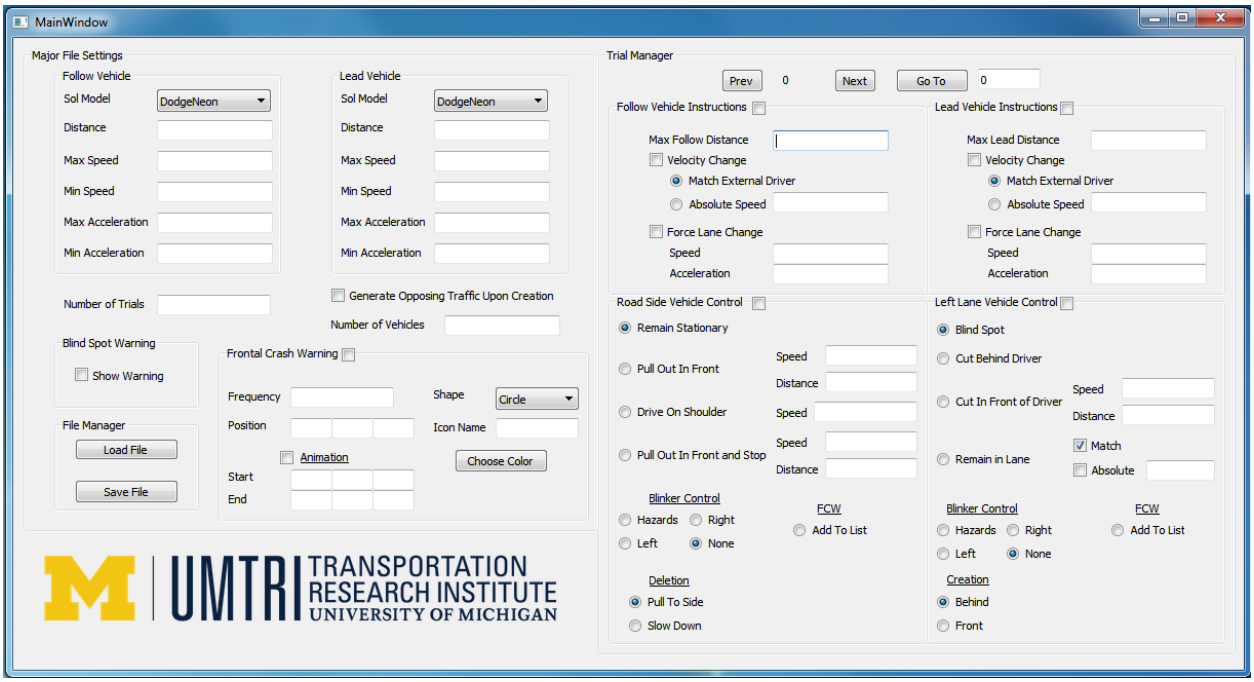
Software Input and Actions



Major File Settings

These settings remain consistent across every trial for the loaded scenario. This section of settings is responsible for the lead and follow vehicle instructions, frontal crash warning settings, generation of opposing traffic, blind spot warning, and file loading/saving.

File Loading/Saving

The Expressway Scenario Interface opens a filestream in order to load a file. All header settings, vehicles, triggers, static objects, and virtual objects are loaded. Once done loading, the interface will then close the input filestream. The interface will open a new filestream to save the new scenario. All trials and major file settings are processed and then the file is written before returning.

Follow Vehicle and Lead Vehicle

The follow vehicle and lead vehicle are objects that exist in every expressway scenario. The user can choose the SOL Model for both vehicles and other parameters that control how the vehicles behave in the scenario. For the follow and lead vehicles the distance parameter is defined as the gap between either vehicle and the external driver. The remaining parameters are straightforward in relation to ISAT as well as the MiniSim.

