Realtime technologies

DRIVING SIMULATION FOR RESEARCH

PRODUCT CATALOG

RESEARCH SIMULATION SIMPLIFIED

COMPLETE SOLUTIONS FOR DRIVING RESEARCH

WHY REALTIME FOR SIMULATION RESEARCH

Realtime Technologies' driving simulators are turn-key driving simulation platforms for research, training, or automotive product development programs.

Our modular, scalable designs allow you to add components to your existing simulator, avoiding the need to replace your entire simulator as your fidelity needs increase.

Networking Simulation Capabilities:

- Multiple simulators connected in a single environment
- Tasking interfaces for multiple participants
- Vehicle-to-everything communications

Custom Solutions:

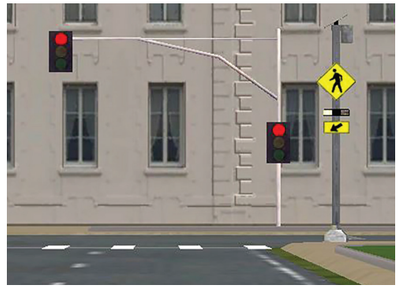
- Custom Cabs & Interfaces
- Customizable Software

Ability to Scale:

- From desktop to full cab simulators
- Start small and upgrade over time using the same software

Multi-Market Research Solutions:

- Original Equipment Manufacturer
- Civil Engineering & Roadway Infrastructure
- Human Factor and Safety
- Bicycles & Pedestrians
- Signage



CUSTOM SOLUTIONS

Need a specific configuration for your driving research? Realtime Technologies has the ability to fully customize the simulated driving experience to meet your research requirements.

Customized Research Simulators:
Realtime works with researchers to modify vehicle cabs to include custom add-ons to enhance their research capabilities.

Powerful Research Software:
Our software's standard modules and plug-ins make customization of the virtual driving environment accessible.

Continued Support:
Our staff is dedicated to helping customers leverage our simulation tools as their research evolves.

CONFIGURATION SHOWN MAY VARY

RDS-2000T

The RDS-2000T is a full-size commercial fleet truck simulator with options for modeled trailers. This full-scale replica cab has all the features you would find in a real commercial fleet vehicle. All the driving components can be linked directly to the Realtime Technologies' software providing realistic driver feedback and accurate data collection. The fully instrumented vehicle cabin allows for a more life-like experience that will, in turn, give you the data needed for your research.

Includes:

- Full or half-cab options
- High-fidelity steering subsystem
- Real brake and accelerator pedals
- Cab input/output signals from turn signals, headlights, steering wheel buttons
- Fully customizable virtual dashboard
- Fully customizable center stack touchscreen
- LCD side mirrors embedded into a real mirror
- Host and visual channels to match the visual system
- 5.1 surround sound audio system
- Vibration transducer for road rumble feel
- Commercial truck fleet models with options for trailers

Options:

- Motion options in 3DOF or 6DOF
- Driver's horizontal view up to 360° FOV - monitor, faceted screen or curved screen options
- SimObserver - After Action Scenario Review
- Radio Intercom

CONFIGURATION SHOWN MAY VARY

RDS-2000 FULL CAB

For the ultimate research driving simulation experience, step into the RDS-2000 full-size cab simulator. This full-scale cab has all the features you would find in a real vehicle. All the driving components can be linked directly to the Realtime Technologies' software providing realistic driver feedback and accurate data collection. The fully instrumented vehicle cabin allows for a more life-like experience that will, in turn, give you the data needed for your research.

Includes:

- Full or half-cab options
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- Real brake and accelerator pedals
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Options:

- Motion options in 3DOF or 6DOF
- Driver's horizontal view up to 360° FOV - monitor, faceted screen or curved screen options
- SimObserver - After Action Scenario Review
- Radio Intercom

CONFIGURATION SHOWN MAY VARY

RDS-1000 SINGLE SEAT

The RDS-1000 has the smallest footprint for real-vehicle equipment, including a real steering wheel with control, loaded steering, real accelerator, and brake pedals, along with a fully customizable virtual dashboard. The RDS-1000 features a quarter cab design with a standard 205-degree horizontal field of view and 38-degree vertical field of view, using 65 inch displays.

