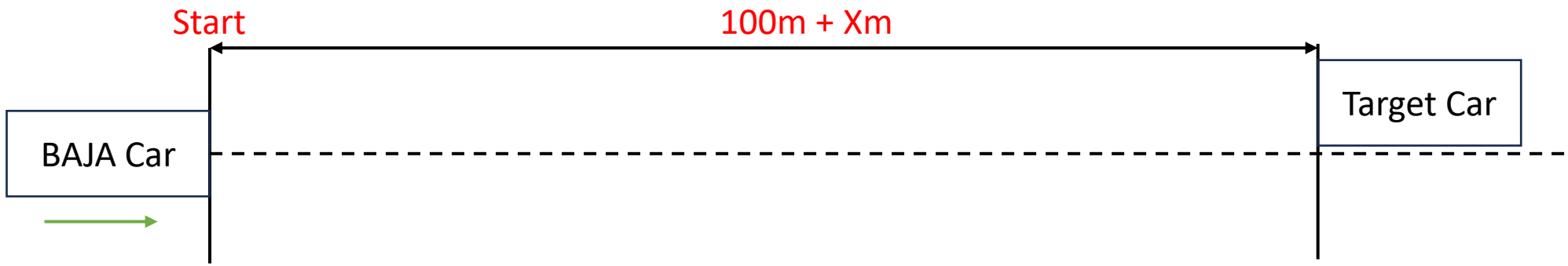
Virtual Dynamic Event

Example Scenarios

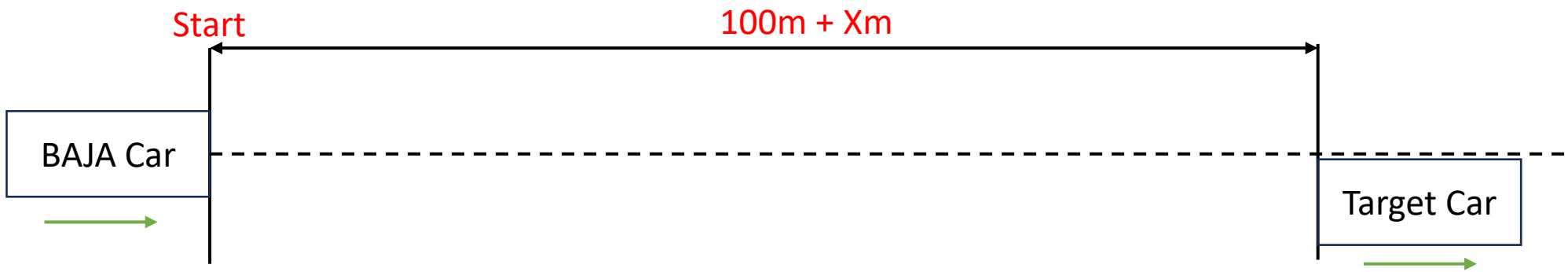
Autonomous Emergency Braking 1 – Car to Car Rear Stationary



- The BAJA Car starts at a distance of 100m + Xm from the Target Car
- The BAJA Car needs to reach a speed of 30kmph within the initial 100m
- The Target Car will be stationary
- The Target Car will have +50% overlap with the Target Car
- Xm distance is a variable value and can be anything

- The **Longitudinal Control** needs to be done by the algorithm developed **by Teams**
- The **Lateral Control** will be done **by IPG Driver**

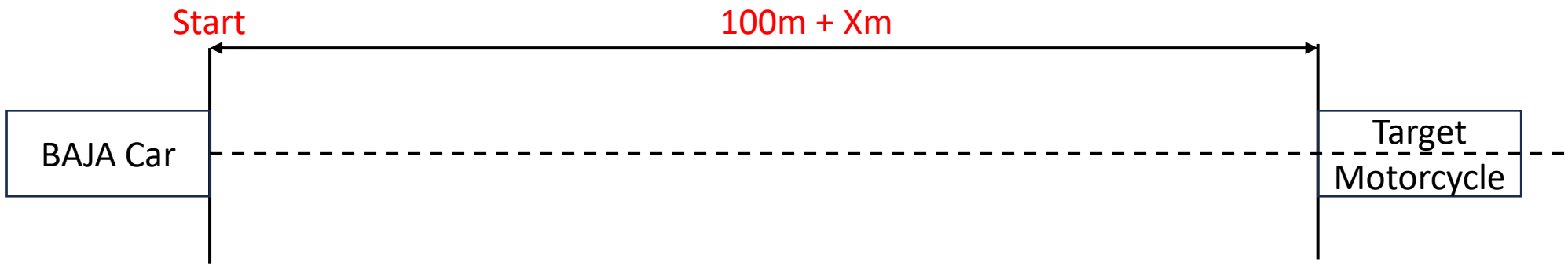
Autonomous Emergency Braking 2 – Car to Car Rear Braking



- The BAJA Car starts at a distance of 100m + Xm from the Target Car
- The BAJA Car needs to reach a speed of 30kmph within the initial 100m
- The Target Car will be moving at a constant speed of 30kmph – it will get triggered once the BAJA Car has reached the 100m mark from the starting point
- The Target Car will have -50% overlap with the BAJA Car
- The Target Car will quickly decelerate and come to a stop
- Xm distance is a variable value and can be anything

- The **Longitudinal Control** needs to be done by the algorithm developed **by Teams**
- The **Lateral Control** will be done **by IPG Driver**

