Dynamic Obstacle Avoidance - Test Specification Report

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26-May-2021 10:06:07

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1. Dynamic_obstacle_avoidance

Test Details

Description	This report describes the tests performed for the Obstacle Avoidance regarding a dynamic obstacle moving at a lower speed respect to the ego-vehicle considering different simple scenarios at 40km/h and 100km/h.

1.1. Dynamic_obstacle 100km/h

1.1.1. 0° 100km/h

PostLoad Callback

```
%% Set Speed
V = 100/3.6;

%% Scenario Loading
map = [0 0; 1000 0];

% Evaluate total distance covered by the route on the map
distance = odometer(map);
%% Reference signal
% Upsample map based on speed and timestep
[X_rec, Y_rec, Theta_rec] = reference_generator(map,V,Ts);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 50/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
```

```
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
            start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, ***if*** an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.1.2. 20° 100km/h

PostLoad Callback

```
%% Set Speed
V = 100/3.6;
%% Scenario Loading
map = [0 0; 1000 364];

% Evaluate total distance covered by the route on the map
distance = odometer(map);
%% Reference signal
% Upsample map based on speed and timestep
[X_rec, Y_rec, Theta_rec] = reference_generator(map,V,Ts);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 50/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
            start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.1.3. 45° 100km/h

PostLoad Callback

```
%% Set Speed
V = 100/3.6;
%% Scenario Loading
map = [0 0; 1000 1000];

% Evaluate total distance covered by the route on the map
distance = odometer(map);
%% Reference signal
% Upsample map based on speed and timestep
[X_rec, Y_rec, Theta_rec] = reference_generator(map,V,Ts);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
```

```
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 50/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
            start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	

Enabled	Name	Definition	Requirements
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.1.4. 70° 100km/h

PostLoad Callback

```
%% Set Speed
V = 100/3.6;
%% Scenario Loading
map = [0 0; 1000 2747];

% Evaluate total distance covered by the route on the map
distance = odometer(map);
%% Reference signal
% Upsample map based on speed and timestep
[X_rec, Y_rec, Theta_rec] = reference_generator(map,V,Ts);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 50/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
```

```
        start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.1.5. 90° 100km/h

PostLoad Callback

```
%% Set Speed
V = 100/3.6;
%% Scenario Loading
map = [0 0; 0 1000];

% Evaluate total distance covered by the route on the map
distance = odometer(map);
%% Reference signal
% Upsample map based on speed and timestep
[X_rec, Y_rec, Theta_rec] = reference_generator(map,V,Ts);
```

```
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 50/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
            start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	

Enabled	Name	Definition	Requirements
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.1.6. 110° 100km/h

PostLoad Callback

```
%% Set Speed
V = 100/3.6;
%% Scenario Loading
map = [0 0; -364 1000];

% Evaluate total distance covered by the route on the map
distance = odometer(map);
%% Reference signal
% Upsample map based on speed and timestep
[X_rec, Y_rec, Theta_rec] = reference_generator(map,V,Ts);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 50/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
```

```
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
            repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
        start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.1.7. 135° 100km/h

PostLoad Callback

```
%% Set Speed
V = 100/3.6;
%% Scenario Loading
map = [0 0; -1000 1000];
```

```
% Evaluate total distance covered by the route on the map
distance = odometer(map);
%% Reference signal
% Upsample map based on speed and timestep
[X_rec, Y_rec, Theta_rec] = reference_generator(map,V,Ts);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 50/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
            start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	

Enabled	Name	Definition	Requirements
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.1.8. 160° 100km/h

PostLoad Callback

```
%% Set Speed
V = 100/3.6;
%% Scenario Loading
map = [0 0; -2747 1000];

% Evaluate total distance covered by the route on the map
distance = odometer(map);
%% Reference signal
% Upsample map based on speed and timestep
[X_rec, Y_rec, Theta_rec] = reference_generator(map,V,Ts);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 50/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
```

```
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
            start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.1.9. 180° 100km/h

PostLoad Callback

```
%% Set Speed
V = 100/3.6;
```

```
%% Scenario Loading
map = [0 0; -1000 0];

% Evaluate total distance covered by the route on the map
distance = odometer(map);
%% Reference signal
% Upsample map based on speed and timestep
[X_rec, Y_rec, Theta_rec] = reference_generator(map,V,Ts);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 50/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
            start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.1.10. -20° 100km/h

PostLoad Callback