Includes:

- Open quarter-cab design
- High-fidelity steering subsystem
- Real brake and accelerator pedals
- Cab input/output signals from turn signals, headlights, steering wheel buttons
- Fully customizable virtual dashboard
- Fully customizable center stack touchscreen
- Three large-panel monitors with inset mirrors
- 5.1 surround sound audio system
- SUV seating height
- 4 generic physical response buttons in the center console
- Dedicated SimDriver automation button
- Driving assistance indicators and buttons

Options:

- 3DOF motion system
- SimObserver - After Action Scenario Review

CONFIGURATION SHOWN MAY VARY

RDS-MODULAR CAB

The RDS-Modular Cab provides a real-life driving experience similar to the full-cab setup, but it has more flexibility when making modifications to the hardware. The hardware can be rolled in and out of the space.

Includes:

- Driver and passenger seats
- High-fidelity steering subsystem
- Real brake and accelerator pedals
- Cab input/output signals from turn signals, to steering wheel buttons
- Fully customizable virtual dashboard
- Fully customizable center stack touchscreen
- Three small mounted LCDs for rear-view mirrors
- 5.1 surround sound audio system

Options:

- Windshield with A-Pillar frame
- Door Frame
- Monitor, faceted screen, or curved screen options
- SimObserver - After Action Scenario Review

CONFIGURATION SHOWN MAY VARY

RDS-500

The RDS-500 simulator provides a real-life driving experience similar to higher fidelity models but with a smaller footprint. It provides flexibility for making modifications to the hardware.

RDS-500 Includes:

- Low-cost single seat driving simulator
- Built for mobility for easy transport
- Driver seat
- Brake and accelerator pedals
- Cab input-output signals from turn signals, to steering wheel buttons
- Fully customizable virtual dashboard
- Three 32-inch monitors
- 2.0 audio system

Options:

- Fully customizable center stack touchscreen
- Monitor, faceted screen or curved screen options
- SimObserver - After Action Scenario Review

CONFIGURATION SHOWN MAY VARY

RDS-100 DESKTOP

The RDS-100 Simulator brings the performance of mid-to-high-fidelity simulators into a compact lower-fidelity package. Using Realtime Technologies' core software, complex simulations run on a high-performance PC platform.

The RDS-100 Dev Simulator brings the off-line scenario editing and development capabilities to your lab. This development system will add capacity to your lab allowing the main simulator to be running studies, while others develop scenarios for later use on the larger main simulator.

RDS-100 Includes:

- Operator station laptop
- High-end simulation computer
- Three 32-inch HD monitors
- USB-based steering wheel and pedal set
- 2.0 audio system

Options:

- SimObserver - After Action Scenario Review
- Development station to create scenarios
- Stand-alone simulator
- Networked simulator in a shared scenario

CONFIGURATION SHOWN MAY VARY

RESEARCH BIKE SIMULATOR

The research bike simulator is available as an add-on to the RDS products and as a standalone simulator.

For the bike, sensors are placed at the front and rear wheels to measure wheel turning angle and speed of the rider. A constant force-resistance attachment will also be placed for rear-wheel pedal force. The short-throw front projector will be combined with one computer for SimCreator and visuals.

Networking simulation capable - connect multiple simulators in a single environment.

Includes:

- Full-size adult hybrid bicycle
- Platform with turntable for steering
- Forward projection screen and projector
- 5.1 surround sound audio system
- Sensors to track speed and heading

Options:

- Monitor, faceted screen or curved screen options
- SimObserver - After Action Scenario Review
- Noise-canceling headphones

CONFIGURATION SHOWN MAY VARY

PEDESTRIAN SIMULATOR

The research pedestrian simulator is available as an add-on to the RDS products and as a standalone simulator.

This pedestrian simulator allows for decoupled movement and viewing directions. Operators are able to adjust analog movement speeds.

Networking simulation capable - connect multiple simulators in a single environment.

Includes:

- Omni-Directional walking platform
- Belt-based rotating treadmill
- VR headset with integrated speakers and microphone

Options:

- Monitor, faceted screen or curved screen options
- AR headsets with eye tracking
- 5.1 surround sound audio system