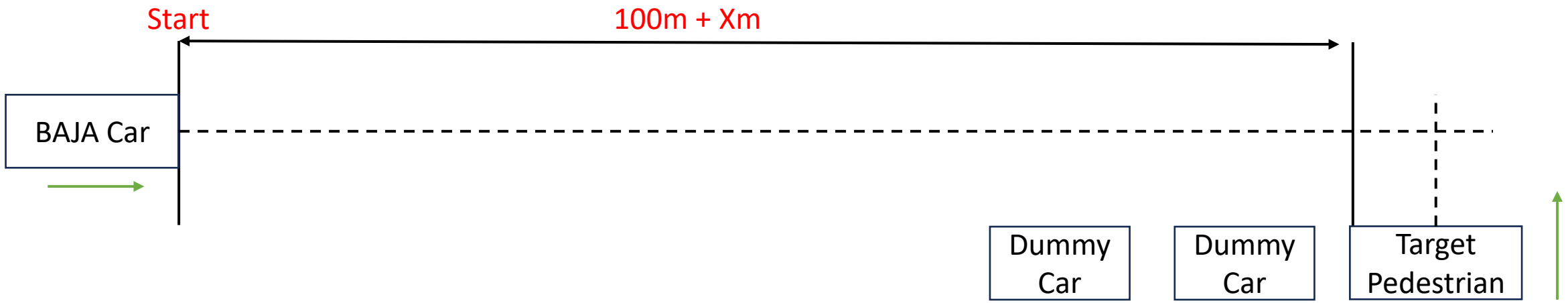
Autonomous Emergency Braking 3 – Car to Motorcyclist Rear Stationary



- The BAJA Car starts at a distance of 100m + Xm from the Target Motorcycle
- The BAJA Car needs to reach a speed of 30kmph within the initial 100m
- The Target Motorcycle will be stationary
- Xm distance is a variable value and can be anything

- The **Longitudinal Control** needs to be done by the algorithm developed **by Teams**
- The **Lateral Control** will be done **by IPG Driver**

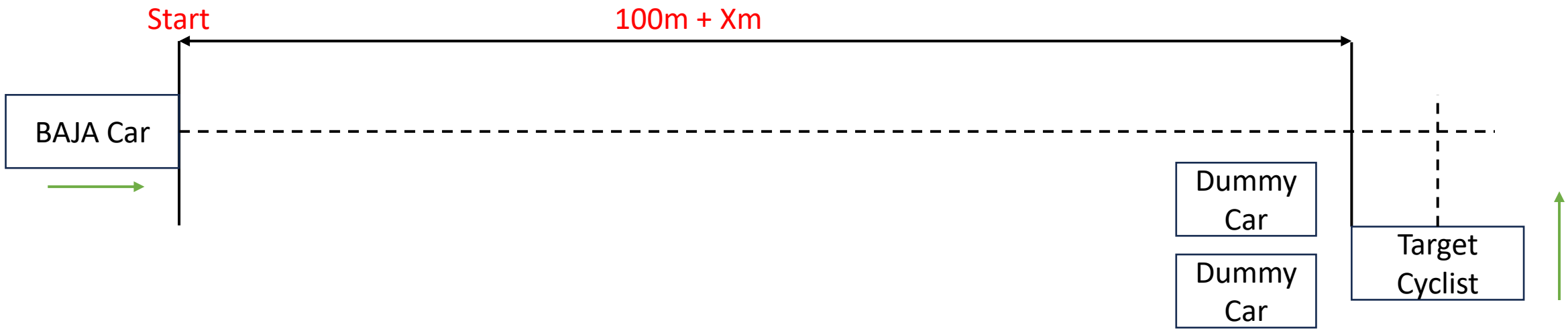
Autonomous Emergency Braking 4 – Car to Pedestrian Nearside Child Obstructed



- The BAJA Car starts at a distance of 100m + Xm from the target pedestrian
- The BAJA Car needs to reach a speed of 30kmph within the initial 100m
- The Target Pedestrian will be crossing the road.
- The Target Pedestrian motion will be triggered by the BAJA Car passing the 100m mark
- Xm distance is a variable value and can be anything

- The **Longitudinal Control** needs to be done by the algorithm developed **by Teams**
- The **Lateral Control** will be done **by IPG Driver**

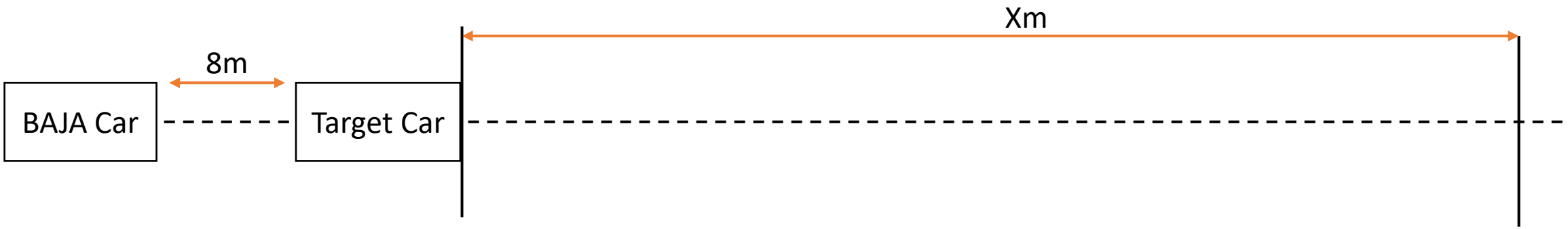
Autonomous Emergency Braking 5 – Car to Bicyclist Nearside Adult Obstructed



- The BAJA Car starts at a distance of 100m + Xm from the Target Cyclist
- The BAJA Car needs to reach a speed of 30kmph within the initial 100m
- The Target Cyclist will be crossing the road
- The Target Cyclist motion will be triggered by the BAJA Car passing the 100m mark
- Xm distance is a variable value and can be anything

- The **Longitudinal Control** needs to be done by the algorithm developed **by Teams**
- The **Lateral Control** will be done **by IPG Driver**

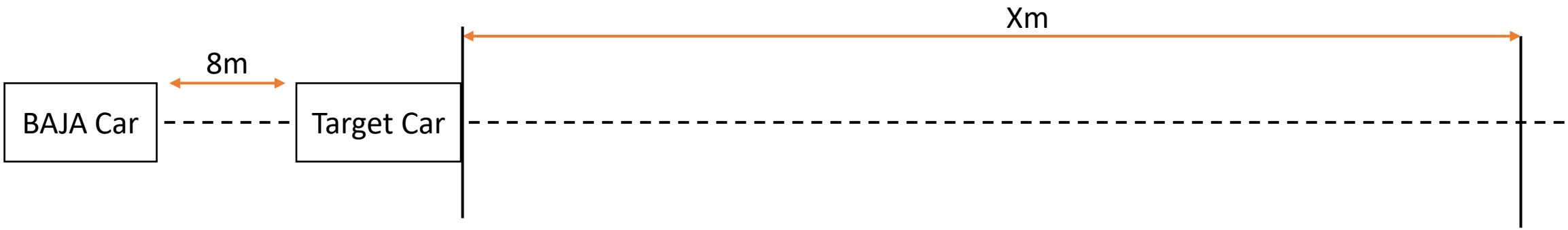
Adaptive Cruise Control 1 – Stop and Go - Speed Profile 1



