

The Use of Virtual Environments to Solve Real World Problems



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http://www.csm.ornl.gov/Internships/posters04/c_harrison_pa.pdf

Usefulness of Virtual Environments to Protect America from terrorists attacks

In order to create a virtual environment for the military to use to calculate real world scenarios, the Unreal Engine was chosen. To further add to the realism, the SAS modification, developed in the U.K., was incorporated. Lifelike soldiers, terrorists, and environments were created. Within these "real world" environments, the Oak Ridge National Laboratory's Modeling and Simulation Group is working diligently to create and duplicate nuclear facilities and power plants across the country into the Unreal Engine's virtual environment as a place for the soldiers and terrorists to work and move, while using the VISAC program to continuously provide current plant safety level.

What is The Unreal Engine?

- Developed by Epic Games Inc. and Digital Extremes Inc. in 1998
- An open source environment that features flexible programming
- Object Oriented Programming Language similar to C++ and Java
- Features advanced Artificial Intelligence
- One of the most popular virtual environments in the world

What is VISAC?

- Visual Interactive Site Analysis Code
- Java-based
- Uses event / fault tree methodology to provide probability of facility kill
- Supplied with a library of models that can be customized by user

Incorporation of VISAC into Unreal

- Learn and Re-Learn Java and C++
- Implement Program into Unreal Script, the programming language that the Unreal Engine uses
- Develop textures to be used in the program
- Code textures in to the Unreal Engine
- Create links between the Unreal Engine and VISAC

The author acknowledges the use of UnrealTournament and SAS software in the project.

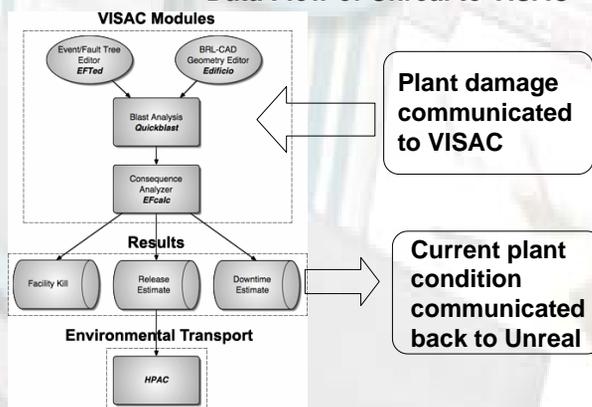


www.unrealtournament.com



www.sas.jolt.co.uk

Data Flow of Unreal to VISAC



VISAC Output

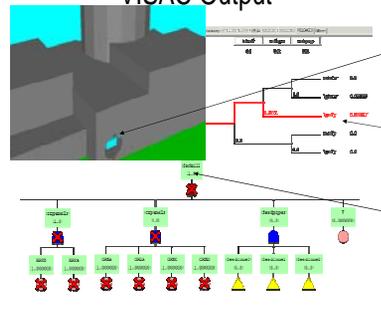


Illustration of VISAC Calculation Paradigm

- Calculation of blast damage
- Evaluation of plant safety
- Determination of systems failures

Initial screen, illustrating guard's starting position and plant's current condition

Bar indicates that plant has had no visible damage



Equipment attack screen, illustrating attack on critical component and reduction in plant safety

Bar indicates that plant has sustained ~50% damage



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