CONFIGURATION SHOWN MAY VARY

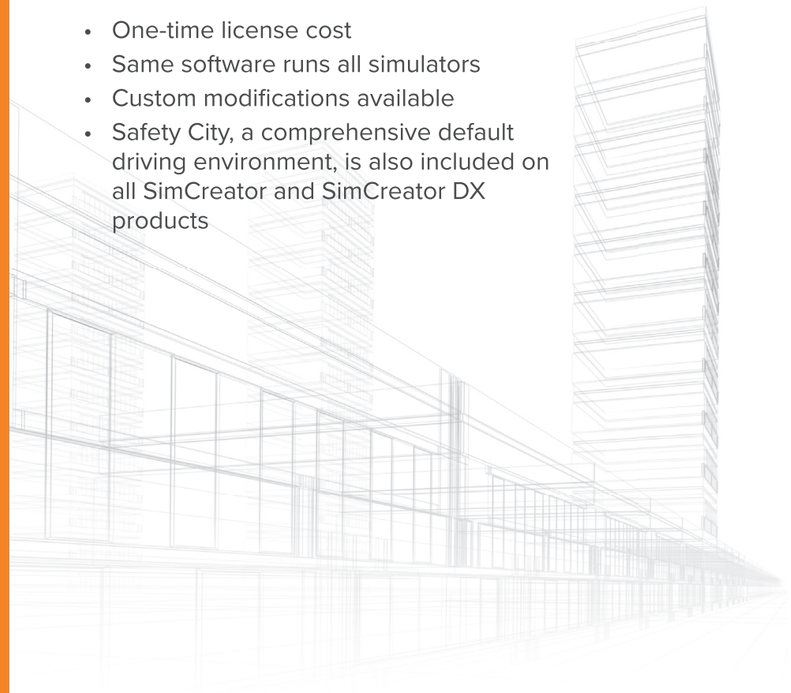
SYSTEM OVERVIEW

Regardless of which simulator you purchase, the same world-class, leading research software is included.

SimCreator and SimCreator DX are included with all new simulator purchases.

Features:

- One-time license cost
- Same software runs all simulators
- Custom modifications available
- Safety City, a comprehensive default driving environment, is also included on all SimCreator and SimCreator DX products



SimCreator System Architecture

SimCreator – Modular Sandbox for Research with Robust SDK for Third Party Integrations

Core System Components

SimCreator – Real-Time Simulation and Modeling System
Fusion 2 – Updated Image Generator
Safety City – Pre-Loaded Driving Environment

Advanced Scenario Authoring

SimCreator DX – Scenario Authoring & Development

Road Network Development

RoadRunner – Integrated Third Party Road Network Modeling Software

Supporting Applications

Maneuver Designer – Programmable Maneuver Generation
SimObserver Pro – Video Capture & After Action Review System

Autonomous Solutions

SimADAS – Vehicle Assistance – SAE Levels 1 & 2
SimDriver – Vehicle Controls – SAE Levels 3 & 4

SIMCREATOR SYSTEM ARCHITECTURE

SimCreator is an endlessly extensible modular sandbox for research with a robust SDK that allows for mix and matching third-party integrations. It supports a wide range of hardware and software solutions.

Users can edit, compile, and run custom vehicle models, and other user customizations as part of the product. User scripts make it possible to integrate third-party components that require bidirectional data transfer through SimCreator.

Read/write (get/set) access is provided to data with SimCreator via the user script to support full and rich integration of those components through C++ or Javascript code.

New Modularized System:

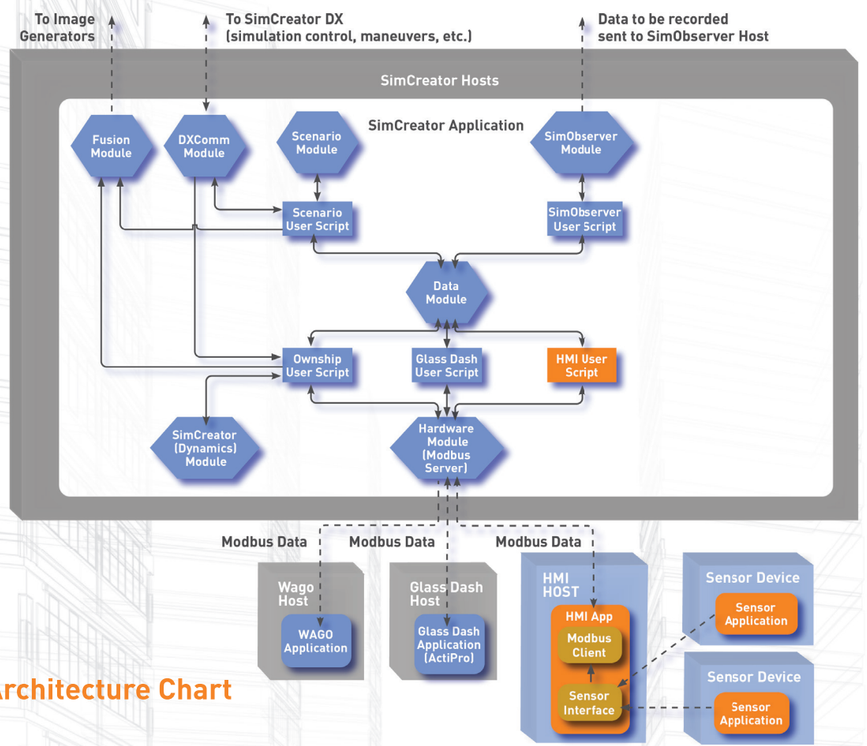
- Base user projects are quickly modifiable while maintaining software standardization for seamless rollouts of bug fixes, and new releases
- Proprietary research elements are compartmentalized from base setup when seeking support