- The BAJA Car and Target Car are stationary (like stopped at a traffic signal)
- The Target Car will accelerate to a speed of 30kmph within 5seconds
- The BAJA Car need to follow the Target Car at a 1 second time interval
- Xm distance is a variable value and can be anything

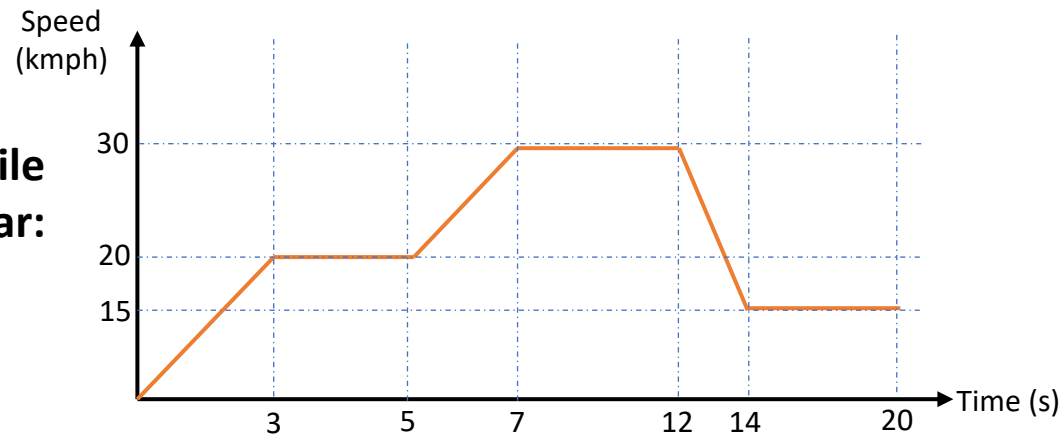
- The **Longitudinal Control** needs to be done by the algorithm developed **by Teams**
- The **Lateral Control** will be done **by IPG Driver**

Adaptive Cruise Control 2 – Stop and Go - Speed Profile 2

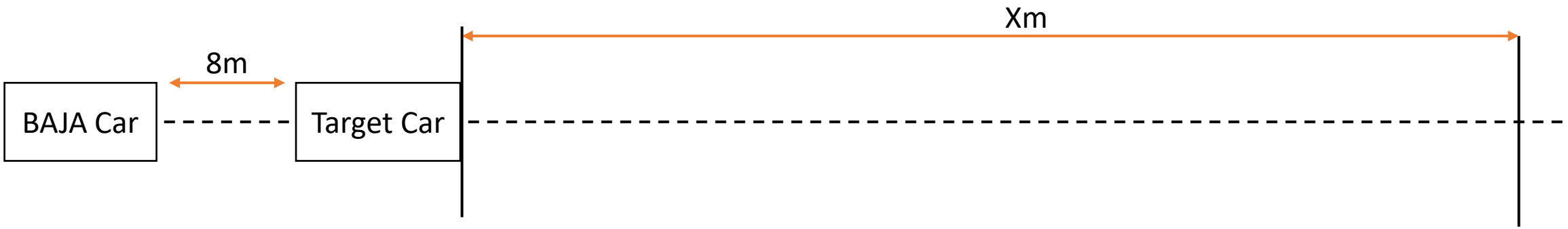


- The BAJA Car and Target Car are stationary (like stopped at a traffic signal)
- The Target Car will follow the speed profile defined
- The BAJA Car need to follow the Target Car at a 1 second time interval
- Xm distance is a variable value and can be anything
- The **Longitudinal Control** needs to be done by the algorithm developed **by Teams**
- The **Lateral Control** will be done **by IPG Driver**

Speed Profile of Target Car:

