

Advanced EO/IR/NVG Sensor Module for DVC's GenesisRTX™

GenesisSN™ is a real-time physics-based sensor IG module for use with DVC's GenesisRTX™ Scene Generator System that allows simulation of correlated and accurate NVG, EO, MWIR, and LWIR sensors.

Features

Run-time Dynamic Scene Construction

Enables run-time "Dynamic Construction" of high-quality, materially-encoded 3D scenes composed of high definition terrain, cultural features, and special effects, *directly from unprocessed GIS source data.*

GenesisSN™ Sensor Physics Module

Renders physics-based sensor output imagery in real-time, at user-configurable resolutions and frame rates.

On-the-Fly Physics-Based Signature & Sensor Modeling

Predicts ephemeris, angle-dependent irradiances & thermal loading, fully-transient material surface temperatures, true BRDF reflection based on measured material properties, atmospheric transmission & path radiance, and post-aperture sensor optics, detector, & electronics effects.

In addition, GenesisSN™ quickly provides the correct spectral radiance from man-made light sources, including tungsten, sodium, mercury, neon, and poly-metallic lamps.

Real-time EO/IR Atmospheric

Implements JRM's innovative, extremely fast path-integral/transport algorithms based on MODTRAN atmospheric physics licensed from AFRL. These algorithms operate on a common atmospheric data model, allowing the user to assign such parameters as the pressure, temperature, molecular species concentrations and weather state at each altitude of the atmospheric profile.

Genesis-RDR™ Radar Simulator (*Separately available*)

The new Genesis-RDR module provides physics-based SAR, ISAR, and RBGM radar image prediction at arbitrary RF wavelengths, *from the same material system-encoded database.* This module imports customizable entity and terrain RCS tables, and predicts polarization, coherence, leading-edge brightness, shadowing, RF noise, and Doppler blur/shift effects.

Features:

- Customizable MODTRAN-based atmospheric modeling
- Physics-based man-made light sources
- Dynamic scene construction
- Real-Time signature modeling (ephemeris, atmospheric, irradiance, reflection, thermal absorption & emission)
- Real-Time sensor modeling (optics, detector, electronics)
- 16-bit radiance output
- Optional 3D geometry modeling and material classification tools



Complex Scenes

Easily load a complex 3D terrain database, completely specify any number of arbitrary sensors, atmospheric and weather conditions, and place 3D vehicle or human models in the scene, then display in real-time.

Realistic Sensor Simulation

GenesisSN™ provides accurate simulation of arbitrary imaging sensors in the UV through far IR (0.20-25.0 μm) spectrum and RF frequencies with optimized, physics-based signature synthesis and MODTRAN-based atmospheric propagation modeling.



Special Effects

GenesisSN™ provides physics support for accurate scene special effects such as flares, fire, smoke and dust clouds, as well as the ability to individually control active thermal systems of entity models.

Realistic Dynamic Range

GenesisSN™ also offers support for 16-24 bit high dynamic range (HDR) output images. This allows the IG to simulate and represent special effects like plumes & flares at full dynamic range without clipping or burying the terrain signature in noise.

GUI-based modeling tools make it easy to generate and classify complex 3D environments and entity models for use in GenesisSN!

Modeling Tools

GenesisMC™ Material Texture Classification Tool

An advanced-algorithm semi-automated software tool for creating material-classified-maps from remote-sensed terrain imagery or RGB textured 3D models -- complete with physical properties and thermal boundary conditions for realistic physics-based sensor simulations.

Entity Geometry Modeling Tool

COTS tool for the creation, editing and manipulation of 3D wire-frame mesh models and mapping of high-resolution textures for subsequent material/thermal classification.

ModtranGUI™ Weather/Atmosphere Modeling Tool

GUI-based tool for creating, editing and saving MODTRAN-based weather/atmosphere state files.

Material System Editing Tool

COTS tool for editing material systems, affording control of the physical and thermodynamic properties of all scene elements, necessary to support OTF fully-transient numerical solvers of the heat diffusion equation, with surface forcing functions and boundary conditions.

GenesisAM™ Database Tool

GenesisAM™ is a Windows Graphical User Interface (GUI) that allows users to construct and modify XML-based project files for use by GenesisRTX™. By utilizing GenesisAM™, the user is given complete control over how GenesisRTX™ interprets and utilizes the source data, including building extrusion, road cut-ins, and vector file associations. Project changes can be rapidly visualized, enabling an iterative approach to 3D scene development.

