

Simulink 3D Animation 5

Animate and visualize Simulink models in three dimensions

Simulink 3D Animation™ lets you visualize dynamic system simulations in a 3D virtual reality environment. It provides an interface between MATLAB® and Simulink® and virtual reality graphics represented in Virtual Reality Modeling Language (VRML). You can change position, rotation, size, and other properties of objects in the virtual world, enabling you to observe the dynamic behavior of your system. Simulink 3D Animation includes a viewer for rendering detailed virtual scenes and playing high-quality animations.

Working with Simulink 3D Animation

Simulink 3D Animation provides insight into your Simulink model of a dynamic system through 3D visualizations. You can create virtual worlds by using standard VRML and then control them from Simulink. Simulink 3D Animation includes a comprehensive set of tools that let you:

- Build virtual reality worlds using VRML authoring tools
- Import VRML worlds, including CAD models
- View virtual reality worlds using VRML viewers
- Link and interact with virtual worlds using MATLAB functions and Simulink blocks
- Work in a collaborative, virtual environment

KEY FEATURES

- Ability to link Simulink models with virtual reality worlds, enabling visualization and tracking of 3D object motion
- Tools for building, modifying, and viewing virtual reality worlds
- Video recording and animation playback
- Visualization of real-time simulations
- Connection to common hardware input devices, including joysticks and 3D mice
- Client/server architecture, enabling collaboration among teams in multiple locations



Visualization of Simulink based applications, clockwise from far left: magnetic ball levitation, aircraft over terrain, automotive vehicle dynamics, self-balancing robot, and trajectory of aborted spacecraft mission.

Building Virtual Reality Worlds

Simulink 3D Animation provides tools for authoring and importing virtual reality worlds.

Working with the VRML Editor

The V-Realm Builder in Simulink 3D Animation is a native VRML authoring tool that enables you to create views and images of physical objects using VRML. The V-Realm Builder GUI offers a hierarchical, tree-style view of objects that make up the virtual world. The GUI contains a set of object, texture, transform, and material libraries that are stored locally for reuse.

You can author virtual scenes with any 3D authoring tool and export models in the VRML97 standard for use with Simulink 3D Animation.

Importing CAD Models

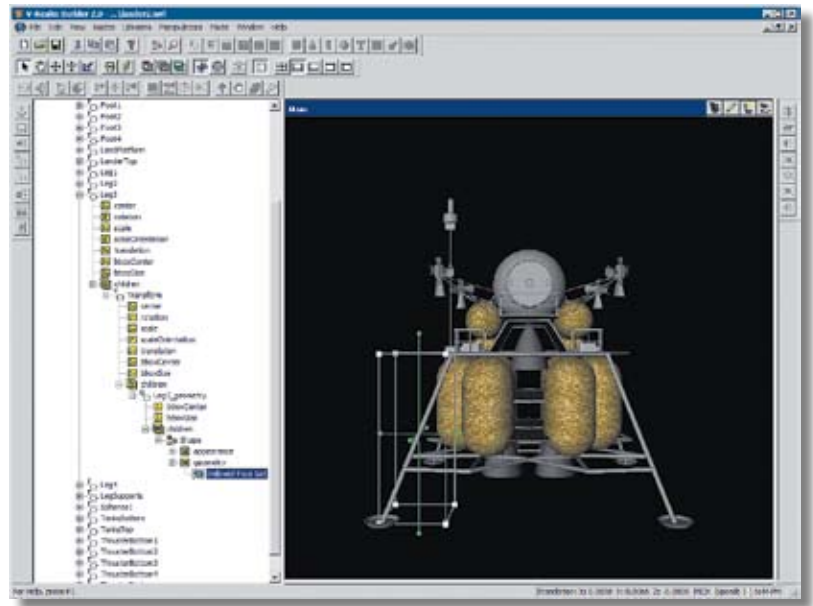
Simulink 3D Animation lets you import and process VRML files created from CAD assemblies that were authored in tools such as SolidWorks® and Pro/ENGINEER®. You can then automatically create visualizations based on these VRML files for models that have been created from the same CAD assemblies by using the SimMechanics™ Link utility.

Viewing Virtual Reality Worlds

Simulink 3D Animation includes VRML viewers that display your virtual worlds and record scene data.

VRML Viewers

The Simulink 3D Animation viewer integrates with MATLAB figures so that you can combine virtual scenes with Handle Graphics® objects and multiple views of one or more virtual worlds.



V-Realm Builder GUI showing a hierarchical, tree-style view (left) and scene preview (right) of various components of the lunar module.

You can navigate the virtual world by zooming, panning, moving sideways, and rotating about points of interest known as viewpoints. In the virtual world, you can establish viewpoints to emphasize areas of interest, to guide visitors, or to observe an object in motion from different positions. During a simulation, you can switch between these viewpoints.