New SDK:

- Userscripts based interface
- Supports OpenDrive road networks
- Supports data integration from OpenFlight
- Streamlines GIS data use with RoadRunner

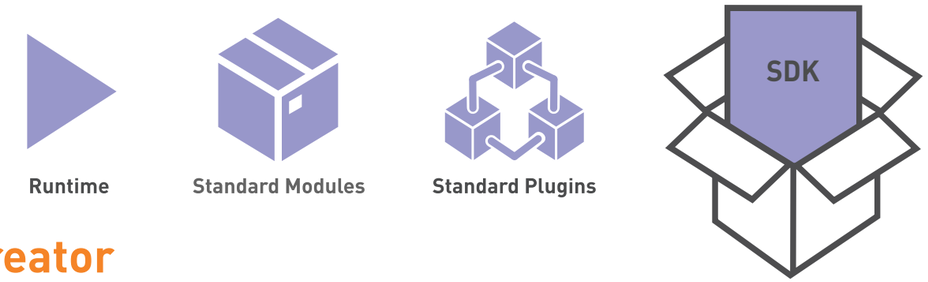
Updated Graphics Engine:

- Allows for flexibility in visual display systems from monitors, seamless projection, and AR for the widest variety of research simulator configurations available in the industry



System Architecture Chart

CORE SYSTEM COMPONENTS



SimCreator

Real-Time Simulation and Modeling System

SimCreator provides the core software for all of the vehicle simulators and is a high-fidelity, real-time driving simulation software. It is a Windows-based simulation development environment with a standard library of modules and plugins that offer ready-made integration with hardware, audio, visual, and data collection integrations.

The software manages the communications between all of the relevant subsystems, including visuals, scenario control, audio, motion, control loading, and data collection. SimCreator supports exporting models to C/C++ code and libraries for use in external code. It enables building and running models with a host and remote computer.

Each complete RDS product comes bundled with ActiPro, which allows for the creation and integration of user interface components such as virtual dashes and touchscreen center stacks.

Fusion 2

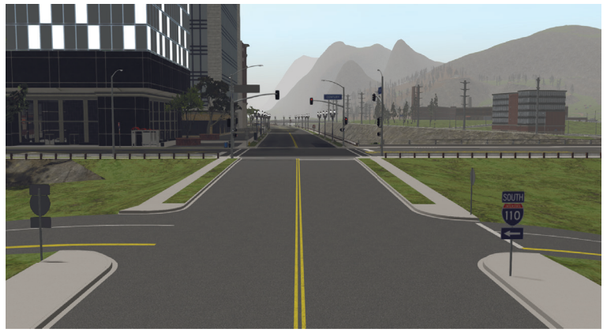
Updated Image Generator

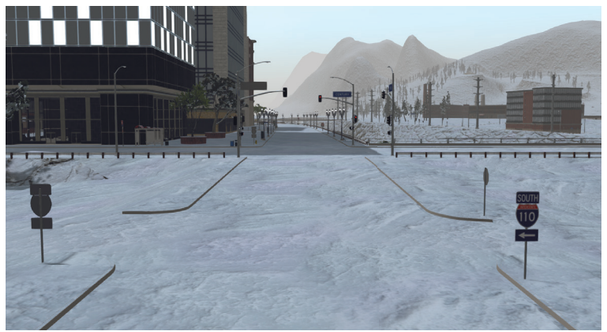
Fusion 2 is the latest image generator developed by Realtime Technologies. It features dynamics time-of-day, dynamic weather, and support for OpenFlight and FBX models. Fusion comes packaged with over 350 vehicles, animals, and pedestrians, as well as over 425 static objects. With such a wide variety of content, you will be sure to find what you need.

