Open Simulation Training
Taking it beyond professional systems

Austin Tate
AIAI, University of Edinburgh

Ai Austin
Virtual University of Edinburgh
Vue – Virtual University of Edinburgh
OpenVCE – Virtual Collaboration Environment
I-Room – a Virtual Space for Intelligent Interaction

Social Web + Agents + Plans + Virtual Worlds

http://vue.ed.ac.uk
http://openvce.net
http://openvce.net/iroom
Collaboration

Kelly: ok, so we email Concierge and tell them to move us where Kat says :)

Tactical Operations and Simulations: Si Arcadia
Virtual Field Trips

Virtual World for Inquiry and Planetary Geology Field Work

MoonWorld

http://moonworld.cet.edu
Vue – Virtual University of Edinburgh

A multi-disciplinary virtual organisation exploring the potential of virtual worlds for e-learning, research, collaboration & outreach related to the University of Edinburgh

http://vue.ed.ac.uk
Dissertation Defence
Art Installations
OpenVue – Open Source Virtual University of Edinburgh

Exploring the potential of open source virtual worlds for e-learning, research, collaboration & outreach related to the University of Edinburgh

http://vue.ed.ac.uk/openvue
Simulation for Training & Exercises

Using computer-based simulation for training and exercises in civil and military scenarios

Author By: Staff Writer | Last Updated: 1/25/2011

**Principle Contractor:** Lockheed Martin Simulation, Training and Support

**Date Reported:** 1/25/2011

**Department:** Defense Advanced Research Projects Agency

**Contract Details:** Lockheed Martin Simulation, Training & Support, Orlando, Fla., is being awarded a $7,360,467 modification to a cost plus fixed-fee contract (HR0011-10-C-0042). This award is for the National Cyber Range (NCR) program. The contractor will build on the preliminary design created in Phase I and tasks that have been accomplished in Phase II to date. At the completion of the revised Phase II program, the contractor will demonstrate the capabilities of the flexible automated Cyber Test Range NCR. The Phase I and Revised Phase II deliverables including the Concept of Operations and the Detailed Engineering Plan (DEP) are the basis of the revised Phase II effort. Work will be performed in Orlando, Fla. (69.810 percent); Cherry Hill, N.J. (16.262 percent); Princeton, N.J. (4.073 percent); Columbia, Md. (0.120 percent); Albuquerque, N.M. (1.033 percent); San Antonio, Texas (0.002 percent); Washington, D.C., (8.700 percent). The work is expected to be completed July 7, 2011. The Defense Advanced Research Projects Agency is the contracting activity.

**Total Contract Value:** $7,360,467
Virtual Worlds - Systems Architecture

Asset Server (A)

User (I) & Avatar (U)

Grid (G) of 3D Region Simulators (R)

Open Source

Viewers

Web Services

Open Source

Emerging Standards

Emerging Online Currency/Paypal

UGAI: User, Grid, Asset, Inventory

R: Region
Virtual Worlds – Multiple Levels

Publicly Accessible Grids (e.g. Second Life)

Privately Managed Grids (e.g. Opensim)

Specialised Simulations (e.g. CRISP, Vega Prime)
Components

Virtual World Viewers (e.g. Firestorm)
Virtual Worlds Service (OpenSim)
Voice Service (I shall say no more)
3D Terrain (DTED)
3D Models (via Collada)
NPCs
Scale (Intel DSG)
Easy Deploy (USB Stick to Cloud)
Role Play Scenario
Virtual University of Edinburgh based on OpenSimulator

Opnvue (OpenSim 0.7.6 Dev)
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Users in World: 25
Active Regions: 182
Total Users: 445
Active Users (Last 30 Days): 65
What is MOSES?

The Military Open Simulator Enterprise Strategy is an exploratory effort designed to evaluate the ability of the Open Simulator to provide independent and secured access to a virtual world.

Year One Goals:

1. Provide a completely independent virtual world capability. Runs in an enclave network, capable of multiple levels of secured processing.
2. Provide a stable in-kind Second Life®-like environment.
3. Provide guidance to other organizations wishing to replicate the MOSES results.
4. Link with other organization in a hyper-grid manner to demonstrate external growth and scalability.

