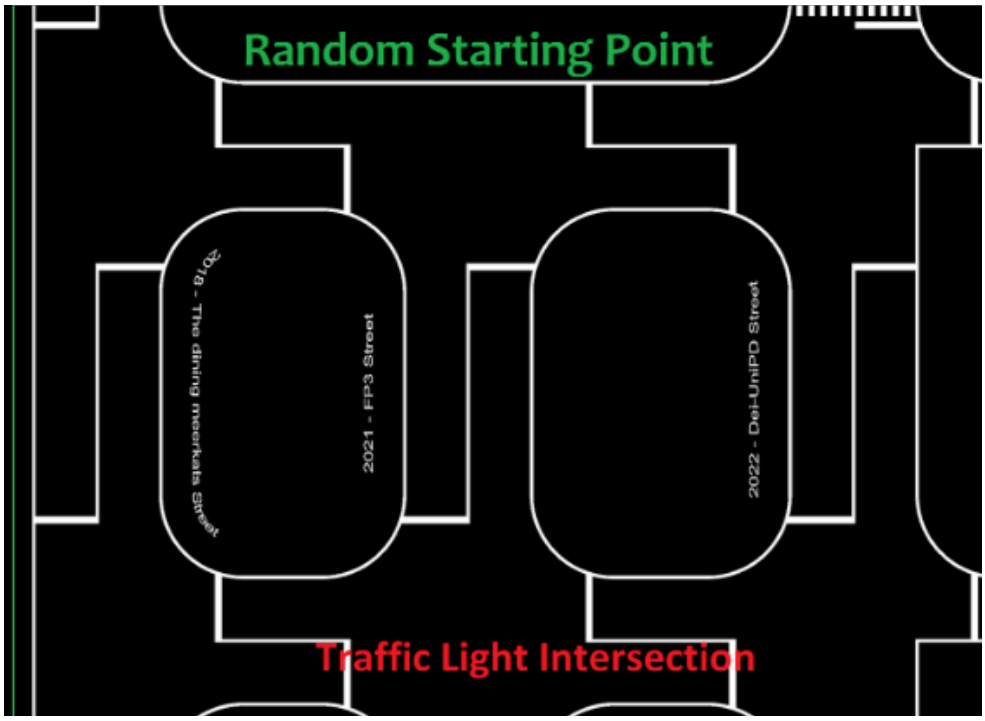

Figure 1 : Intersections to be used in the test

The testing area used will be the above intersections. These have been chosen because they offer a variety of different possible sign and object placements within a fairly concise area.