```
%% Set Speed
V = 100/3.6;
%% Scenario Loading
map = [0 0; 1000 -364];

% Evaluate total distance covered by the route on the map
distance = odometer(map);
%% Reference signal
% Upsample map based on speed and timestep
[X_rec, Y_rec, Theta_rec] = reference_generator(map,V,Ts);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
```

```
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;

% Obstacle definition
V_obst = 50/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
            start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	

Enabled	Name	Definition	Requirements
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.1.11. -45° 100km/h

PostLoad Callback

```
%% Set Speed
V = 100/3.6;
%% Scenario Loading
map = [0 0; 1000 -1000];

% Evaluate total distance covered by the route on the map
distance = odometer(map);
%% Reference signal
% Upsample map based on speed and timestep
[X_rec, Y_rec, Theta_rec] = reference_generator(map,V,Ts);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 50/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
```

```
        start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.1.12. -70° 100km/h

PostLoad Callback

```
%% Set Speed
V = 100/3.6;
%% Scenario Loading
map = [0 0; 1000 -2747];

% Evaluate total distance covered by the route on the map
distance = odometer(map);
%% Reference signal
% Upsample map based on speed and timestep
[X_rec, Y_rec, Theta_rec] = reference_generator(map,V,Ts);
```

```
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 50/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
            start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	

Enabled	Name	Definition	Requirements
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.1.13. -90° 100km/h

PostLoad Callback

```
%% Set Speed
V = 100/3.6;
%% Scenario Loading
map = [0 0; 0 -1000];

% Evaluate total distance covered by the route on the map
distance = odometer(map);
%% Reference signal
% Upsample map based on speed and timestep
[X_rec, Y_rec, Theta_rec] = reference_generator(map,V,Ts);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;

% Obstacle definition
V_obst = 50/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
```

```
                point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
            repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
        start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.1.14. -110° 100km/h

PostLoad Callback

```
%% Set Speed
V = 100/3.6;
%% Scenario Loading
map = [0 0; -364 -1000];
```

```
% Evaluate total distance covered by the route on the map
distance = odometer(map);
%% Reference signal
% Upsample map based on speed and timestep
[X_rec, Y_rec, Theta_rec] = reference_generator(map,V,Ts);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 50/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
            start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	

Enabled	Name	Definition	Requirements
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.1.15. -135° 100km/h

PostLoad Callback

```
%% Set Speed
V = 100/3.6;
%% Scenario Loading
map = [0 0; -1000 -1000];

% Evaluate total distance covered by the route on the map
distance = odometer(map);
%% Reference signal
% Upsample map based on speed and timestep
[X_rec, Y_rec, Theta_rec] = reference_generator(map,V,Ts);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 50/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
```

```
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
            start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.1.16. -160° 100km/h

PostLoad Callback

```
%% Set Speed
V = 100/3.6;
```

```
%% Scenario Loading
map = [0 0; -2747 -1000];

% Evaluate total distance covered by the route on the map
distance = odometer(map);
%% Reference signal
% Upsample map based on speed and timestep
[X_rec, Y_rec, Theta_rec] = reference_generator(map,V,Ts);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 50/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
            start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.1.17. 1000m curvature clockwise 100km/h

PostLoad Callback

```
%% Set Speed
V = 100/3.6;
%% Scenario Loading
[X_rec, Y_rec, Theta_rec] = curve_generator(-1000,V,Ts);
map = [X_rec Y_rec];
distance = odometer(map);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
```

```
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 50/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
            start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.1.18. 500m curvature clockwise 100km/h

PostLoad Callback

```
%% Set Speed
V = 100/3.6;
%% Scenario Loading
[X_rec, Y_rec, Theta_rec] = curve_generator(-500,V,Ts);
map = [X_rec Y_rec];
distance = odometer(map);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;

% Obstacle definition
V_obst = 50/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
            start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.1.19. 300m curvature clockwise 100km/h

PostLoad Callback

```
%% Set Speed
V = 100/3.6;
%% Scenario Loading
[X_rec, Y_rec, Theta_rec] = curve_generator(-300,V,Ts);
map = [X_rec Y_rec];
distance = odometer(map);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
```

```
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 50/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
            start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.1.20. 300m curvature counterclockwise 100km/h

PostLoad Callback