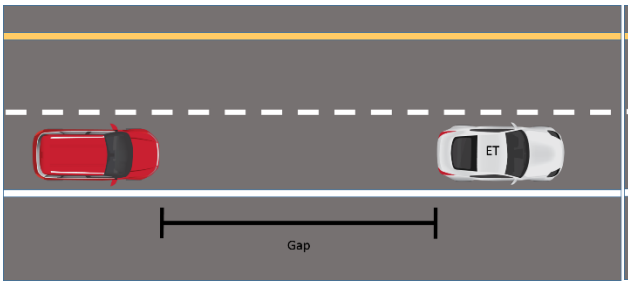


Figure 1. Follow vehicle creation.

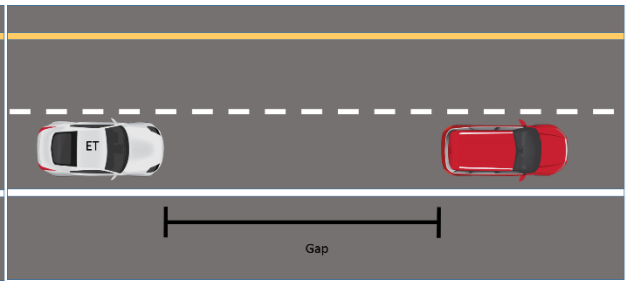


Figure 2. Lead vehicle creation.

The maximum deceleration for the lead and follow vehicles must be zero or a negative number. The distance parameter for the lead vehicle must be negative.

Generation of Opposing Traffic

The user has the option to generate opposing traffic for their scenario. It is the user's responsibility to ensure that this option is deselected if there is already opposing traffic existing in the scenario. The user can specify how many vehicles are generated per trial in the major file settings. This will allow for the flow of traffic to be controlled by the researcher. The interface then places the user specified amount of traffic in each trial.

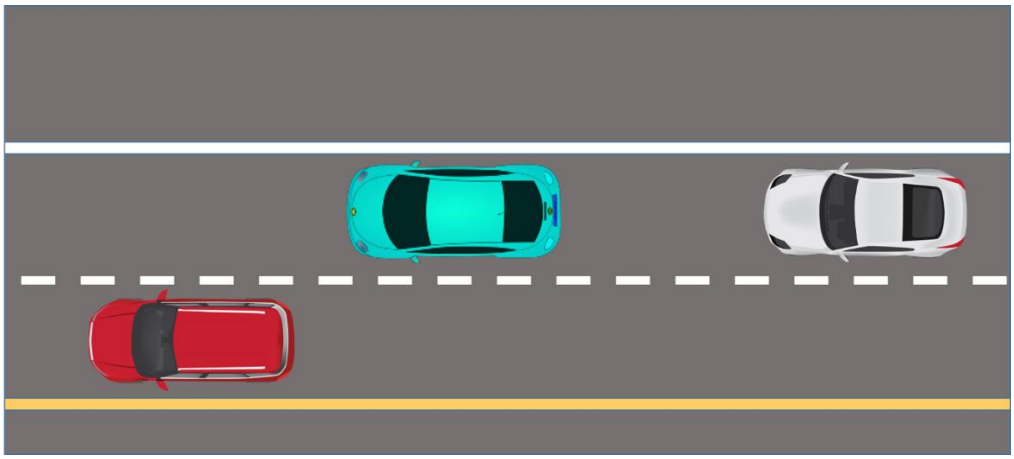


Figure 3. An example of generated opposing traffic for three vehicles a trial.

The program divides the trial up into sections based upon how many vehicles that the user specifies. A vehicle is then placed in every section. Its specified lane is also random (i.e. whether it is placed in the outside or inside lane is random). Each opposing vehicle is created at a radius of 2000 feet and has an initial velocity of 65 mph. A creation radius of 2000 feet may be too small so further research is necessary. The opposing traffic will be generated from a mix of colors and vehicle models.

Blind Spot Warning

The interface will generate the virtual objects for left side and right side blind spot warning as well as the triggers for displaying the warnings to the external driver. The user is responsible for deselecting the blind spot warning if the scenario file already contains blind spot warning objects. The blind spot warning creates a virtual object for both the left side mirror and the right side mirror. The left side blind spot warning becomes visible when the external driver comes within 36 feet of the external driver. The right side blind spot warning is visible when the external driver drives past a road side vehicle using a series of roadpad triggers.