Safety City

Pre-Loaded Driving Environment

Safety City is a single vivid and rich training environment utilizing Fusion for the latest graphics technology. Environments include urban, rural, industrial, suburban and highways that experience realistic weather.



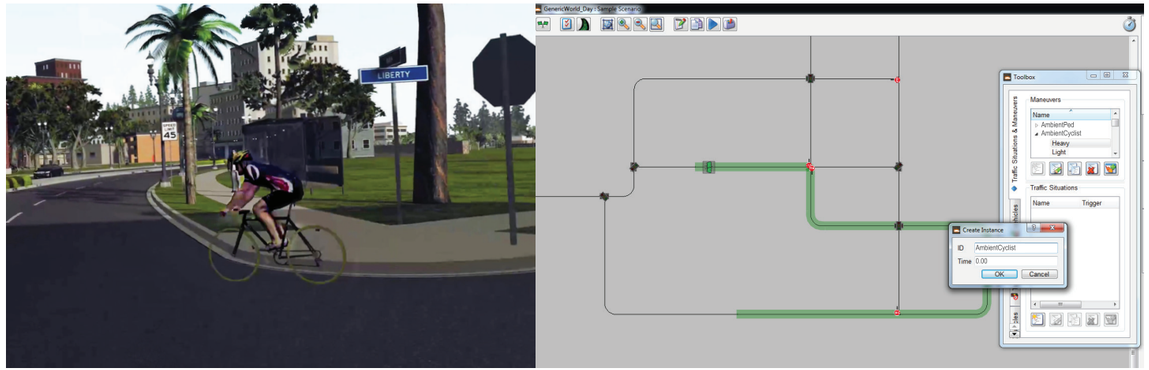


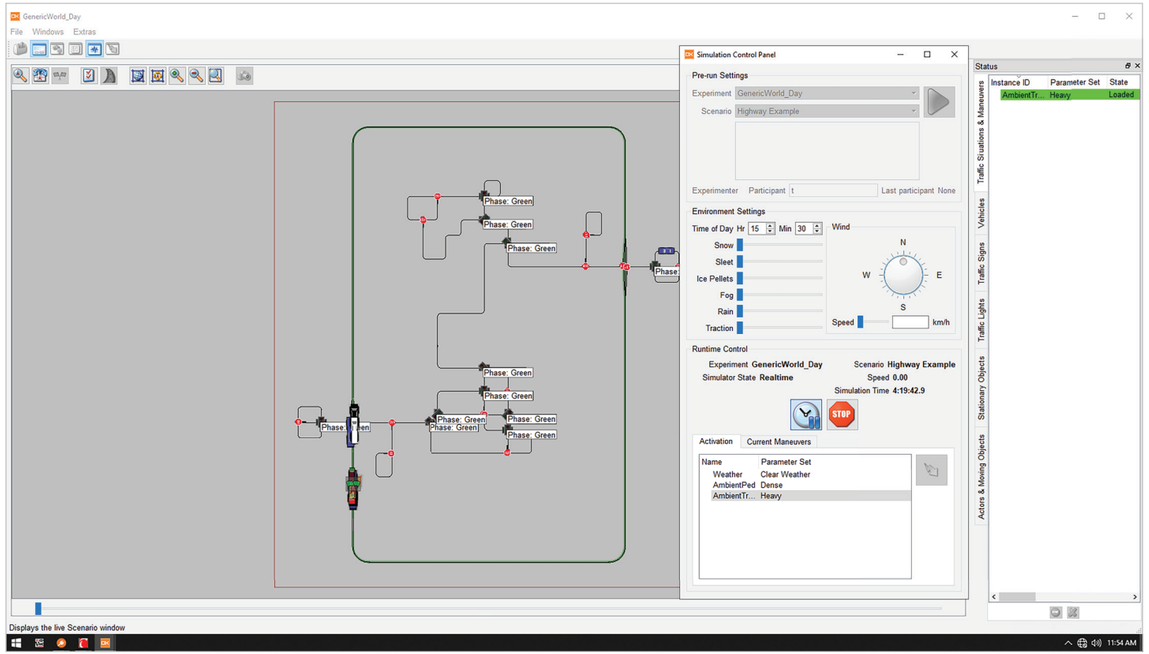
ADVANCED SCENARIO AUTHORING

SimCreator DX

Scenario Authoring and Development

SimCreator DX is the latest generation of Realtime Technologies' scenario authoring and development software. DX allows you to create your own rapid and advanced scenario authoring, as well as advanced experimental control ability. This graphical user interface allows researchers to develop scenarios with pre-defined configurable behaviors called maneuvers rapidly. SimCreator DX provides various user permissions to facilitate both development and experimentation mode. Using the scenario control panel, the researcher can select their experiment and run the scenarios.