```
%% Set Speed
V = 100/3.6;
%% Scenario Loading
[X_rec, Y_rec, Theta_rec] = curve_generator(300,V,Ts);
map = [X_rec Y_rec];
distance = odometer(map);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 50/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
            start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.1.21. 500m curvature counterclockwise 100km/h

PostLoad Callback

```
%% Set Speed
V = 100/3.6;
%% Scenario Loading
[X_rec, Y_rec, Theta_rec] = curve_generator(500,V,Ts);
map = [X_rec Y_rec];
distance = odometer(map);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
```

```
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 50/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
            start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.1.22. 1000m curvature counterclockwise 100km/h

PostLoad Callback

```
%% Set Speed
V = 100/3.6;
%% Scenario Loading
[X_rec, Y_rec, Theta_rec] = curve_generator(1000,V,Ts);
map = [X_rec Y_rec];
distance = odometer(map);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 50/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
            start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.2. Dynamic_obstacle 40km/h

1.2.1. 0° 40km/h

PostLoad Callback

```
%% Set Speed
V = 40/3.6;
%% Scenario Loading
map = [0 0; 1000 0];

% Evaluate total distance covered by the route on the map
distance = odometer(map);
%% Reference signal
% Upsample map based on speed and timestep
[X_rec, Y_rec, Theta_rec] = reference_generator(map,V,Ts);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
```

```
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 10/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
            start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, ***if*** an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	

Enabled	Name	Definition	Requirements
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.2.2. 20° 40km/h

PostLoad Callback

```
%% Set Speed
V = 40/3.6;
%% Scenario Loading
map = [0 0; 1000 364];

% Evaluate total distance covered by the route on the map
distance = odometer(map);
%% Reference signal
% Upsample map based on speed and timestep
[X_rec, Y_rec, Theta_rec] = reference_generator(map,V,Ts);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 10/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
```

```
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
            repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
        start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.2.3. 45° 40km/h

PostLoad Callback

```
%% Set Speed
V = 40/3.6;
%% Scenario Loading
map = [0 0; 1000 1000];
```

```
% Evaluate total distance covered by the route on the map
distance = odometer(map);
%% Reference signal
% Upsample map based on speed and timestep
[X_rec, Y_rec, Theta_rec] = reference_generator(map,V,Ts);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 10/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
            start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	

Enabled	Name	Definition	Requirements
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.2.4. 70° 40km/h

PostLoad Callback

```
%% Set Speed
V = 40/3.6;
%% Scenario Loading
map = [0 0; 1000 2747];

% Evaluate total distance covered by the route on the map
distance = odometer(map);
%% Reference signal
% Upsample map based on speed and timestep
[X_rec, Y_rec, Theta_rec] = reference_generator(map,V,Ts);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 10/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
```

```
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
            start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.2.5. 90° 40km/h

PostLoad Callback

```
%% Set Speed
V = 40/3.6;
```

```
%% Scenario Loading
map = [0 0; 0 1000];

% Evaluate total distance covered by the route on the map
distance = odometer(map);
%% Reference signal
% Upsample map based on speed and timestep
[X_rec, Y_rec, Theta_rec] = reference_generator(map,V,Ts);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 10/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
            start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.2.6. 110° 40km/h

PostLoad Callback

```
%% Set Speed
V = 40/3.6;
%% Scenario Loading
map = [0 0; -364 1000];

% Evaluate total distance covered by the route on the map
distance = odometer(map);
%% Reference signal
% Upsample map based on speed and timestep
[X_rec, Y_rec, Theta_rec] = reference_generator(map,V,Ts);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
```

```
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 10/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
            start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	

Enabled	Name	Definition	Requirements
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.2.7. 135° 40km/h

PostLoad Callback

```
%% Set Speed
V = 40/3.6;
%% Scenario Loading
map = [0 0; -1000 1000];

% Evaluate total distance covered by the route on the map
distance = odometer(map);
%% Reference signal
% Upsample map based on speed and timestep
[X_rec, Y_rec, Theta_rec] = reference_generator(map,V,Ts);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 10/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
```

```
        start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.2.8. 160° 40km/h

PostLoad Callback