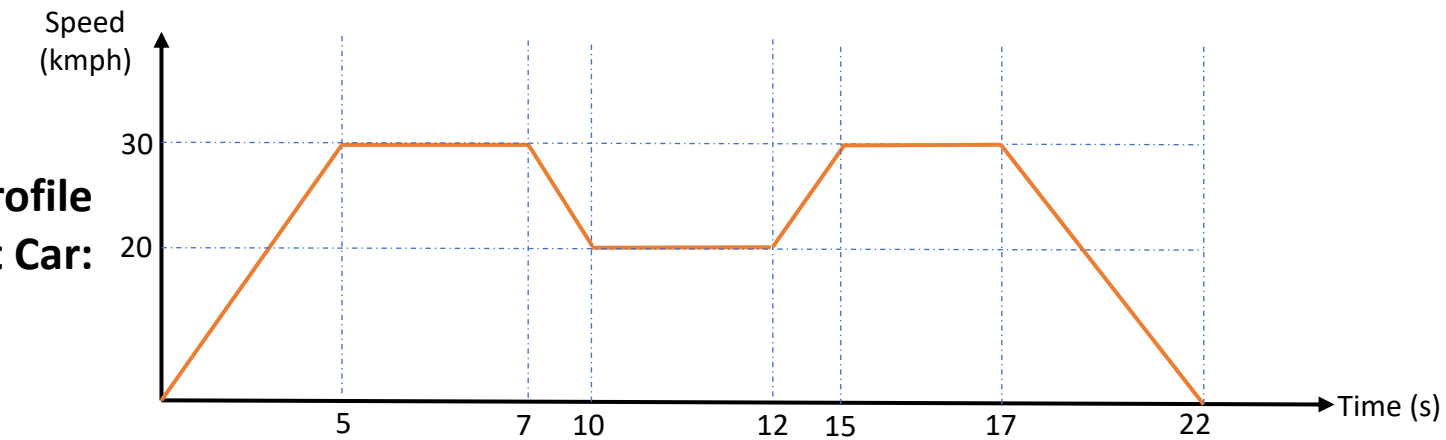


Adaptive Cruise Control 3 – Stop and Go - Speed Profile 3

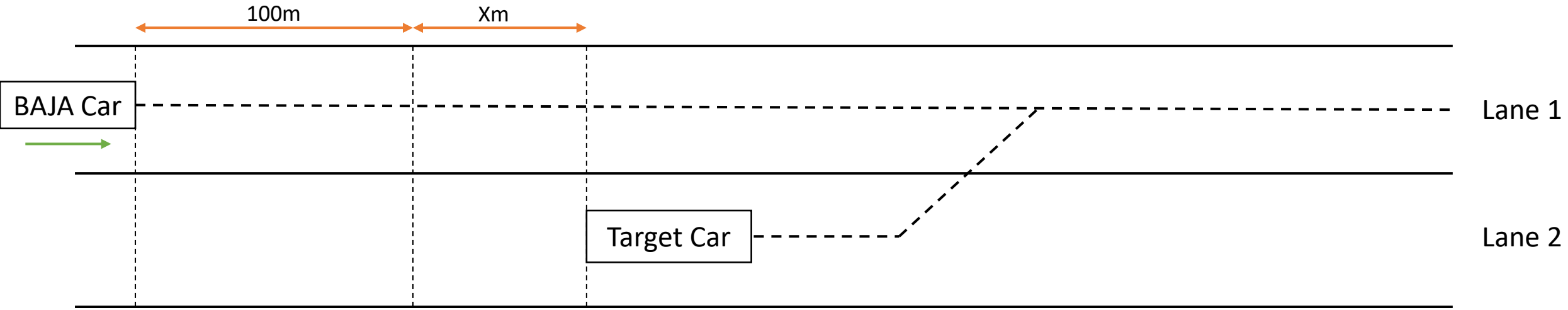


- The BAJA Car and Target Car are stationary (like stopped at a traffic signal)
- The Target Car will follow the speed profile defined
- The BAJA Car need to follow the Target Car at a 1 second time interval
- When the Target Car and BAJA Car come to stationary at the end, the BAJA Car needs to maintain a distance of 8m with the Target Car
- Xm distance is a variable value and can be anything
- The **Longitudinal Control** needs to be done by the algorithm developed **by Teams**
- The **Lateral Control** will be done **by IPG Driver**

Speed Profile of Target Car:



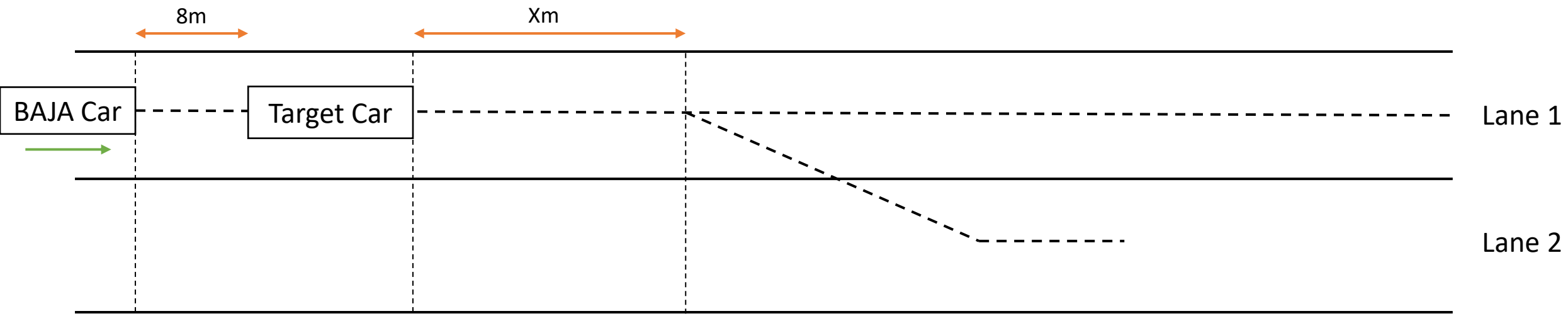
Adaptive Cruise Control 4 – Cut In Scenario



- The BAJA Car starts from stationary and has 100m to reach 30kmph and maintain it in Lane 1
- The Target Car gets triggered when the BAJA Car has reached the 100m mark
- The Target Car will move at a speed of 15kmph in Lane 2 and cut in into Lane 1 before the BAJA Car
- The BAJA Car need to adapt the speed to match the Target Car speed and maintain 1 second time interval with the Target Car
- Xm distance is a variable value and can be anything

- The **Longitudinal Control** needs to be done by the algorithm developed **by Teams**
- The **Lateral Control** will be done **by IPG Driver**

Adaptive Cruise Control 5 – Cut Out Scenario



- The BAJA Car and Target Car are stationary (like stopped at a traffic signal)
- The Target Car will accelerate to a speed of 20kmph within 4seconds
- The BAJA Car need to follow the Target Car at a 1 second time interval
- The Target Car will cut out into Lane 2
- Once the Target Car has moved into Lane 2, the BAJA Car needs to reach 30kmph and maintain it
- Xm distance is a variable value and can be anything

- The **Longitudinal Control** needs to be done by the algorithm developed **by Teams**
- The **Lateral Control** will be done **by IPG Driver**

Lane Keep Assist 1: Smooth curved road single bend

- The BAJA Car will start from stationary
- The BAJA Car will move at a speed of 30kmph
- The track will be a 150m smooth curved road that curves to the right
- The radius of curvature of the road will be 30^0
- Both sides of the Lane will have solid Lane Markings
- BAJA Car needs to maintain the Lane centre as close as possible
- The **Lateral Control** needs to be done by the algorithm developed **by Teams**
- The **Longitudinal Control** will be done **by IPG Driver**