ROAD NETWORK DEVELOPMENT

RoadRunner

Integrated Third Party Road Modeling Software

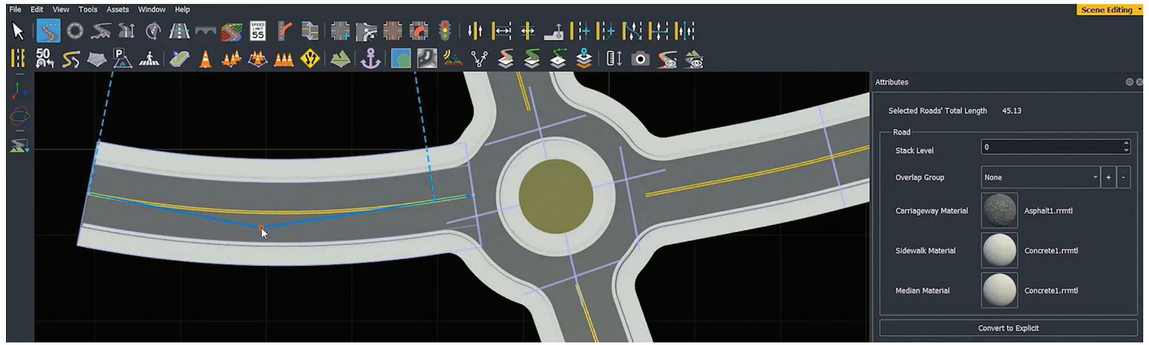
RoadRunner is an integrated interactive editor that lets you design 3D scenes for simulating and testing automated driving systems.

With RoadRunner, you can customize roadway scenes by creating region-specific road signs and markings. You can insert signs, signals, guardrails, and road damage, as well as foliage, buildings, and other 3D models.

RoadRunner provides tools for setting and configuring traffic signal timing, phases, and vehicle paths at intersections. RoadRunner Asset Library lets you quickly populate your 3D scenes with a large set of realistic and visually consistent 3D models. RoadRunner Scene Builder lets you automatically generate 3D road models from HD maps.

Create Customized Environments:

- Road and 3D scene modeling
  - Build roads and templates
  - Create intersections
  - Adjust curvature
  - Add lanes and edit lane widths
  - Add crosswalks
  - Create islands
- Create functional road networks and traffic signals
- Prebuilt and customizable assets and signs
- Reuse templates and merge scenes
- Export to simulators

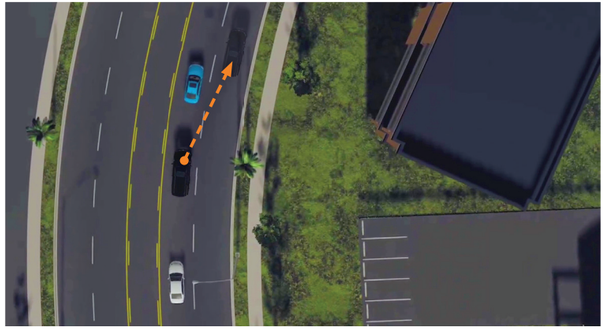


SUPPORTING APPLICATIONS

Maneuver Designer

Programmable Maneuver Generation

Maneuver Designer provides researchers with the power to program their own maneuvers in addition to the ones supplied with the SimCreator DX products. Maneuver Designer provides context help when programming, much like the features in a Microsoft Visual Studio environment. It also does some light error checking. With over 350 JavaScript scenario commands available, the possibilities are nearly endless for maneuver and scenario generation. There is a WYSIWYG interface for creating documentation so that other users can understand the intent of the maneuver.



SimObserver Pro

Video Capture and After Action Review System

SimObserver Pro is a stand-alone after action review system that allows you to record video, audio, and data from multiple sources that are then synced, timestamped and available for playback. SimObserver is designed to integrate easily with other applications and environments such as simulators, prototyping systems, usability labs, and virtual environments.