```
%% Set Speed
V = 40/3.6;
%% Scenario Loading
map = [0 0; -2747 1000];

% Evaluate total distance covered by the route on the map
distance = odometer(map);
%% Reference signal
% Upsample map based on speed and timestep
[X_rec, Y_rec, Theta_rec] = reference_generator(map,V,Ts);
```

```
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 10/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
            start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	

Enabled	Name	Definition	Requirements
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.2.9. 180° 40km/h

PostLoad Callback

```
%% Set Speed
V = 40/3.6;
%% Scenario Loading
map = [0 0; -1000 0];

% Evaluate total distance covered by the route on the map
distance = odometer(map);
%% Reference signal
% Upsample map based on speed and timestep
[X_rec, Y_rec, Theta_rec] = reference_generator(map,V,Ts);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 10/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
```

```
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
            repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
        start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.2.10. -20° 40km/h

PostLoad Callback

```
%% Set Speed
V = 40/3.6;
%% Scenario Loading
map = [0 0; 1000 -364];
```

```
% Evaluate total distance covered by the route on the map
distance = odometer(map);
%% Reference signal
% Upsample map based on speed and timestep
[X_rec, Y_rec, Theta_rec] = reference_generator(map,V,Ts);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;

% Obstacle definition
V_obst = 10/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
            start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	

Enabled	Name	Definition	Requirements
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.2.11. -45° 40km/h

PostLoad Callback

```
%% Set Speed
V = 40/3.6;
%% Scenario Loading
map = [0 0; 1000 -1000];

% Evaluate total distance covered by the route on the map
distance = odometer(map);
%% Reference signal
% Upsample map based on speed and timestep
[X_rec, Y_rec, Theta_rec] = reference_generator(map,V,Ts);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 10/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
```

```
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
            start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.2.12. -70° 40km/h

PostLoad Callback

```
%% Set Speed
V = 40/3.6;
```

```
%% Scenario Loading
map = [0 0; 1000 -2747];

% Evaluate total distance covered by the route on the map
distance = odometer(map);
%% Reference signal
% Upsample map based on speed and timestep
[X_rec, Y_rec, Theta_rec] = reference_generator(map,V,Ts);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 10/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
            start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.2.13. -90° 40km/h

PostLoad Callback

```
%% Set Speed
V = 40/3.6;
%% Scenario Loading
map = [0 0; 0 -1000];

% Evaluate total distance covered by the route on the map
distance = odometer(map);
%% Reference signal
% Upsample map based on speed and timestep
[X_rec, Y_rec, Theta_rec] = reference_generator(map,V,Ts);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
```

```
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;

% Obstacle definition
V_obst = 10/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
            start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	

Enabled	Name	Definition	Requirements
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.2.14. -110° 40km/h

PostLoad Callback

```
%% Set Speed
V = 40/3.6;
%% Scenario Loading
map = [0 0; -364 -1000];

% Evaluate total distance covered by the route on the map
distance = odometer(map);
%% Reference signal
% Upsample map based on speed and timestep
[X_rec, Y_rec, Theta_rec] = reference_generator(map,V,Ts);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 10/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
```

```
        start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.2.15. -135° 40km/h

PostLoad Callback

```
%% Set Speed
V = 40/3.6;
%% Scenario Loading
map = [0 0; -1000 -1000];

% Evaluate total distance covered by the route on the map
distance = odometer(map);
%% Reference signal
% Upsample map based on speed and timestep
[X_rec, Y_rec, Theta_rec] = reference_generator(map,V,Ts);
```

```
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 10/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
            start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	

Enabled	Name	Definition	Requirements
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.2.16. -160° 40km/h

PostLoad Callback

```
%% Set Speed
V = 40/3.6;
%% Scenario Loading
map = [0 0; -2747 -1000];

% Evaluate total distance covered by the route on the map
distance = odometer(map);
%% Reference signal
% Upsample map based on speed and timestep
[X_rec, Y_rec, Theta_rec] = reference_generator(map,V,Ts);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 10/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
```

```
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
            repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
        start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.2.17. 1000m curvature clockwise 40km/h