Pure Sign Detection

Projected Trajectory & Object Placement

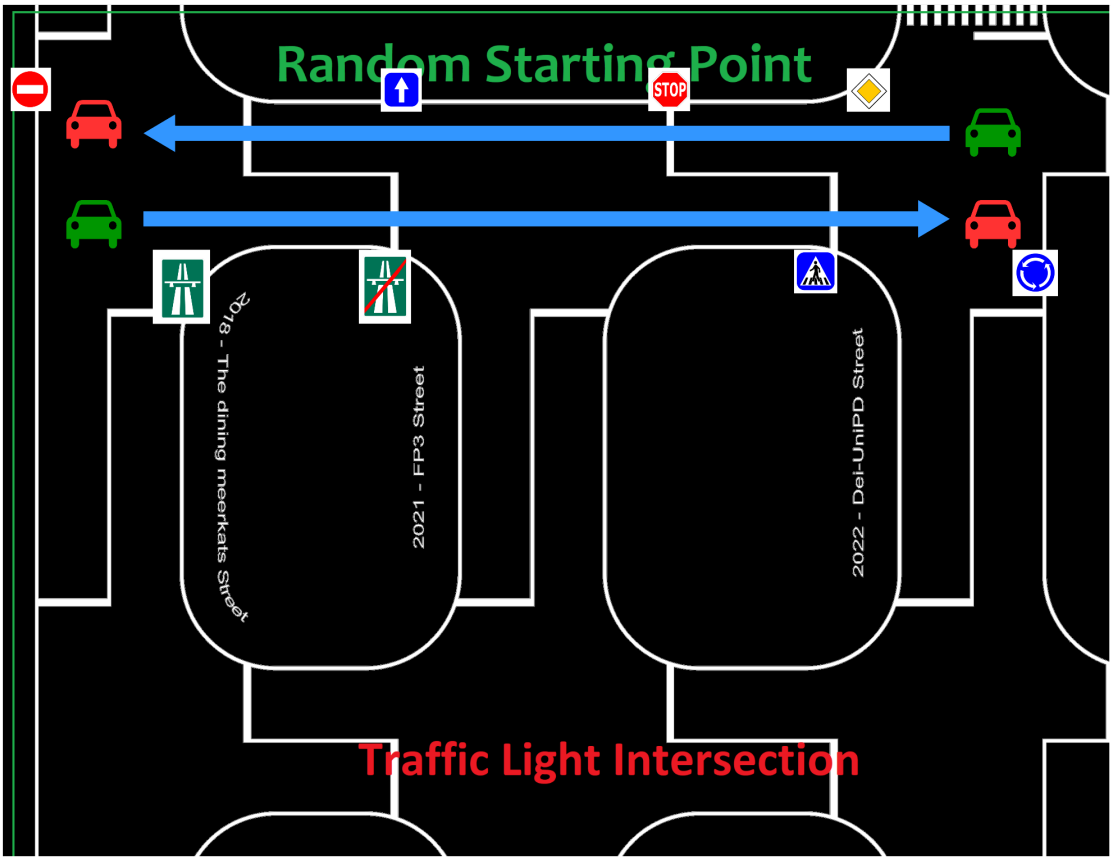

Figure 2 : Proposed trajectory of the car, Pure Sign Detection

Figure 2 shows the proposed trajectory of the car for testing out the detection of signs on the right hand side of the car. The intention of this test is purely to verify that all signs can be identified in real world conditions. Therefore, the signs are not necessarily placed in positions that they would be placed in a real run.

Required Props

For the purpose of this test, which strictly evaluates sign detection depending on their placement on the right hand side of the car, all signs are required except for the parking sign. *i.e.*

- Track
- Car
- Stop sign (1 unit)
- Priority sign (1 unit)
- Highway entrance sign (1 unit)
- Highway exit sign (1 unit)

- Roundabout sign (1 unit)
- Crosswalk sign (1 unit)
- One-way sign (1 unit)
- No entry 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

The time allocated for this test should be no more than 10 minutes. If there are failures to identify certain signs, the conditions for these failures should be quickly noted in order to adjust the sign detection model training accordingly.
i.e. 10 minutes

Evaluation Criteria

- Ability to identify all signs
- When does the sign disappear from the camera feed?
- From what distance is the sign identified in the camera feed?
- Confusion because of multiple signs one behind the other?
- Behaviour when signs are in unexpected places?