Next Steps:

1. Secured/Encrypted Communications
2. User Authentication with certificates and CAC
3. Larger Scale User Support
4. Integration/Conformance with the DoD Virtual World Framework

What value does MOSES bring to military training applications?

MOSES breaks the traditional paradigm of modeling and simulation.
- Art Pipeline: Subject matter experts may create the training material.
- Computationally Steerable: The scripting language can enact changes to objects without restarting simulation.
- Out of the Box External Communications Mechanisms: Everything in the environment is an interactive object, capable of being driven by external behavior models.
- Every Object can connect to an external data source.
- Flexible Terrain: Real world terrain sources can be used. Terrain is deformable while simulation is running; May be restored via scripting.
- Persistent Virtual Environment: Capable of High Availability and Uptimes.
- Multiple Communications Options: Point to point chat, point to many chat Point to point VOIP, point to many VOIP - can replicate military radio behavior.

Why was MOSES created?

- Replacement to the Second Life® Enterprise Project
- Effort to preserve significant investment in the SLE platform
- Continue research started in the SLE platform
## Model Availability

The models and images are provided for your enjoyment, but should not be used for any commercial purpose. The models are provided as is and with no warranty of any kind (of course). Please let the individual creators know of any problems with using them.

<table>
<thead>
<tr>
<th>Supercar</th>
<th>Format</th>
<th>File</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cinema4D v3</td>
<td>sc_c4d.zip 3.11KB 7-Oct-98</td>
<td>Supercar. Origination model, and full supporting textures, bumpmaps, etc. Includes pilot figure, Beaker's desk, blast shield, chair, floor, a simple lighting scheme and a sample render. The default configuration is wings in and open canopy. The Lab items are showing but the pilot figure is hidden. Includes graphic image. Blueprints are also available in colour and black &amp; white. Additional model information is here.</td>
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<tr>
<td></td>
<td>trueSpace 1.04</td>
<td>sc_ts.zip 3.86KB 10-Jan-99</td>
<td>Supercar with extended and retracted wings, open and closed canopy and all textures. Includes read me file and explanatory graphic image.</td>
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<tr>
<td></td>
<td>AutoCAD DXF</td>
<td>sc_def.zip 3.07KB 7-Oct-00, sc_def-autoCADv14.zip 4.66KB 21-Oct-00</td>
<td>Supercar with extended wings and closed canopy. No textures. Includes read me file and graphic image. Alternative as saved from AutoCAD version 14 is available.</td>
</tr>
<tr>
<td></td>
<td>3D Studio MAX</td>
<td>sc_max.zip 4.451 22-Apr-99</td>
<td>Port of model to 3D Studio MAX by Mateen Greenway. Includes all textures, read me file and graphic image.</td>
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<tr>
<td></td>
<td>LightWave 3D</td>
<td>sc_lws.zip 1.936KB 9-Feb-99</td>
<td>Port of model to LightWave 3D by Don Showalter. Includes all textures, read me file and graphic image.</td>
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<tr>
<td></td>
<td>Studio 3D Release 4</td>
<td>sc_3ds.zip 4.298KB 16-Sep-99</td>
<td>Port of model to Studio 3D Release 4 by James Murphy. Includes all textures, read me file and sample images (image 1, image 2).</td>
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<td>Poser 4</td>
<td>sc_pl.zip 2.953KB 9-Oct-99</td>
<td>Port of model to Poser 4 by Darrin Horn. Includes all textures, read me file and sample images (image 1, image 2).</td>
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<td></td>
<td>SketchUp</td>
<td>sc_sketchup.zip 15MB 22-May-2011</td>
<td>Port of model to Sketchup by Austin Tate via 3DS model. Includes all textures, read me file and sample image.</td>
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<td>Blender</td>
<td>sc_brl.blender.zip 27MB 19-May-2011</td>
<td>Initial port of model to Blender 2.5x by Austin Tate via 3DS model.</td>
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<td></td>
<td>Unity3D</td>
<td>Supercar unitypackage 29MB 24-May-2011</td>
<td>Supercar, Blastshield and Figure to Scale. Unity3D Package via Sketchup Model and 3DS export by Austin Tate.</td>
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</table>
Non-Player Characters (NPCs)
Non-Player Characters (NPCs) in OpenSim

**Introduction**

Since OpenSimulator 0.7.2, a number of functions are provided for creating and manipulating server-side NPCs (Non-Player Characters). These replace the previous functions that had stopped working by OpenSimulator 0.7.1.1 (possibly broken since OpenSimulator 0.6.9).