Lane Keep Assist 2: Smooth curved road double bend

- The BAJA Car will start from stationary
- The BAJA Car will move at a speed of 30kmph
- The track will be a 300m smooth curved road that curves to the right and then to the left
- The radius of curvature of the road will be 30^0 for both left and right
- Both sides of the Lane will have solid Lane Markings
- BAJA Car needs to maintain the Lane centre as close as possible
- The **Lateral Control** needs to be done by the algorithm developed **by Teams**
- The **Longitudinal Control** will be done **by IPG Driver**

Lane Keep Assist 3: Smooth Curve Single Bend -Dashed Lanes

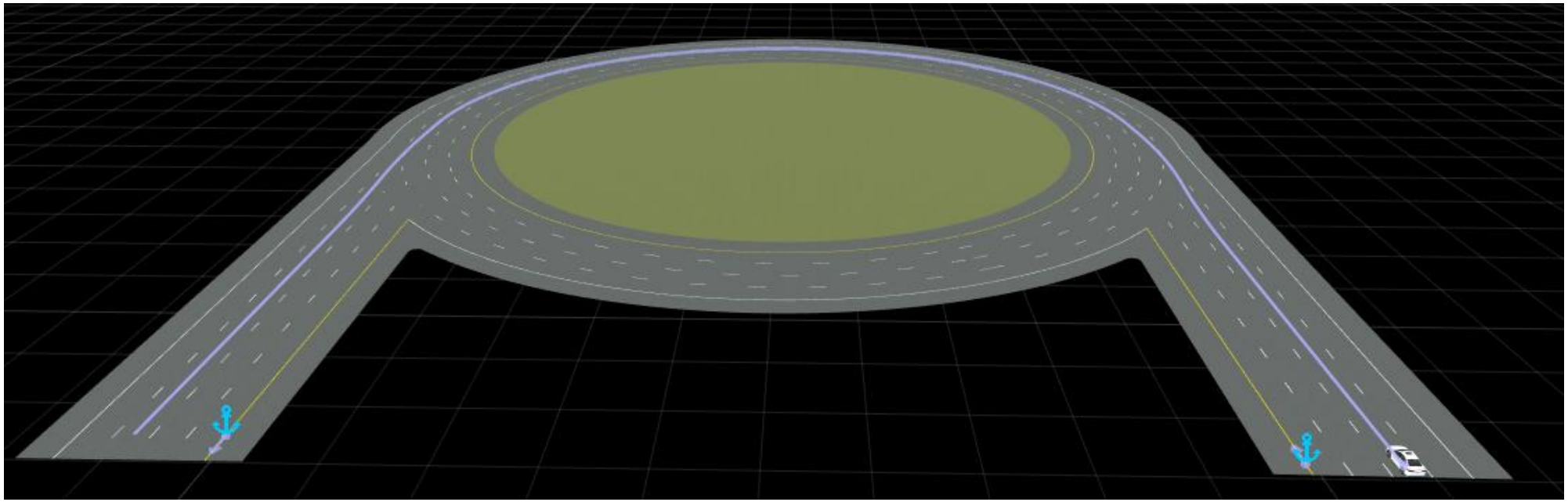
- The BAJA Car will start from stationary
- The BAJA Car will move at a speed of 30kmph
- The track will be a 150m smooth curved road that curves to the right
- The radius of curvature of the road will be 45deg
- Both sides of the Lane will have Dashed Lane Markings
- BAJA Car needs to maintain the Lane centre as close as possible
- The **Lateral Control** needs to be done by the algorithm developed **by Teams**
- The **Longitudinal Control** will be done **by IPG Driver**

Lane Keep Assist 4: Smooth Curve Double Bend -Dashed Lanes

- The BAJA Car will start from stationary
- The BAJA Car will move at a speed of 30kmph
- The track will be a 300m smooth curved road that curves to the right and then to the left
- The radius of curvature of the road will be 30deg for both right and left turn
- Both sides of the Lane will have Dashed Lane Markings
- BAJA Car needs to maintain the Lane centre as close as possible
- The **Lateral Control** needs to be done by the algorithm developed **by Teams**
- The **Longitudinal Control** will be done **by IPG Driver**

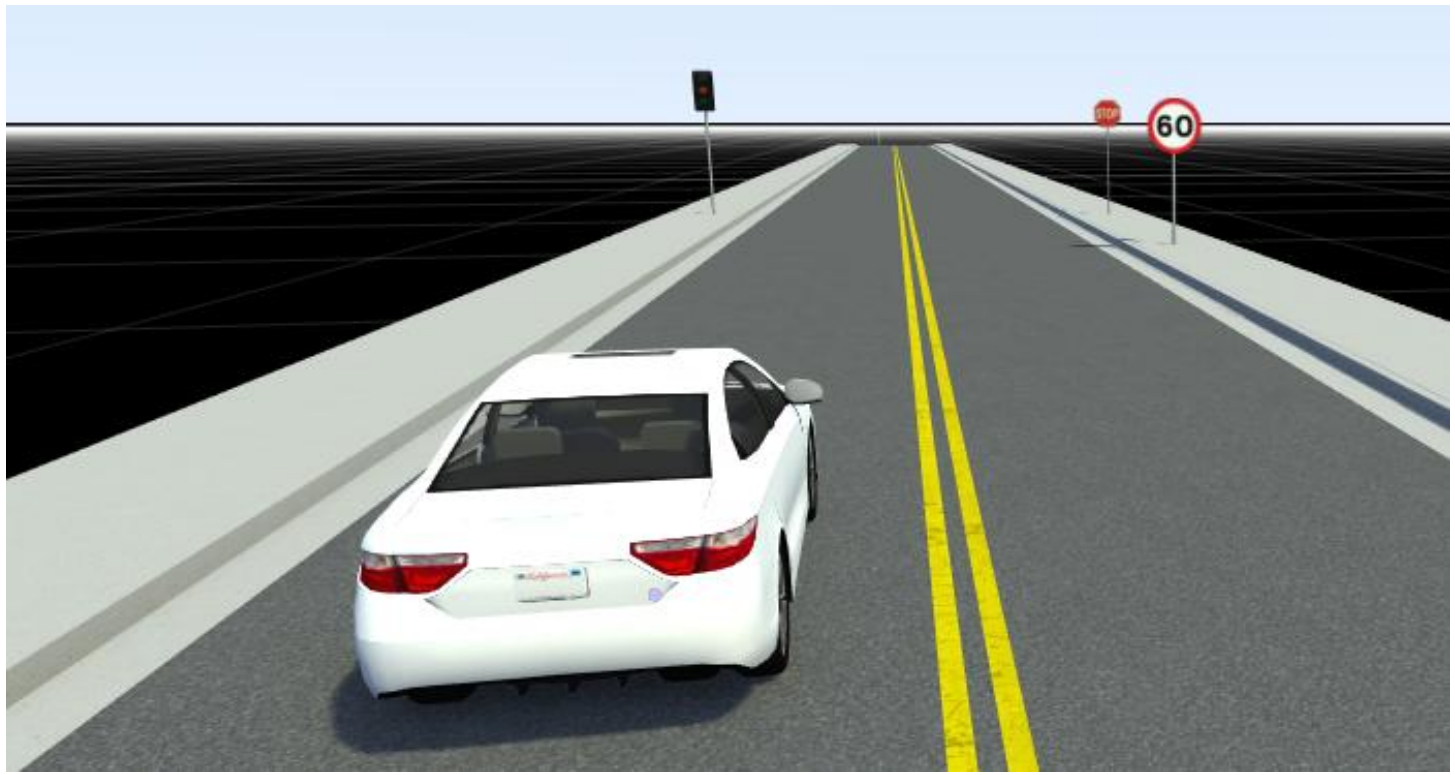
Lane Keep Assist 5: Straight Road with U-Turn