Recording Scene Data

Simulink 3D Animation enables you to control frame snapshots (captures) of a virtual world, or to record animations into video files. You can save a frame snapshot of the current viewer scene as a TIFF or PNG file. You can schedule and configure recordings of animation data into Audio Video Interleaved (AVI) files and VRML animation files for future playback.

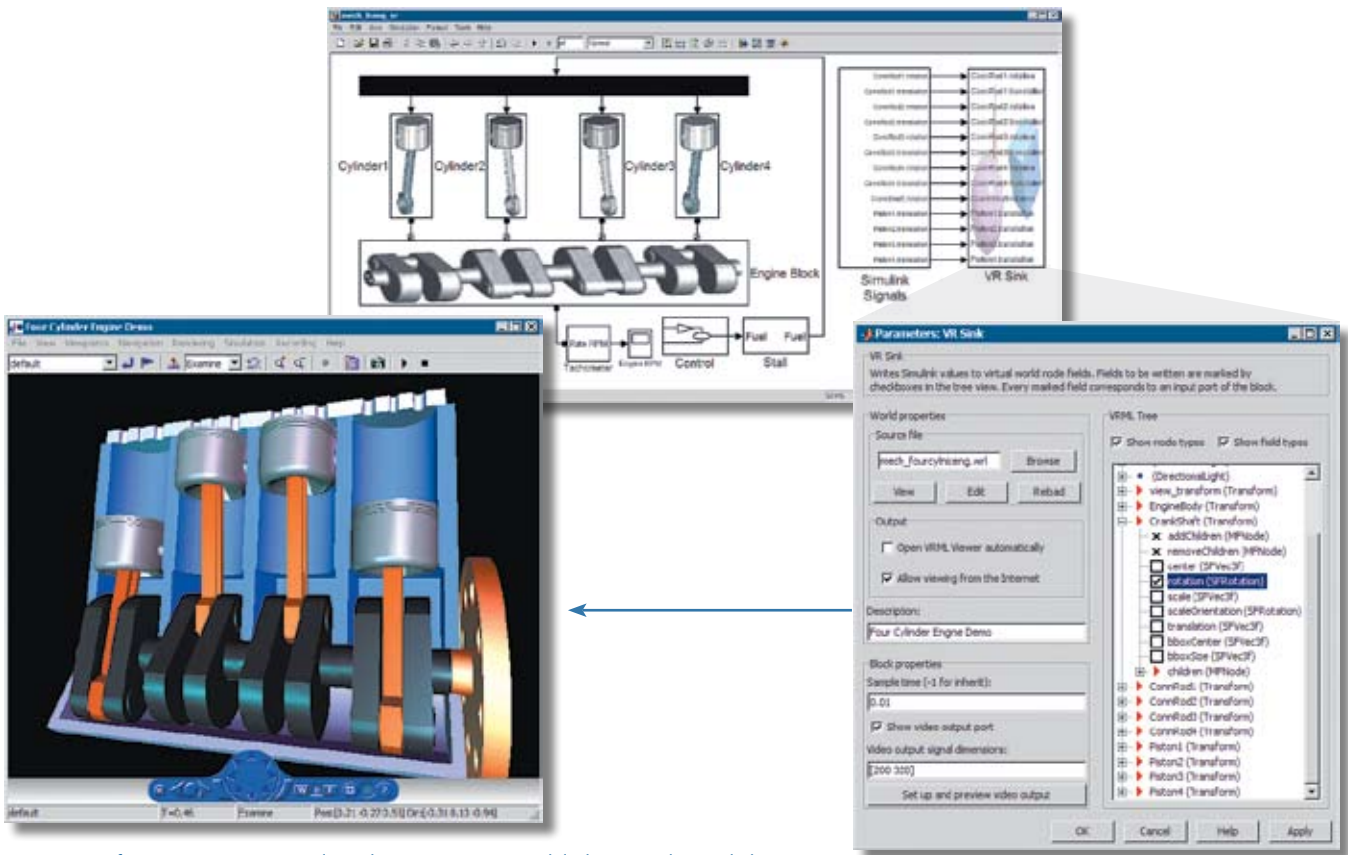
Additionally, Simulink 3D Animation lets you create video output from virtual worlds to develop control algorithms by using a visual feedback loop through the link with a virtual reality environment.

Viewing Object Trajectories

Simulink 3D Animation includes functionality that can trace the trajectory of an object in the associated virtual scene. For example, you can visualize the flight path of a spacecraft.

Linking to Virtual Reality Worlds

Simulink 3D Animation provides MATLAB and Simulink interfaces to virtual reality worlds. It also contains functionality to visualize real-time simulations and connect with input hardware.



Dynamics of an automotive internal combustion engine, modeled (top) with Simulink and SimMechanics. The virtual world (above) is linked through the VR Sink block (right) and viewed with the Simulink 3D Animation viewer.

