

UC-win/Road & CarSim Interface

2012/01/08

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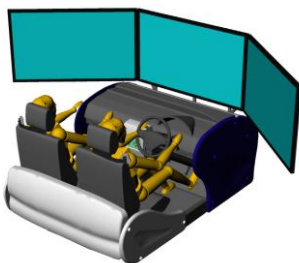
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UC-win/Road



▲ Comparison between photograph and VR (Left: Photograph, Right VR)

(*Ohashi JCT Driving Assistance Measures, Metropolitan Expressway Company – 2009 3D VR Contest Grand Prix Winner)



▲ Drive Simulator (2 seater)

1. Using CarSim in UC-win/Road

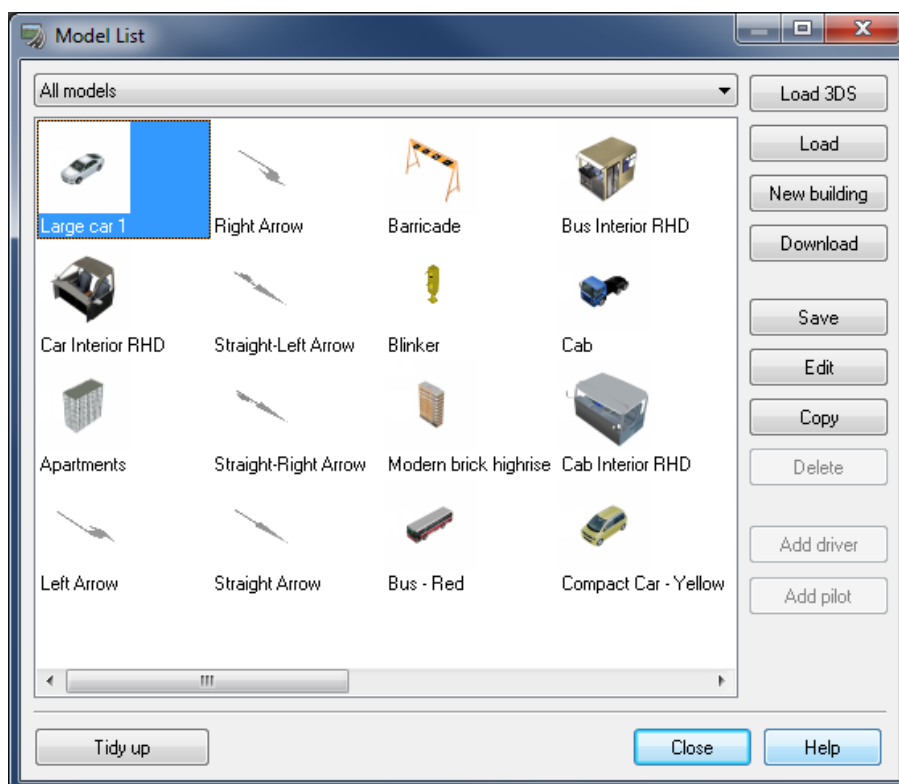
How to set up UC-win/Road driving simulation with CarSim

1.1. Vehicle Dynamics Settings

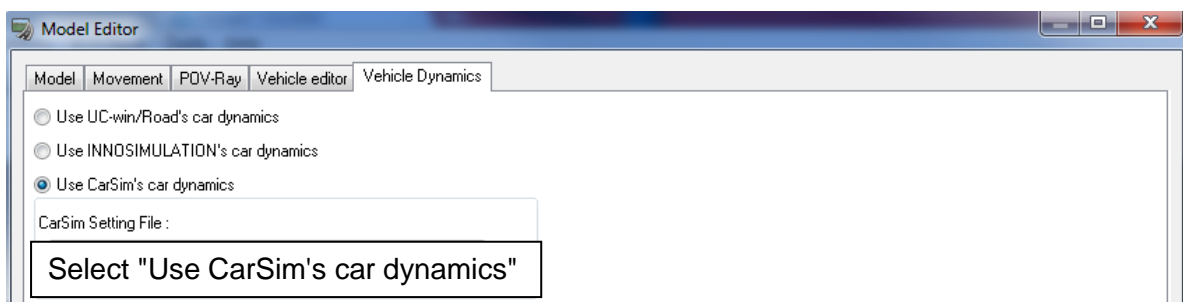
In UC-win/Road, it is possible to choose whether to apply vehicle dynamics to the vehicle that is used for driving simulation or not. As a default, vehicle dynamics is already enabled to the driver's vehicle.

See below for the method to adjust vehicle dynamics:

- Select "Load Models" from "File" in the main menu
- Select the vehicle that you wish to use for driving and click "Edit"



- Select "Vehicle Editor" tab from the top of the Model Editor window



NB: DS Plug-in and Vehicle Editor Plug-in must be loaded.

1.2. Preparation for Driving Simulation

CarSim must be running before the driving simulation is started.