- The BAJA Car will start from stationary
- The BAJA Car will move at a speed of 30kmph
- The track will look like the example attached below
- The Radius of curvature is 45° for the roundabout
- Both sides of the Lane will have Dashed Lane Markings
- BAJA Car needs to maintain the Lane centre as close as possible
- The **Lateral Control** needs to be done by the algorithm developed **by Teams**
- The **Longitudinal Control** will be done **by IPG Driver**



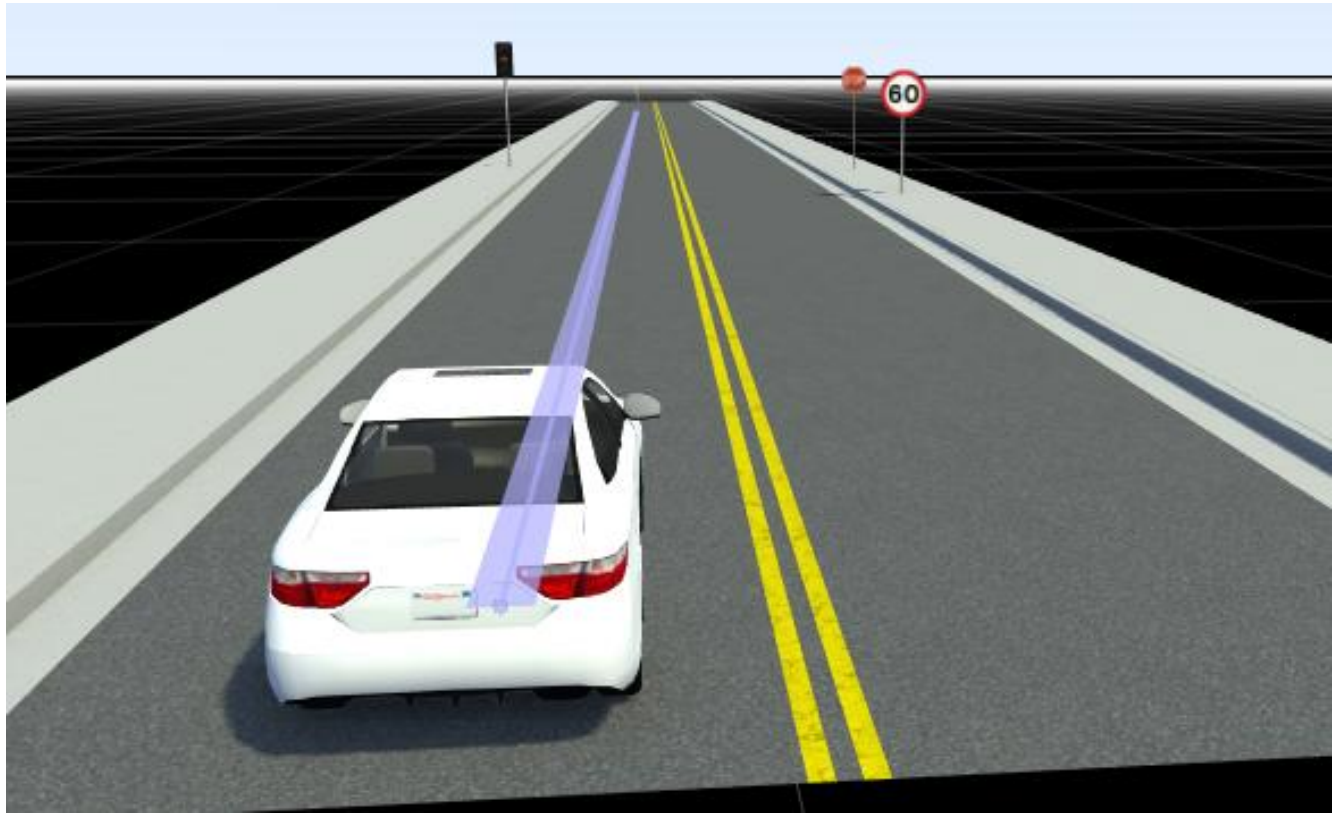
Traffic Light and Sign Detection 1: Stationary Ego Vehicle in a Straight Road

- The BAJA Car will be stationary
- The track will look like the example attached below
- The road signs and traffic light must be detected , classified and tracked by the BAJA Car
- The states of the traffic light (red, green, amber) and the classification of the Road signs needs to be reported by the BAJA Car
- **Both Lateral and Longitudinal Control** will be done **by IPG Driver**



