

CHIMAERA is a real-time, Multi-Spectral Imaging Sensor Scene Generator System for stimulating high-frame-rate sensor and projector systems in the 0.2-25.0 μm spectrum. It is designed to fully meet the scene generation requirements of a real-time hardware-in-the-loop (HWIL) laboratory environment.

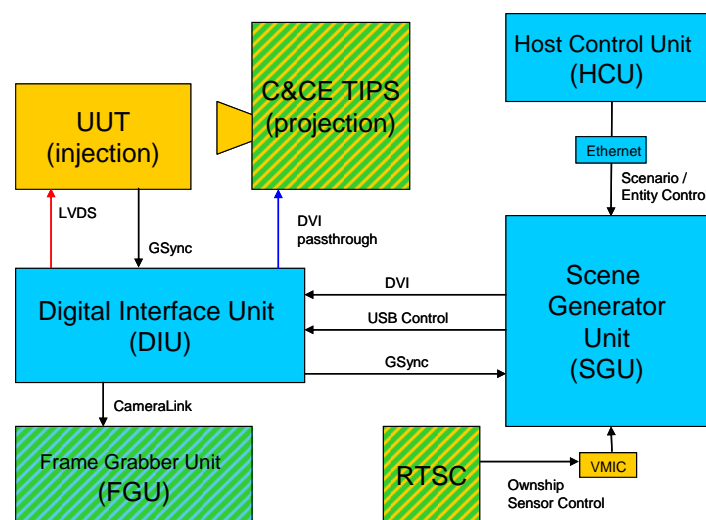
CHIMAERA consists of an integrated combination of unique subsystems, each with dedicated hardware and software components.

1. Chimaera Host Control Unit (HCU)

- GUI-based scenario and trajectory definition
- Scenario & sensor parameters to SGU via CIGI
- Position/orientation updates to SGU via CIGI.
- Tools to generate matclassed terrains & 3D models
- Signature modeling tools

2. Chimaera Scene Generator Unit (SGU)

- Reads scenario, sensor, and entity updates from host via CIGI.
- Reads ownership sensor position/orientation updates from customer's Real-Time Simulation Computer (RTSC) via VMIC shared memory.
- Processes phenomenology and sensor physics to produce 16-bit DVI imagery.
- Combined rack-mount KMM unit (Keyboard/Mouse/Monitor) available.



Key Features

- Multi-Spectral EO/IR Scene Stimulation
- Optical projection & digital injection modes
- Controllable target super-sampling
- Digital Injection Unit (LVDS, CameraLink I/O)
- Genlock-sync capability
- Render-from-source & database paging
- Special Effects: Flare, Smoke, Dust, Plume, Fire
- IR window aerodynamic heating
- Dynamic target thermal signatures
- At-Aperture 32-bit radiance capture
- GUI-based Scenario Creation
- Custom Sensor Optics, Detector, & Electronics
- 16-bit DVI @ 60-200Hz @ 2fr latency ($\ll 3$)
- Physics-based, spectral signature synthesis
- VMIC & CIGI real-time network interfaces
- On-the-fly Modtran-based atmospheric.
- Synchronized multi-channel capability
- Remote operation

3. Chimaera Digital Interface Unit (DIU)

- Produces TTL GSync signal to SGU graphics card
- Inputs genlocked DVI stream from scene generator and converts to LVDS output for driving direct digital injection of customer's unit under test (UUT).
- Passes DVI stream to customer's IR scene projector.
- USB control from SGU or HCU specifies arbitrary gsync/frame rate, resolution, and windowing.
- CameraLink output
- Genlock source or passthrough

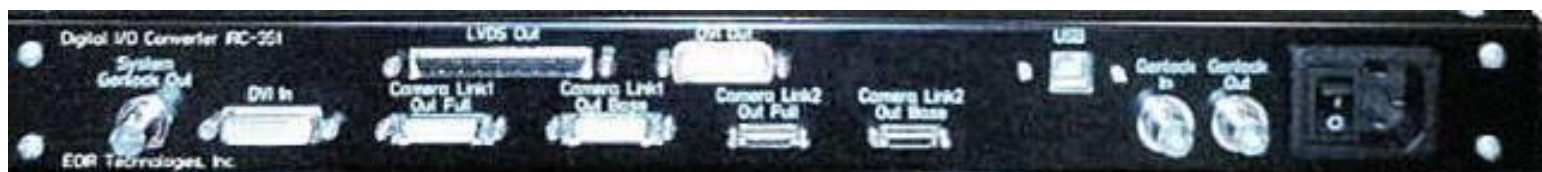
4. Chimaera Frame Grabber Unit (FGU)

- Captures high frame rate 16-bit DVI stream from scene generator for later playback.