2. Proposal for Interface with CarSim

2.1. UC-win/Road Parameters for CarSim

Parameter	Unit	Type	Details
Xo	m	Vehicle Body Information	Front Wheel Central Position
Yo	m		Vehicle Body Central Position
Zo	m		Front Wheel Road Surface Position is set as 0.0
Roll	rad		
Pitch	rad		
Yaw	rad		
Xpos	m	Tire and Road Surface Information: 4 locations	Tire Position on the Road Surface
Ypos	m		Tire Position on the Road Surface
Zpos	m		Front Wheel (Left)
SlopeX			Front Wheel (Right)
SlopeY			Rear Wheel (Left)
MueX			Rear Wheel (Right)
MueY			
SteerSw	rad		
Throttle		Driving Data	Throttle (0.0 - 1.0)
Brake	Pa		Brake Oil Pressure (0 - 15Mpa): Max. 15MPa
ModeTrans			Gears (1: Reverse; 0: Neutral; Gears 1 to 5)
GearTrans			Manual Transmission Gear Selection

NB: There will be requirements for interfacing with CarSim tire models separately.

2.2. CarSim Parameters for UC-win/Road

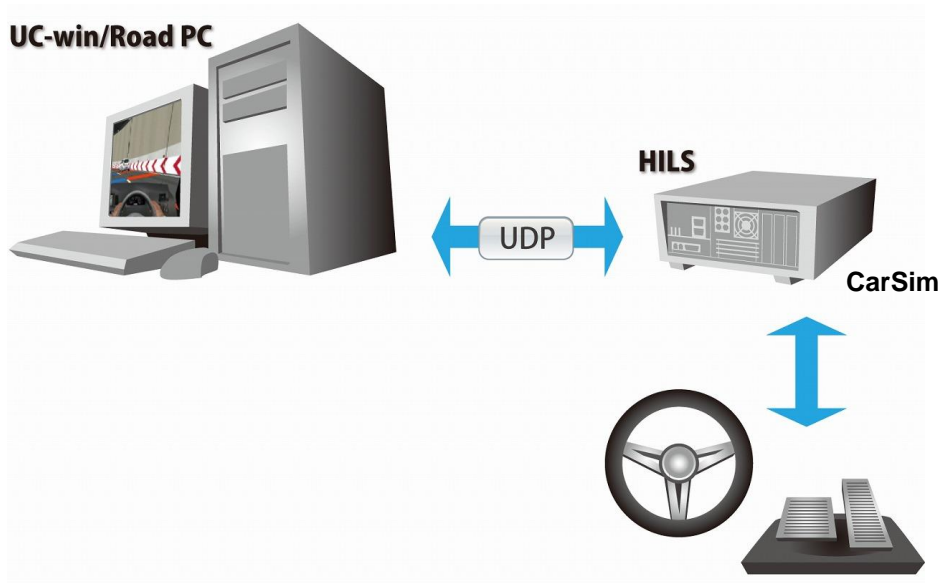
Parameter	Unit	Details	NB
Xo	m	Vehicle Position X Coordinate	Coordinates at the bottom of Front Wheels Central Position
Yo	m	Vehicle Position Y Coordinate	Coordinates at the bottom of Front Wheels Central Position
Zo	m	Vehicle Position Z Coordinate	Coordinates at the bottom of Front Wheels Central Position
Roll	rad	Vehicle Roll Angle	
Pitch	rad	Vehicle Pitch Angle	
Yaw	rad	Vehicle Yaw Angle	
VX_SM	m/sec	Vehicle Speed	
AV_ENG	rpm	Engine Speed	
GearState		Gear Status	
M_SW	N-m	Steering Wheel Torque	
AxBf_SM	m/sec ²	Front/Back G, Figures Positive during Acceleration	
AyBf_SM	m/sec ²	Left/Right G, Figures Positive while Steering Left	1G=9.806m/sec ²
AxBf_SM	m/sec ²	Up/Down G, Figures Positive while Climbing	
Aax	rad/sec ²	Angle Acceleration, Roll Direction, Positive Figures during Right-ward Roll	
Aay	rad/sec ²	Angle Acceleration, Pitch Direction, Positive Figures when Pitching Forward	
AaZ	rad/sec ²	Angle Acceleration, Yaw Direction, Positive Figures while Steering Left	
L_track1	m	Front Tread Width	
L_track2	m	Rear Tread Width	
L_track3	m	Wheel Base	

3. Interface with HILS

Linkage with HILS is possible through customization of UC-win/Road using the SDK.

Extract driving operation data (acceleration, braking and steering) and environment information (road surface height differences, road friction, crosswind etc.) from UC-win/Road, and analyze the dynamic behavior in HILS vehicle dynamics (e.g. CarSim). Feedback this information to UC-win/Road to enable realistic driving simulation in VR and effectuate realistic movements on the motion platform.

Linkage Plan:



FORUM8

8-12 New Bridge Street London EC4V 6AL UK

Phone: +44 (0)207 822 1887

Brendan Hafferty: brendan@forum8.com