Traffic Light and Sign Detection 2: Moving Ego Vehicle in a straight road

- The BAJA Car will be moving at a speed of 30kmph
- The track will look like the example attached below
- The road signs and traffic light must be detected , classified and tracked by the BAJA Car
- The states of the traffic light (red, green, amber) and the classification of the Road signs needs to be reported by the BAJA Car
- **Both Lateral and Longitudinal Control** will be done **by IPG Driver**

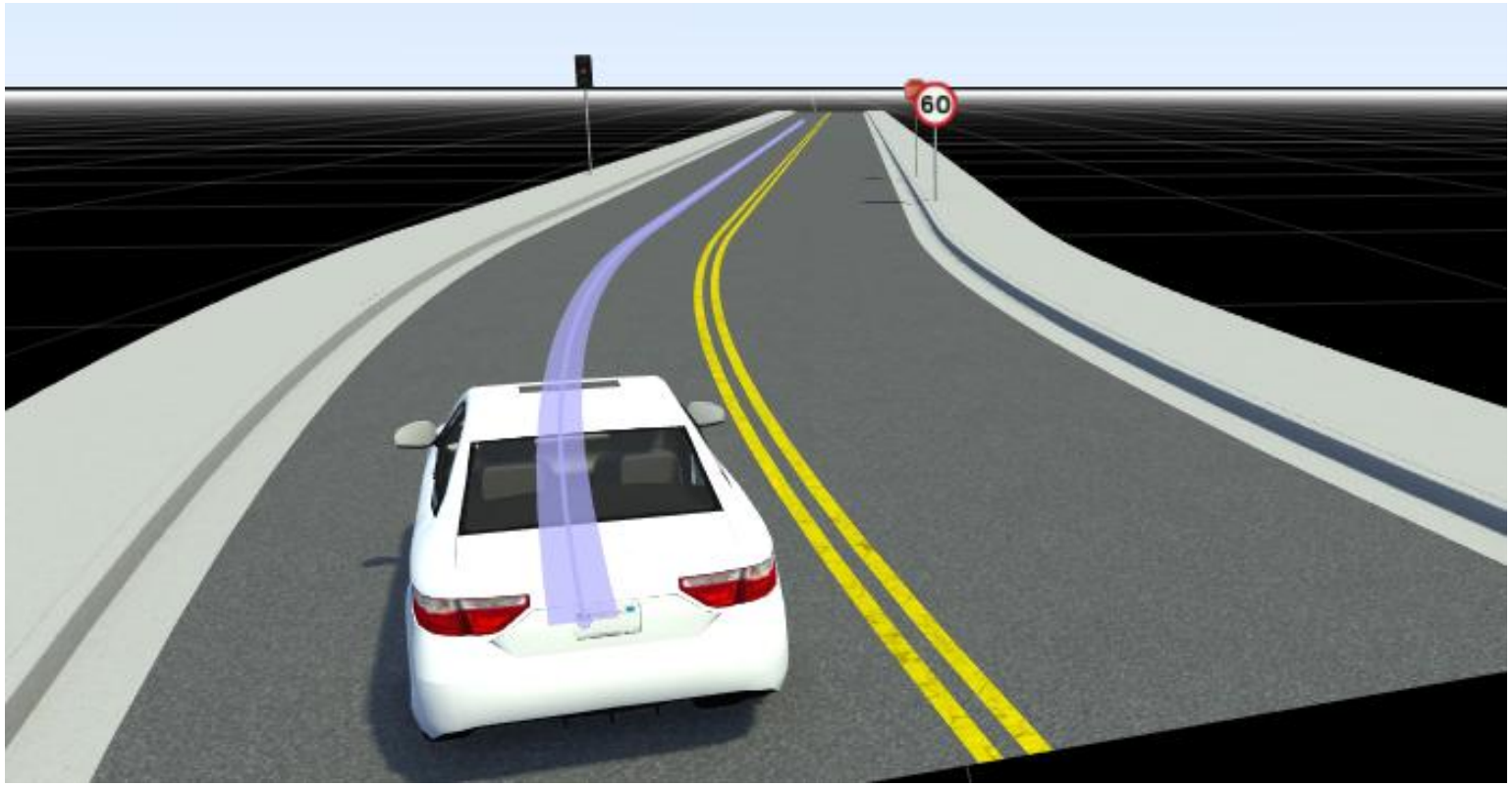


Traffic Light and Sign Detection 3: Stationary Ego Vehicle in a Curved Road

- The BAJA Car will be stationary
- The track will look like the example attached below – Curved road with road signs and traffic light on the sides
- The road signs and traffic light must be detected , classified and tracked by the BAJA Car
- The states of the traffic light (red, green, amber) and the classification of the Road signs needs to be reported by the BAJA Car
- **Both Lateral and Longitudinal Control** will be done **by IPG Driver**