Currently the blind spot warning does not take into account the case where a vehicle is approaching the driver from behind at a high rate of speed. More algorithms may need to be created in order to account the second case.

Frontal Crash Warning

To be completed… Use the acceleration for TTC. Generate algorithm for slight overlap of forward vehicle with external driver. Should FCW be triggered if the external driver is braking?

Trial Manager

The trial manager allows the user to iterate across trials within the scenario. Previous will go back to the previous trial and next will proceed to the next trial. The "Go To" function moves to the trial listed if the number is in range. If a scenario object under the trial manager is checked then that object will be present or altered during that trial. The trial manager saves the user input of a certain scenario element if and only if that scenario element checked.

Follow/Lead Vehicle Instructions

The follow or lead vehicle's behavior can be modified at every trial if the user wishes. The maximum distance between the follow/lead vehicle and the external driver can be altered to user specifications. The follow/lead vehicle can also undergo a velocity change where it either matches the speed of the external driver or travels at an absolute speed that is specified by the user. The final option is a force lane change option in which the user can specify a speed and acceleration for the follow/lead vehicle to change lanes at.

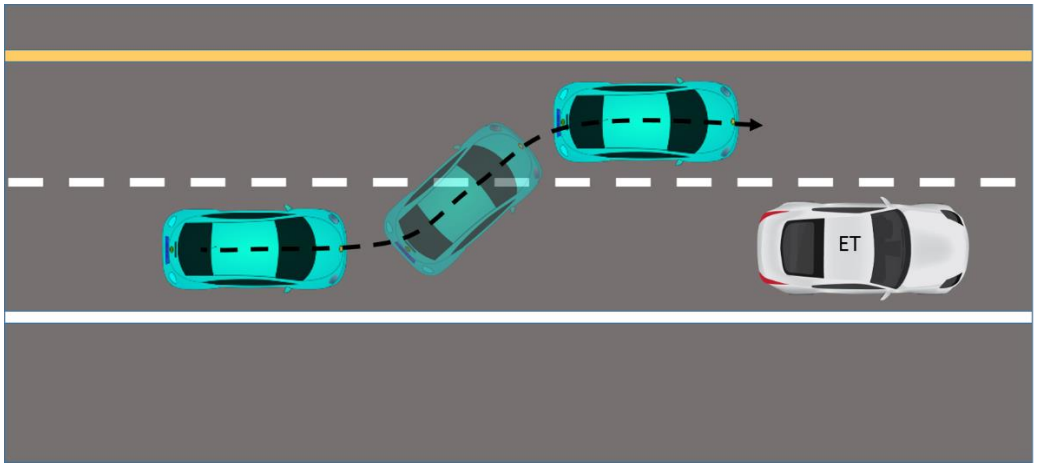


Figure 4. Follow vehicle forced lane change.

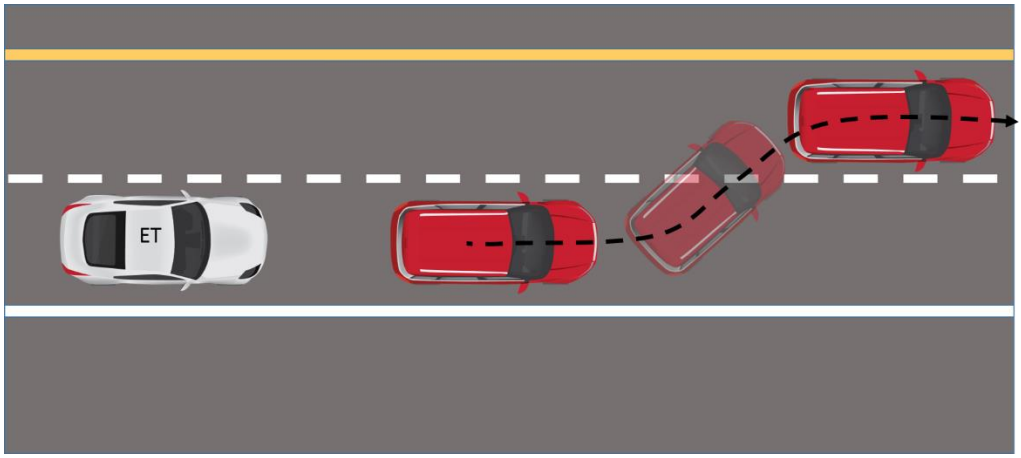


Figure 5. Lead vehicle forced lane change.

