Image Generators with Unparalleled Capabilities

FREE FLAMES CIGI IG plugin for UNREAL ENGINE

FLAMES® and Unreal® Engine can be used to develop CIGI-compatible image generators and integrated computer generated forces simulations that provide unparalleled capabilities and that can be developed quickly and inexpensively.

FLAMES® Simulation Framework

UNREAL ENGINE

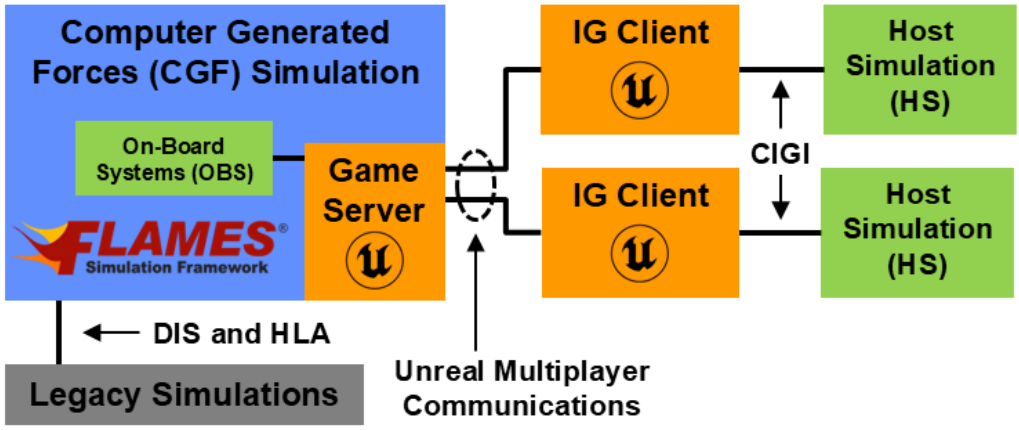
TERNION® CORPORATION Simulations That Work℠

Image Generators with Unparalleled Capabilities

This paper describes the advanced capabilities that are available in CIGI-compatible image generators (IGs) and integrated computer generated forces (CGF) simulations that are developed using the FLAMES Simulation Framework available from Ternion Corporation and Unreal Engine available from Epic Games. Two demonstration flight simulator systems that embody these advanced capabilities are also described.

Advanced Flight Simulators

The figure below depicts the major components of an advanced CIGI-compatible IG and an integrated CGF simulation developed using FLAMES and Unreal Engine.



CIGI-compatible IG and integrated CGF

Host Simulation (HS)

The host simulation (HS) is typically a stand-alone system that is responsible for simulating the motion of the "host" aircraft that is being flown by the pilot. The HS communicates with the IG using the Common Image Generator Interface (CIGI) protocol and is therefore usually compatible with any IG that supports CIGI.

The HS in this advanced simulator is much less complex than typical host simulations, because the simulation of the host on-board systems is moved out of the HS and into the CGF (as described below).

On-Board Systems (OBS)

In this advanced simulator, the on-board systems (OBS) that exist on-board a real aircraft (such as sensors, weapon systems, jammers, and communication devices) are simulated within the CGF simulation. This allows the OBS models to have direct, high-fidelity, zero-latency interaction with the entities that are simulated within the CGF simulation. This also eliminates the need to transmit the properties and state of the entities in the CGF simulation to the HS, further reducing the complexity of the HS.

Image Generator (IG)

The IG is developed using Unreal Engine and the free FLAMES CIGI IG Plugin for Unreal. The IG exploits the industry-leading 3D content creation and rendering capabilities of Unreal Engine. The IG communicates with the HS using CIGI and thereby supports a CIGI-compatible HS.

Computer Generated Forces (CGF) Simulation

The CGF simulation is developed using Ternion's FLAMES Simulation Framework. The CGF simulation is responsible for simulating all of the entities in the simulation other than the aircraft being flown by the pilot.

The FLAMES-based CGF internally integrates the Unreal Engine game server developed using Unreal and the FLAMES Unreal Engine option. Within the CGF, there is zero-latency, near seamless interaction between the FLAMES simulation and the game server. All the entities in the FLAMES-based simulation exist simultaneously in the game server.

Instructor/Operator Station

The FLAMES-based CGF also provides a customizable instructor/operator station (IOS). It includes a full-featured scenario editor and 2D/3D displays of the scenario (rendered by Unreal) that are available during scenario editing and scenario execution. All constructive entities can be controlled interactively during scenario execution.

Client-Server Communications

The CGF and the IG clients communicate using the Unreal Multiplayer Communication system, which is exceedingly more capable than DIS or HLA. The state information for all of the entities in the CGF is sent to the IG clients using this system. This system is also used to send visual effects information to the IG.

Multiplayer Support

The exploitation of the Unreal Multiplayer Communication system within the CGF and IG provides support for the simultaneous execution of multiple IGs.

Multichannel Display Support

Unreal Engine's nDisplay system supports rendering 3D content simultaneously on multiple displays in real time. The IG is compatible with the Unreal nDisplay system.

Open Architecture

The FLAMES-based CGF and IG are developed using FLAMES and Unreal Engine. Both products are application-independent, open-architecture frameworks/platforms for developing custom applications. In addition, both the FLAMES Developer and the Unreal Engine Editor are available for FREE. Developing extremely capable applications with FLAMES and Unreal Engine is very simple and inexpensive when compared to attempting to develop similar applications in another way.

Demonstration Flight Simulators

The following are two examples of flight simulator systems developed as described in this paper.

KUH-1 Virtual Flight Trainer

Korea Aerospace Industries, LTD (KAI) is a total solution provider in aerospace and plays a leading role in the national aviation industry and security. KAI is also the number one simulation organization in Korea that develops and delivers a full range of flight/maintenance/civilian simulators.

KAI and its support contractors have developed the Korea Utility Helicopter (KUH-1) Virtual Flight Trainer (VFT) to support KUH-1 pilot training. The KUH-1 VFT was developed using FLAMES and Unreal Engine and supports all of the advanced capabilities described in this paper. The VFT also uses the Globe SDK Platform and Synthetic 3D high resolution 3D AI extracted geospatial terrain data available from Blackshark.ai.

FLAMES CIGI IG and CGF Simulation

An example CIGI-compatible IG and a FLAMES-based CGF simulation that demonstrates the features described in this paper are available for FREE in the FLAMES Store in the item named Unreal CIGI IG Content. This content can be downloaded and executed immediately using the included scenarios. The Unreal Engine game project for the IG and game server, including the FLAMES CIGI IG Plugin for Unreal, is also available for FREE in the FLAMES Store in the item named Unreal CIGI IG Game Project.

FLAMES® Simulation Framework
TERNION® CORPORATION Simulations That Work℠
UNREAL ENGINE
KAI KOREA AEROSPACE INDUSTRIES, LTD.
blackshark.ai