This program comes in two options. The first option is a four-camera combination using a hardware multiplexer into one 1920×1080 (HD) video output encoded using h.264 format. The second option is a four HD camera combination using software into one 3840 x 2160 (UHD) video output encoded using h.265.

AUTONOMOUS SOLUTIONS

SimADAS

Advanced Driver-Assistance Systems & Autonomous Vehicle Simulation Research

The SimADAS software allow you to create simulations of a wide range of advanced driver-assistance systems and is completely customizable to meet OEM specifications.

Researchers can delve into both the interaction between humans, drivers, pedestrians, passengers, and among autonomous vehicles, as well as shared control strategies between car occupants and AI.

Available Features:

- Adaptive Cruise Control
- Lane Keeping
- Blind Spot Monitoring
- Forward Collision Warning
- Lane Departures
- Pedestrian Warning
- Speed Limit

SAE INTERNATIONAL® J3016™

SAE LEVEL 1™

SAE LEVEL 2™

SimDriver

Autonomous Vehicle Control Solution

SimDriver is a transfer-of-vehicle-control solution used for the evaluation of human interaction with automated vehicles in both city and freeway driving environments. The program enhances the understanding of this relationship, which will be vital to ensuring safe autonomous vehicles. SimDriver can offer data that shows why drivers become distracted and how to re-engage into the task of driving smoothly. SimDriver's ability to run code through the simulator is a considerably more cost-effective and safer alternative than an expensive prototype.

Available Features:

- Engage/Disengage
- Lane Change
- Set Speed
- Routing
- Pull Over

SAE INTERNATIONAL® J3016™

SAE LEVEL 3™

SAE LEVEL 4™

TRAINING

Training can occur either at Realtime Technologies' site in Ann Arbor, Michigan, or at the customer site within the lower 48 states. For optimal training, the number of trainees should be limited to 3-5 people.

If additional training is desired, it can be purchased at a later date. For example, if there is lab turnover with researchers, training may be required for the new research staff.

3 day training covers the following topics:

- Basic simulator operation and "Quick-Start Guide"
- RoadRunner world building
  - Basics and what is needed
  - Best design practices
- SimCreator mechanics
  - Understanding user scripts, modules, plugins, and components
  - Understanding your data
- ActiPro basics within the context of SimCreator
- SimCreator DX scenario generation
  - Experiments and scenarios
  - Routes and maneuvers
  - Paths and waypoints
  - Using Maneuver Designer and JavaScript

WARRANTY/SUPPORT

SIMULATORS

The simulators provided by Realtime Technologies will come with a one-year limited hardware warranty. This warranty is limited to normal use and does not include expendables such as projector bulbs or damage caused by the customer personnel or contractors not associated with Realtime. This warranty is provided by the factory and involves free repair or replacement of parts when they are shipped to the factory.

SOFTWARE

Realtime Technologies provides software support services for all software provided and maintained by Realtime Technologies. Products include, but are not limited to, SimCreator, SimObserver Pro, SimCreator DX, Maneuver Designer, Data Distillery, SimDriver and Driving Simulators.

Software support services are available for purchase after the first year. Included in the software support services contract are unlimited email and phone support for software-related issues.

Phone Support Line: 248.548.4876 available from 8 am to 5 pm Monday - Friday

Email Support: support@simcreator.com

WHY REALTIME TECHNOLOGIES

Numbers – Vast team of simulation professionals brings strength in numbers, confidence comes from knowing that the answer resides in-house.

Innovation – An innovative culture focused on research and development.

History – Over 50 years of hard-working mentality with the advancements in technology.

Integration – Bridge the state-of-the-art, with the art of the possible.

Knowledge – With multiple markets, we create a depth and breadth of knowledge that is unsurpassed.

Support – Unmatched customer support to troubleshoot, diagnose, and answer your questions.

Partnership – The type of relationship we forge with our customers.

REALTIME TECHNOLOGIES SPECIALIZES IN MULTIBODY VEHICLE DYNAMICS, AND GRAPHICAL HUMAN FACTORS SIMULATION AND MODELING. WE OFFER SIMULATION SOFTWARE APPLICATIONS, CONSULTING SERVICES, CUSTOM ENGINEERING SOLUTIONS, AND SOFTWARE/HARDWARE DEVELOPMENT.

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