Road Side Vehicle

The road side vehicle is originally parked on the shoulder of the road and can move different based upon the users input. The following sections describe what different settings for the road side vehicles are.

Road Side Vehicle Control (Movement)

Remain Stationary: when checked the road side vehicle will remain in its position on the side of road without moving.

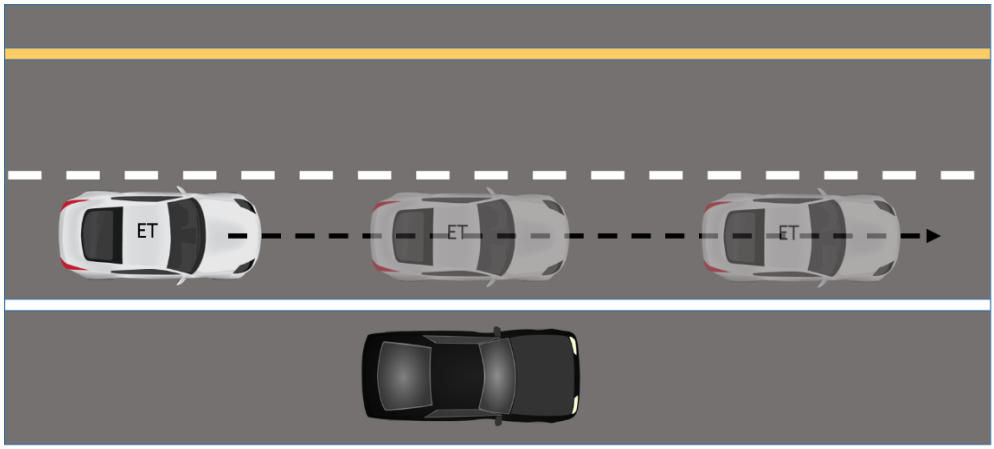


Figure 6. Road side remain stationary movement option.

Pull Out in Front: when checked the road side vehicle pulls out in front of the driver at the given distance from the external driver and then reach the specified velocity.

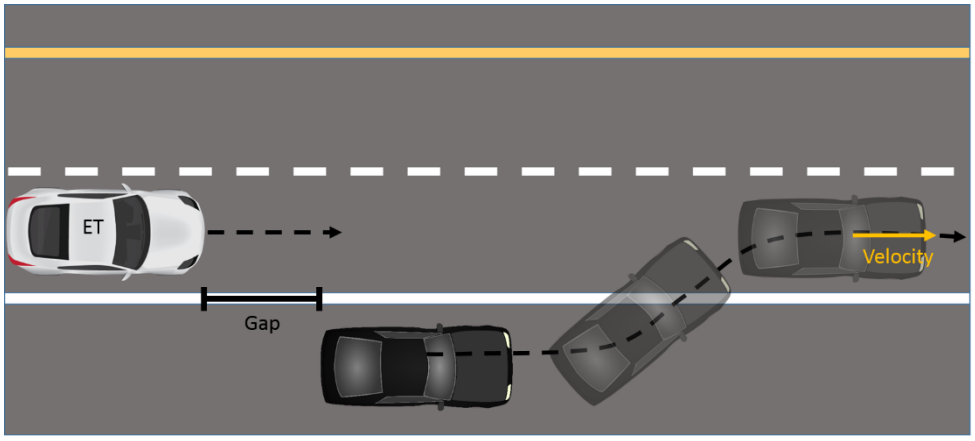


Figure 7. Road side pull out in front of external driver movement option.

Drive on Shoulder: when checked the road side vehicle will remain on the shoulder and proceed at the given speed for the entirety of the trial.