Sign Detection and Left Turns

Projected Trajectory & Object Placement

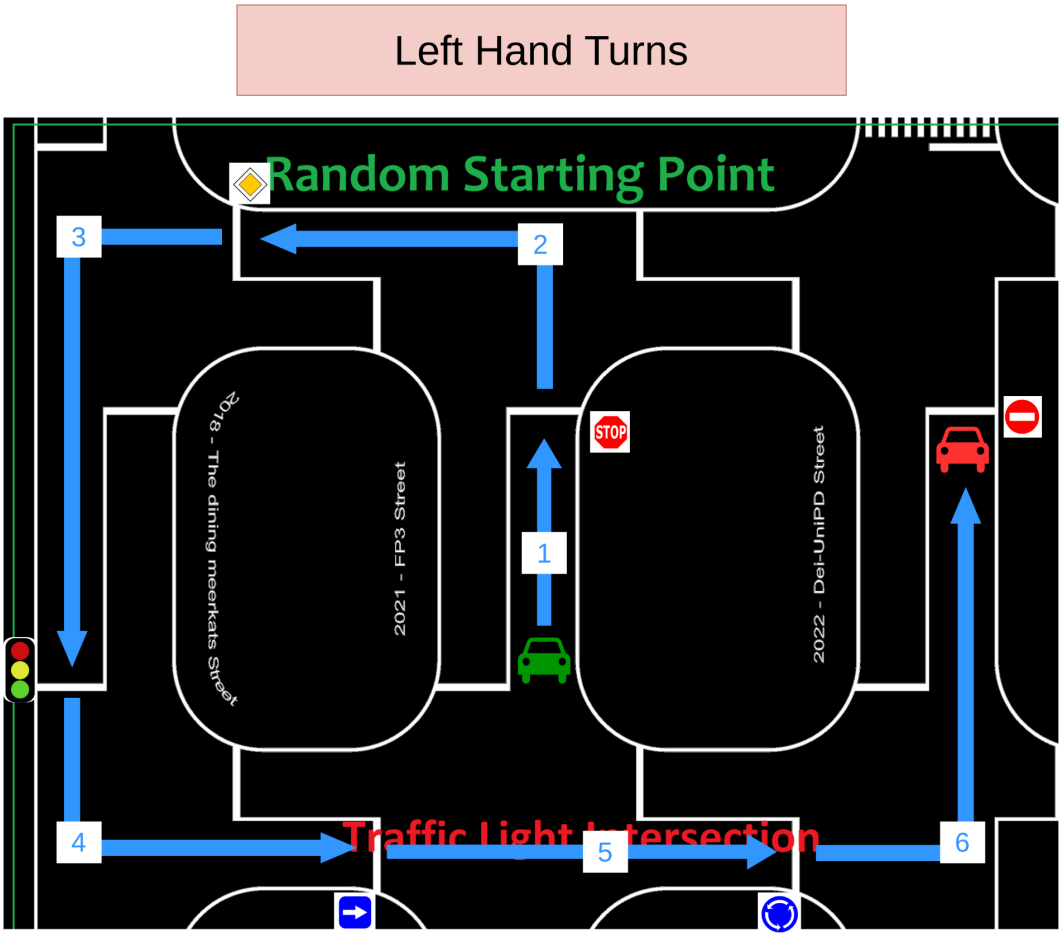

Figure 3 : Proposed trajectory of the car, Left Hand Turns

Figure 3 shows the proposed trajectory of the car for testing out sign detection with respect to left hand turns. The car will begin by maintaining a straight line movement until it reaches the **stop sign** (1). At this point, the car should stop before initiating a left hand turn into the appropriate lane. It should continue past the intersection without stopping since there is a **priority sign** at this intersection (2). As it crosses this intersection, it should begin a left hand turn to enter the lane as shown in (3), maintaining its course until it reaches the following intersection which has a **traffic light**. At this traffic light, it should stop before performing another left hand turn (4). A straight line trajectory should then be followed without stopping (5), given it will cross a **one way sign**. At the **roundabout sign,** it should initiate a final left hand turn, merging into the lane before finally stopping when it sees the **no entry sign** (6).

Required Props

For the purpose of this test, the following signs are required :

- Stop sign (1 unit)
- Priority sign (1 unit)
- Traffic light (1 unit)
- One way sign (1 unit)
- Roundabout sign (1 unit)
- No entry sign (1 unit)

Required Running Scripts

The car should be running the camera node with sign detection enabled, the controller and the dashboard so that we can evaluate the quality of the detection.
i.e.

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

Estimated Time for Completion

The allocated time for this test should be around 15 minutes. This includes placement of the signs in the appropriate places, placement of the car, running, light troubleshooting and evaluation of the results.
i.e. 15 minutes

Evaluation Criteria

- Ability to identify all signs
- Ability to identify the sign when exiting a turn
- When does the sign disappear from the camera feed?
- Ability to take correct decision after having identified the sign
- Are there situations where it has more trouble identifying the sign?