PostLoad Callback

```
%% Set Speed
V = 40/3.6;
%% Scenario Loading
[X_rec, Y_rec, Theta_rec] = curve_generator(-1000,V,Ts);
map = [X_rec Y_rec];
```

```
distance = odometer(map);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 10/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
            start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	

Enabled	Name	Definition	Requirements
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.2.18. 500m curvature clockwise 40km/h

PostLoad Callback

```
%% Set Speed
V = 40/3.6;
%% Scenario Loading
[X_rec, Y_rec, Theta_rec] = curve_generator(-500,V,Ts);
map = [X_rec Y_rec];
distance = odometer(map);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;

% Obstacle definition
V_obst = 10/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostacolo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
```

```
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
        start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.2.19. 300m curvature clockwise 40km/h

PostLoad Callback

```
%% Set Speed
V = 40/3.6;
%% Scenario Loading
[X_rec, Y_rec, Theta_rec] = curve_generator(-300,V,Ts);
map = [X_rec Y_rec];
distance = odometer(map);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
```

```
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 10/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
            start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(later-	

Enabled	Name	Definition	Requirements
		al_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.2.20. 300m curvature counterclockwise 40km/h

PostLoad Callback

```
%% Set Speed
V = 40/3.6;
%% Scenario Loading
[X_rec, Y_rec, Theta_rec] = curve_generator(300,V,Ts);
map = [X_rec Y_rec];
distance = odometer(map);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 10/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
            start_dyn_obst];
```

```
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.2.21. 500m curvature counterclockwise 40km/h

PostLoad Callback

```
%% Set Speed
V = 40/3.6;
%% Scenario Loading
[X_rec, Y_rec, Theta_rec] = curve_generator(500,V,Ts);
map = [X_rec Y_rec];
distance = odometer(map);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
```

```
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 10/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
            start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	

Enabled	Name	Definition	Requirements
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	

1.2.22. 1000m curvature counterclockwise 40km/h

PostLoad Callback

```
%% Set Speed
V = 40/3.6;
%% Scenario Loading
[X_rec, Y_rec, Theta_rec] = curve_generator(1000,V,Ts);
map = [X_rec Y_rec];
distance = odometer(map);
% Extend the reference signal to avoid index over limits
X_rec(end+1:end+p+20) = X_rec(end);
Y_rec(end+1:end+p+20) = Y_rec(end);
Theta_rec(end+1:end+p+20) = Theta_rec(end);
% Define initial condition based on map
x0_kin = [X_rec(1) Y_rec(1) Theta_rec(1) V]';
x0_dyn = [X_rec(1) Y_rec(1) Theta_rec(1) V 0 0]';
extended_map = [X_rec Y_rec Theta_rec repmat(V,length(X_rec),1)];
egoStates.Plant = x0_kin';
egoStates.Covariance = eye(6)*1000;
% Obstacle definition
V_obst = 10/3.6;
[X_ostacolo, Y_ostacolo, theta_ostacolo] = reference_generator(map,V_obst,Ts);
point_B = round(length(X_ostacolo)*0.4);
number_obstacles = [point_B
                    point_B];
dyn_obstacle1 = [X_ostacolo(point_B:end) Y_ostacolo(point_B:end) theta_ostaco-
lo(point_B:end)...
                 repmat(V_obst,length(X_ostacolo(point_B:end)),1)];
start_dyn_obst = [X_ostacolo(point_B) Y_ostacolo(point_B) V_obst];
obstacle = [start_dyn_obst
            start_dyn_obst];
X_obstacle_dyn = dyn_obstacle1(:,1);
Y_obstacle_dyn = dyn_obstacle1(:,2);
theta_obstacle_dyn = dyn_obstacle1(:,3);
```

Logical and Temporal Assessments

Assessments

Enabled	Name	Definition	Requirements
True	Left lane assessment 1	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(lateral_dev >= 2 && lateral_dev <= 6) must be true must be true	
True	Left lane assessment 2	At any point of time, At ***any*** point of time, verify(lateral_dev < 6) must be true must be true	
True	Safe overtake assessment	At any point of time, At ***any*** point of time, if an obstacle is detected: verify(duration(lateral_dev > 5 && lateral_ dev < 3,sec) < 1) must be true must be true	
True	Lateral acceleration assessment	At any point of time, At ***any*** point of time, verify(duration(Lateral_ acceleration >= 2,sec)<=0.5) must be true must be true	