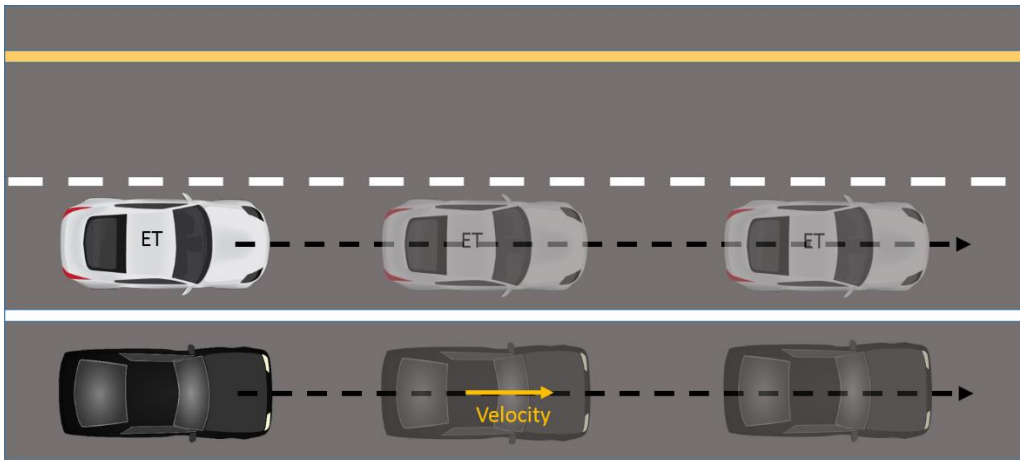


Figure 8. Road side drive on shoulder movement option.

Pull Out in Front and Stop: when checked the road side vehicle will pull out in front of the external driver when at the given distance from the external driver at the speed given and will come to a stop in the outside lane.

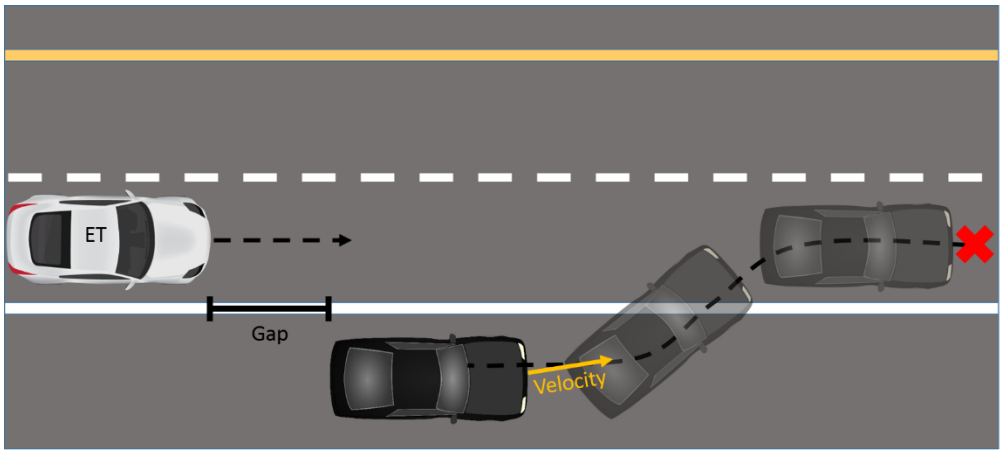


Figure 9. Road side pull out front and stop movement option.

Road Side Vehicle Control (Blinker Control)

The user has the ability to specify the blinker state of the road side vehicle. This allows for situations in which the user does not wish to provide a predictable situation to the external driver. The blinker state specified will be the blinker state for that vehicle for the entirety of the trial.