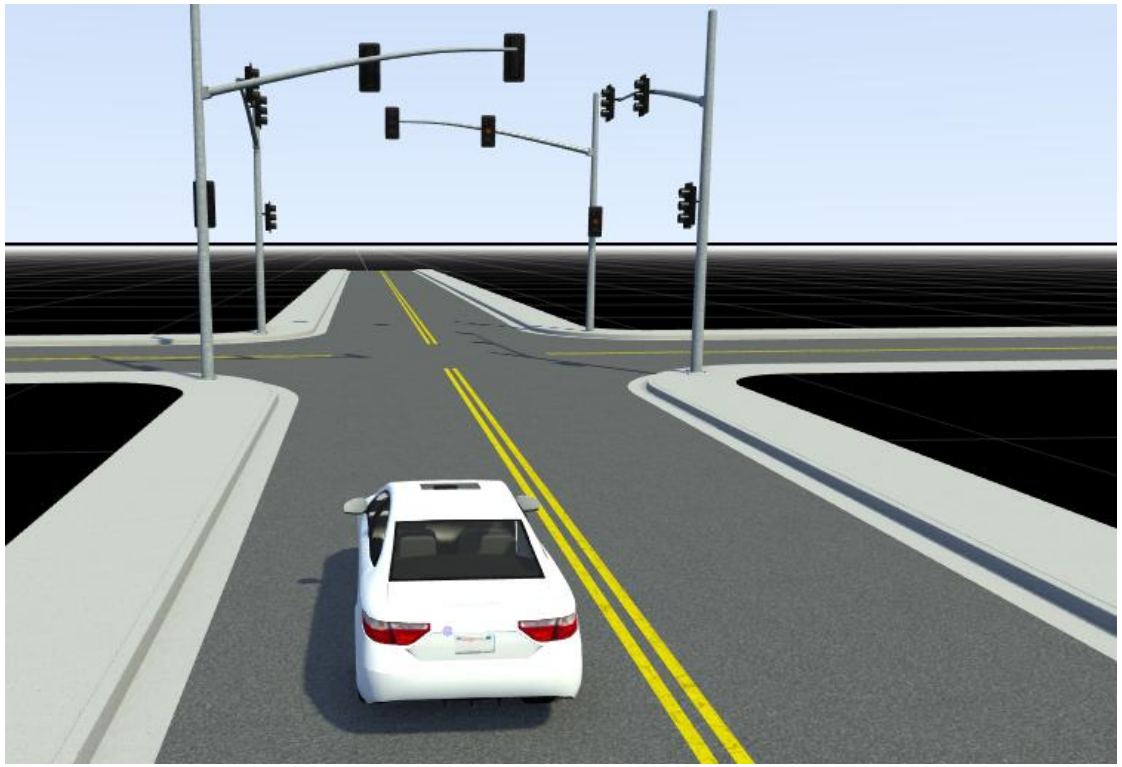
Traffic Light and Sign Detection 4: Moving Ego Vehicle in a Curved Road

- The BAJA Car will be moving at a speed of 30kmph
- The track will look like the example attached below – Curved road with road signs and traffic light on the sides
- The road signs and traffic light must be detected , classified and tracked by the BAJA Car
- The states of the traffic light (red, green, amber) and the classification of the Road signs needs to be reported by the BAJA Car
- **Both Lateral and Longitudinal Control** will be done **by IPG Driver**



Traffic Light and Sign Detection 5: Moving Ego Vehicle into a junction

- The BAJA Car will be moving at a speed of 30kmph and come to a stop at the Junction
- The track will look like the example attached below – Traffic light controlled plus junction
- The road signs and traffic light must be detected and classified by the BAJA Car
- The BAJA Car must report the traffic light state (red, green, amber) that corresponds to the active lane of the BAJA Car
- **Both Lateral and Longitudinal Control** will be done **by IPG Driver**



Virtual Endurance Track

- Both the **Longitudinal and Lateral Control** needs to be done by the algorithm developed **by Teams**
- **All the features should work together**
- The **target set speed is 30kmph** and the BAJA Car should maintain the **Lane centre as close as possible always**

Stage 1 – Start at Traffic Light – Traffic light detection, classification and reaction

The BAJA Car begins in a stationary position at a red light. After a 5 second countdown, the signal turns green, prompting the vehicle to start moving autonomously.

Stage 2 – Achieve a target speed – Speed control

The BAJA Car should accelerate to 30 kmph and maintain it

Stage 3 – Speed Adjustment for Safe Following – Adaptive cruise control

A Target Car will cut in into the active lane of the BAJA Car. The BAJA needs to detect the Target Car and adapt its speed to the Target Car. The BAJA Car should follow the Target at a 1 second time gap.

Stage 4 – Target Vehicle Cut-out – Speed Control

The Target car cuts out of the active lane and BAJA Car should ramp up to set speed of 30 kmph

Stage 5 – Curvy Lanes – Path following

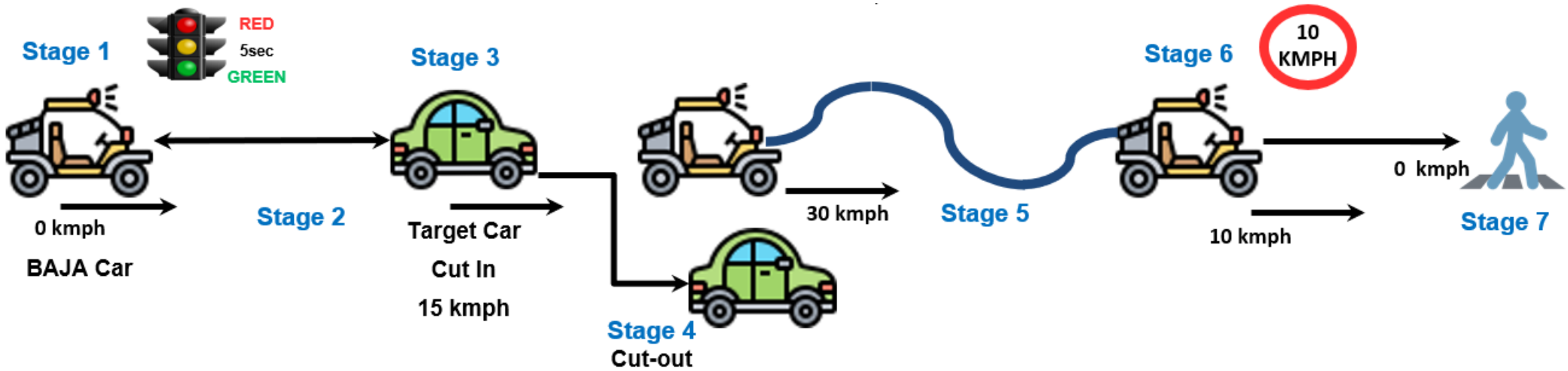
The BAJA Car should manipulate its speed and control the steering to maintain the lane center as close as possible and follow the curvy lanes

Stage 6 – Traffic Sign Detection and Speed Regulation

Speed limiter of 10kmph should be detected by BAJA Car and adapt the vehicle speed to 10 kmph.

Stage 7 – Automatic Emergency Braking

Approaching a pedestrian crossing at 10 kmph, the BAJA Car detects a pedestrian in its path. The Automatic Emergency Braking should be activated to bring vehicle to stand still, without touching the pedestrian



Organised by

BAJA SAEINDIA 2025

Under the Aegis of

Our Sponsors

Assessment Partner

Supported by

Media Partner