Simulink Interface to Virtual Reality Worlds

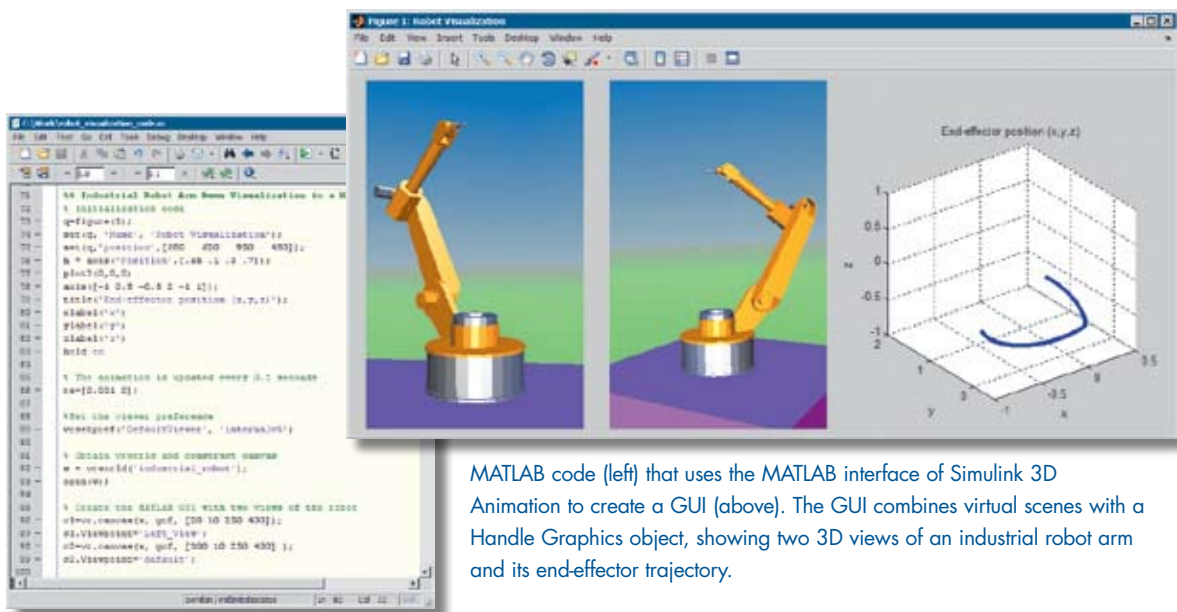
The Simulink 3D Animation library provides blocks to directly connect Simulink signals with virtual reality worlds. You can control position, rotation, size, and other properties of a virtual object in a scene to visualize its motion and deformation. A set of vector and matrix utilities for axis transformations enables flexible associations of Simulink signals with properties of objects in your virtual world. You can adjust views relative to objects and display Simulink signals as text in the virtual world.

MATLAB Interface to Virtual Reality Worlds

Simulink 3D Animation provides a flexible MATLAB interface to virtual reality worlds. You can read and change the positions and other properties of VRML objects, read signals from VRML sensors, create callbacks from GUIs, record animations of virtual scenes, and map data to virtual objects from MATLAB. You can use MATLAB Compiler™ to generate redistributable, standalone applications that include Simulink 3D Animation functionality.

Visualization of Real-Time Simulations

You can use C code generated from Simulink models using Real-Time Workshop® to drive animations. This approach enhances your real-time simulations by providing a visual animation of your dynamic system model as it connects with real-time hardware.



MATLAB code (left) that uses the MATLAB interface of Simulink 3D Animation to create a GUI (above). The GUI combines virtual scenes with a Handle Graphics object, showing two 3D views of an industrial robot arm and its end-effector trajectory.

Support for Input Hardware

Simulink 3D Animation includes Simulink blocks and MATLAB functions for user interaction and virtual prototyping with 3D input devices, including 3D mice from 3Dconnexion and force-feedback joysticks.

Working in a Collaborative Environment

Simulink 3D Animation enables you to view and interact with simulated virtual worlds on one machine that is running Simulink or on networked computers connected locally or via the Internet. In a collaborative work environment, you can view an animated virtual world on multiple client machines connected to a host server through TCP/IP protocol. When you work in an individual (nonnetworked) environment, your modeled system and the 3D visualization run on the same host.

Required Products

MATLAB®

Simulink® (for using product blocks)

Related Products

Aerospace Blockset™

Model and simulate aircraft, spacecraft, and propulsion systems

MATLAB Compiler™

Build standalone executables and software components from MATLAB code

SimMechanics™

Model and simulate mechanical systems

Video and Image Processing Blockset™

Design and simulate video and image processing systems

xPC Target™

Perform real-time rapid prototyping and hardware-in-the-loop simulation using PC hardware

Platform and System Requirements

For platform and system requirements, visit www.mathworks.com/products/3d-animation. ■

Learn More

www.mathworks.com/products/3d-animation

Resources

VISIT

www.mathworks.com

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