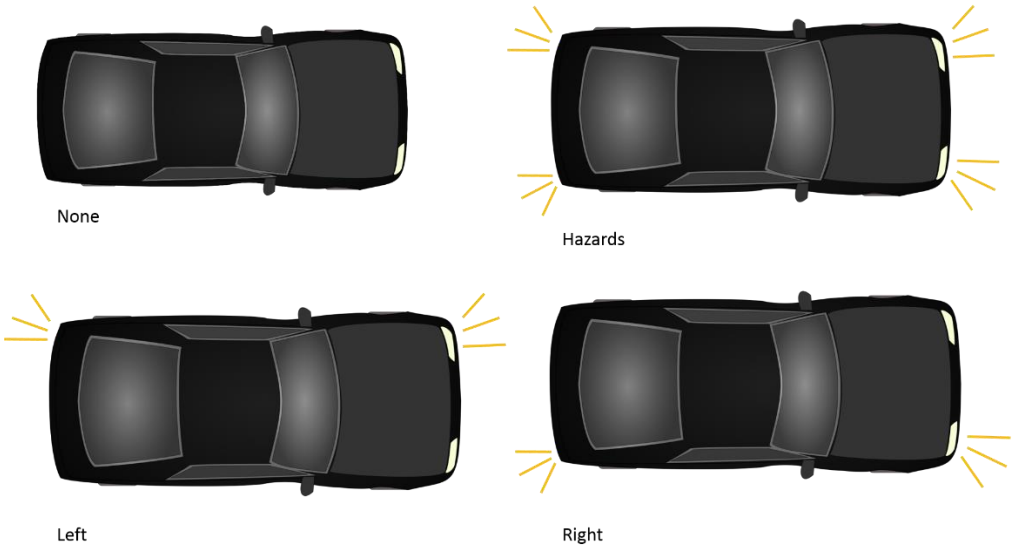


Figure 10. Blinker options.

Road Side Vehicle Control (FCW Add to List)

This button is selected when the user wishes to have the FCW displayed to the external driver for this specific road side vehicle.

Road Side Vehicle Control (Deletion)

The road side vehicle can be deleted in one of two ways: pulling off to the side of the road or slowing down out of sight of the external driver.

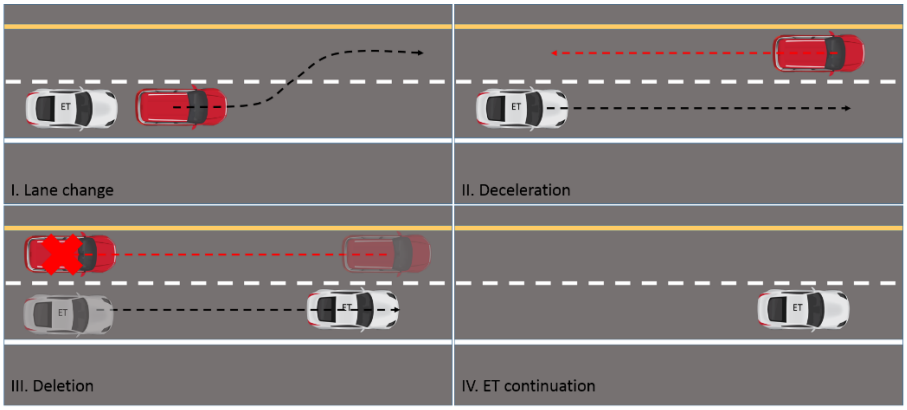


Figure 11. Road side slow down deletion.

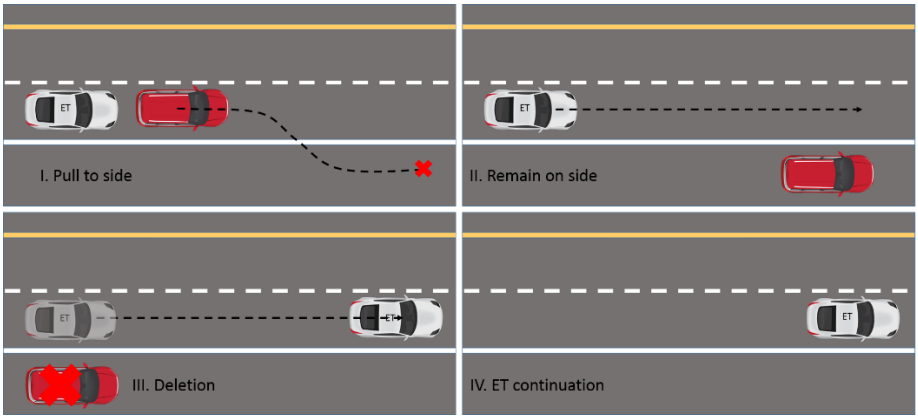


Figure 12. Road side pull to side deletion.