Sign Detection and Right Turns

Projected Trajectory & Object Placement

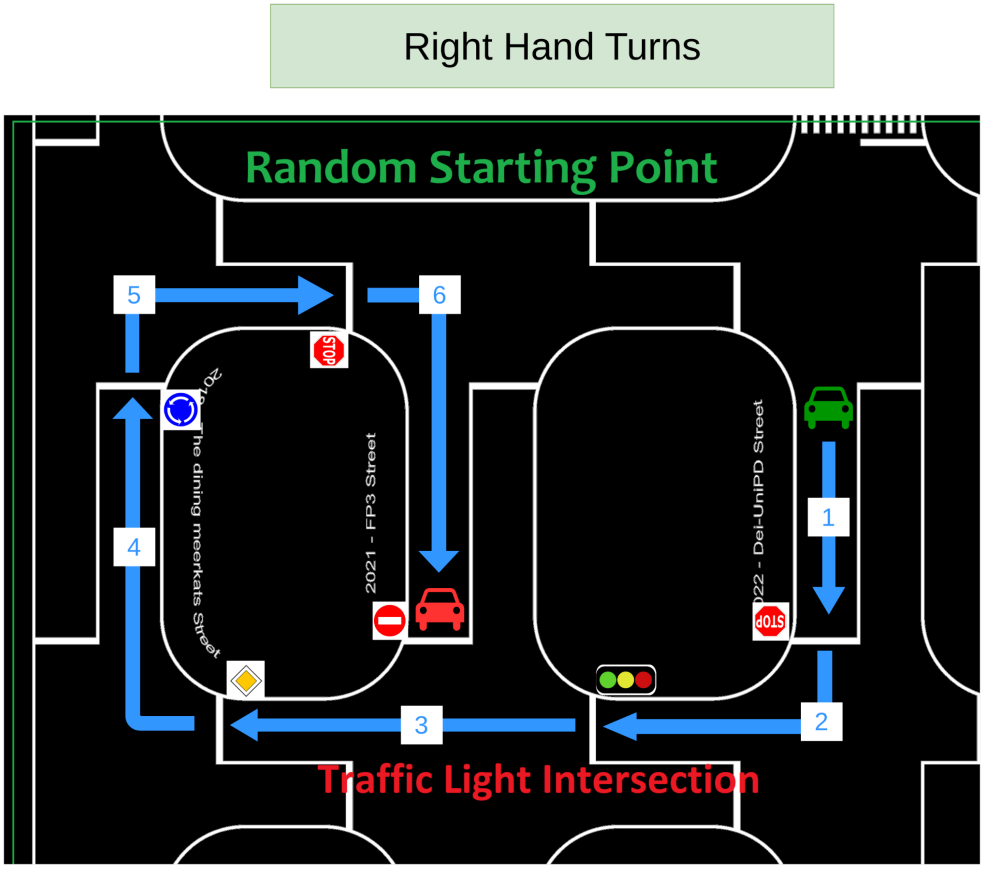

Figure 4 : Proposed trajectory of the car, Right Hand Turns

Figure 4 shows the proposed trajectory of the car with respect to right hand turns. The car starts by advancing in a straight line until it reaches the first intersection, where it should stop because of the **stop sign** (1). It should then perform a right hand turn to merge into the lane, and stop at the following intersection when it sees the **traffic light** (2). At this light, the car should take a short break, continuing straight before starting a right hand turn at the following intersection without stopping because of the **priority sign** (3). Coming out of this right hand turn, it should merge into the lane and perform another right hand turn at the next intersection, yet again without stopping because of the **roundabout sign** (4). It should however stop at the following intersection, after having merged into the lane, when it sees the **stop sign** (5). A final right hand turn should lead the car to its final stopping point when it recognizes the **no entry sign** (6).

Required Props

For the purpose of this test, the following signs are required :

- Stop sign (2 units)
- Priority sign (1 unit)

- Traffic light (1 unit)
- Roundabout sign (1 unit)
- No entry sign (1 unit)

Required Running Scripts

The car should be running the camera node with sign detection enabled, the controller and the dashboard so that we can evaluate the quality of the detection.
i.e.

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

Estimated Time for Completion

The allocated time for this test should be around 15 minutes. This includes placement of the signs in the appropriate places, placement of the car, running, light troubleshooting and evaluation of the results.
i.e. 15 minutes

Evaluation Criteria

- Ability to identify all signs
- Ability to identify the sign when exiting a turn
- When does the sign disappear from the camera feed?
- Ability to take correct decision after having identified the sign
- Are there situations where it has more trouble identifying the sign?