5. Real-time Simulation Computer Emulator (RTSC)

- Emulates the Unit-under-test (UUT) flight motion feeds into VMIC (reading track file).

Multiple Chimaera systems may be genlock-synchronized for driving more than one channel simultaneously.

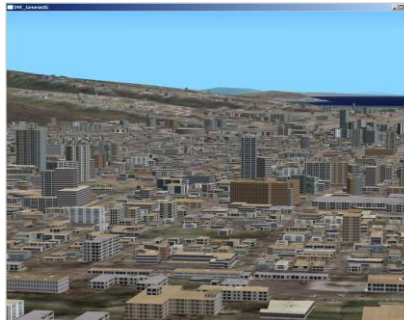


Configurable Hardware-in-the-Loop Image Generator for Advanced EO-IR Applications

CHIMAERA is a HWIL Image Generator for advanced EO-IR Applications, based upon JRM's *SigSim* and *SenSim* physics-based signature & sensor modeling libraries and the latest in real-time graphics hardware.

Complex Scenes

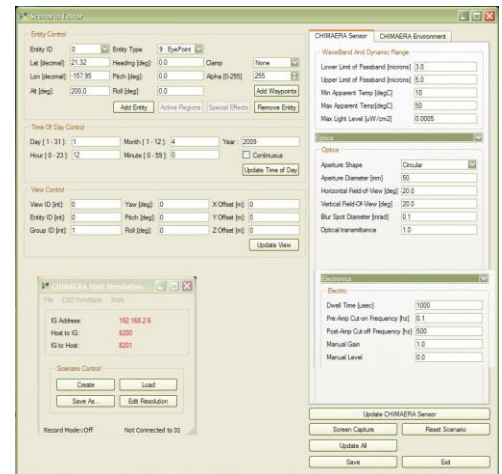
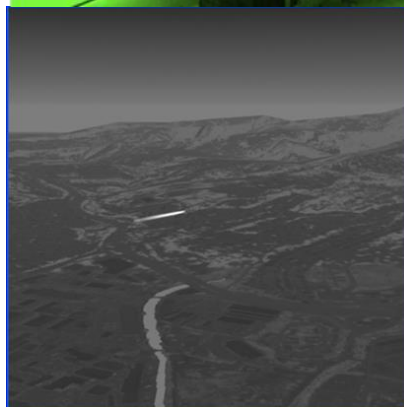
Easily load a complex 3D terrain database, completely specify any number of arbitrary sensors, atmospheric and weather conditions, and place 3D vehicle or human models in the scene, then display in real-time.



High Fidelity Simulation

CHIMAERA provides high-fidelity simulation of arbitrary imaging sensors in the UV through far IR (0.20-25.0 um) spectrum with highly-optimized, physics-based models for:

- Ephemeris
- Natural and man-made Irradiances
- Full transient, angle-dependent thermal modeling based on material properties & user-defined boundary conditions
- Spectral BRDF reflection
- Signature synthesis and Modtran 4.0-based atmospheric propagation modeling
- Special effects & countermeasures
- Physics-based sensor modeling, including all major optical, detector, and electronics effects such as :
 - o Diffraction and design blur
 - o 3rd order Optical Aberrations
 - o Motion blur
 - o Platform Jitter Blur
 - o Gaussian, Poisson, 1/f noise
 - o NVG Haloing
 - o Scanning effects
 - o Gain, level, AGC



The Host Scenario Definition GUI and Xbox Trajectory Controller offer easy user interaction for all elements of CHIMAERA.



System Performance (16-bit DVI-D Single-link)

Frame Rate (Hz)	Resolution (Typical)	Resolution (Max)
100	1024x1024	1024x1024
200	512x512	800x600
400	256x256	480x360



CHIMAERA HCU/SGU/DIU Rack