Left Lane Vehicle Control

The left lane vehicle is the vehicle that originates in the left lane of traffic either in front of or behind the external driver during a trial. The follow sections describe the left lane vehicle settings.

Left Lane Vehicle Control (Movement)

Blind Spot: when checked the left lane vehicle will remain in the blind spot for the majority of its lifetime.

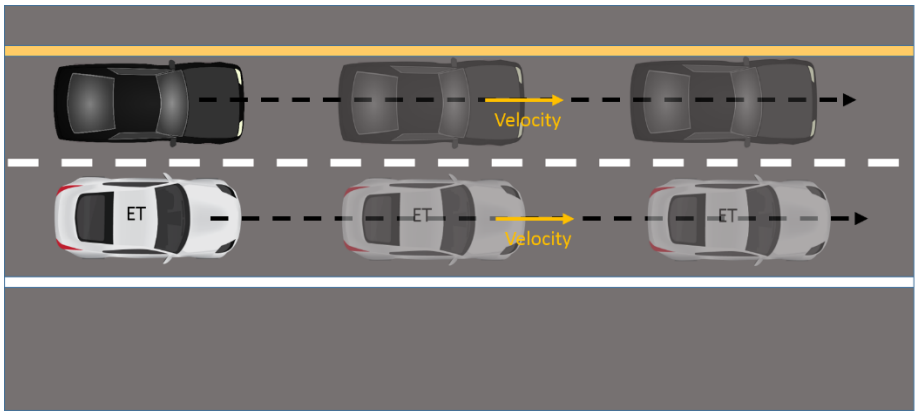


Figure 13. Left lane blind spot movement option.

Cut Behind Driver: when checked the left lane vehicle will drive behind the external driver in the left lane and then pull behind the external driver.

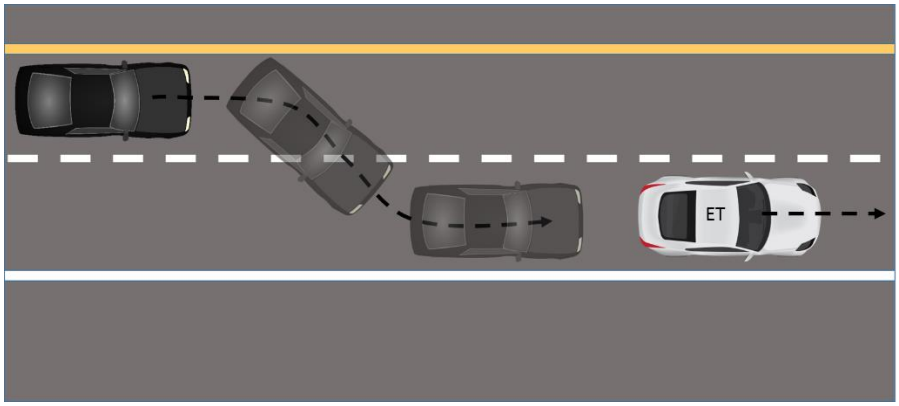


Figure 13. Left lane cut behind movement option.

Cut in Front of Driver: when checked the left lane vehicle will cut in front of the external driver at the specified speed when the left lane is the specified distance from the external driver.

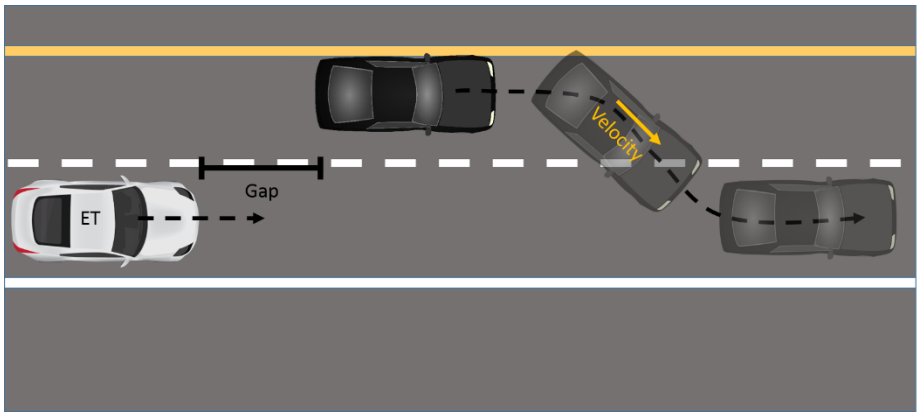


Figure 14. Left lane cut in front movement option.

Remain in Lane: when checked the left lane vehicle will remain in the left lane and travel at the specified speed (match the external driver or travel at an absolute speed).

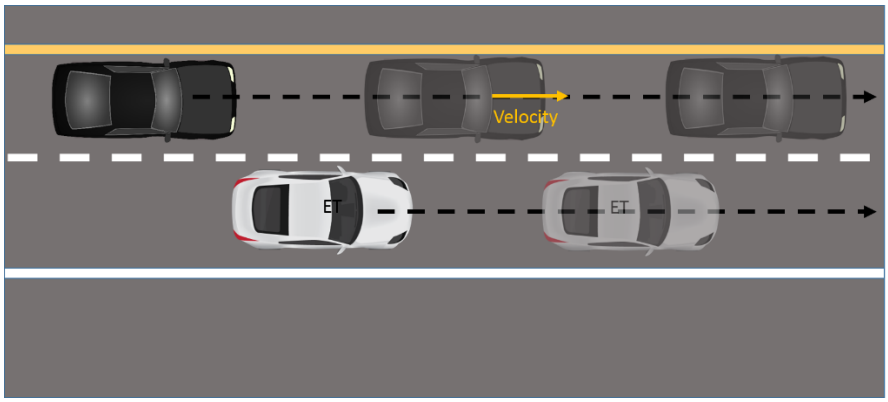


Figure 14. Left lane remain in lane movement option.

Left Lane Vehicle Control (Blinker Control)

The user has the ability to specify the blinker state of the left lane vehicle. This allows for situations in which the user does not wish to provide a predictable situation to the external driver. The blinker state specified will be the blinker state for that vehicle for the entirety of the trial (see figure 10).

Left Lane Vehicle Control (FCW Control)

This button is selected when the user wishes to have the FCW displayed to the external driver for this specific left lane vehicle.

Left Lane Vehicle Control (Creation)

The user can specify how the left lane vehicle is created: behind or in front of the external driver. This allows the user more freedom in scenario creation.

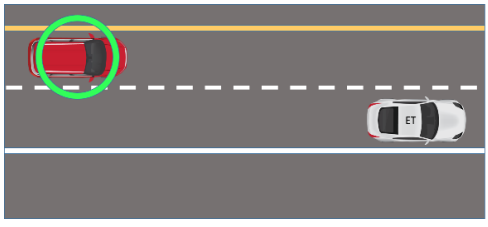


Figure 15. Left lane vehicle creation behind.

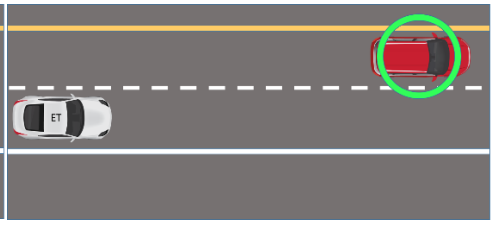


Figure 16. Left lane vehicle creation front.

Naming Diction

Definition	SCN Name
Follow Vehicle	“FV”
Lead Vehicle	“LV”
Maintain Gap Trigger	“ET_Keep_Distance”
Opposing Vehicle at Trial X and Number Y	“OPVX_Y”