The general philosophy in creating these new functions is to:

1. Give script writers the simple tools needed to create more sophisticated behaviour.
2. Avoid duplicating existing LSL and OSSL functions. For instance, finding out what state an agent is in can be done through `IGetAgentInfo()` rather than creating a special NPC function.

NPCs are controlled via a script which must be in the same region as the NPC. This could be housed in an attachment that is attached to the avatar.

Server-side NPCs cannot leave the region in which they were born. If you want region crossing behaviour, please look at the alternative NPC options on the NPC wiki page.

Server-side NPC appearance is saved and loaded by redesigning the appearance structure to a notecard present in the same prim as the script. The required textures will be preserved when an OAR is saved and loaded.

The current appearance data format (as seen in notecards created by appearing) is in the same used for the OpenSimulator wire format and so is not designed to be edited directly. With great care it is possible, see Appearance Formats for more details but it’s not recommended unless you really, really need to do it.

**Enabling**

To use these functions, in the OpenSimIni file you will need the following config:

1. `Enable = true` set in the [NPC] section.
2. `Enable = true` set in the [NEngine] section.
3. `AllowOSFunctions = true` in the [NEngine] section.
4. `OSSFunctionThreadLevel = VeryHigh` in the [NEngine] section.

The functions `osAgentGetPresence()`, `osAvatarPlayAnimation()` and `osAvatarStopAnimation()` need this level. If you don’t need these functions, then a “High” level will suffice.

See Configuring Simulator Parameters#Getting information about parameters if you need to double check that these parameters have been set correctly.

**Notes**

- When using your avatar to model appearance before saving, you will need to wait a few seconds before invoking any save appearance command. This is because appearance saving currently operates on a timer in order to manage multiple appearance updates from the viewer.

- OpenSimulator 0.7.3.1 introduces the concept of ‘owned’ and ‘unowned’ NPC. An ‘owned’ NPC is one where only the creating script and other scripts with the same owner can manipulate the NPC. An ‘unowned’ NPC is one where any script with the right permissions (as defined in the [NEngine] configuration section) can manipulate it. In OpenSimulator 0.7.3, all avatars are ‘owned’ by default unless otherwise specified in the osNpcCreate() call.

**Sensing**

`IMoveSensor()` can be used to set up a sensor that will detected NPCs instead of as well as other region entities.
Scaling – Intel Distributed Scene Graph

[Diagram showing the architecture of Intel Distributed Scene Graph with various components such as Physics Scene, Persistence Scene, and Scripts Scene. There are 10 servers hosting client managers and 1000 clients connected.]

City disaster response training scenario
single-user preconfigured
OpenSimulator 0.7.5
running with its own isolated instances of MySQL, Apache, and PHP for Windows
Targeted Configuration

- EC2, OR
- EC2, CA
- EC2, VA

MOSES grid (Florida)

TCP connections
UDP connections
Grid service traffic: Login & asset retrieving
MOSES OpenSim Grid with Intel DSG Immersive Training

MOSES - IntelSTTC User Scalability Experiment 1 - STTC


IntelSTTC User Scalability Experiment 1 - Fri

MOSES DSG Client: MosesDSG_4-4-8-33429_setup.exe

Goals and Objectives
- Background and Hypothesis
- Scalability Experimentation Goals
- March 22 2013 Event Experimental Objectives

Experimental Design
- Independent Variables
- Dependent Variables
- Experiment Details

Scenario
- Background
- Roles
- Observer Roles (10 Players)
- Blue Force Roles (40 Players)
- Neutral Roles (50 Players)

References

Goals and Objectives

Background and Hypothesis

Properly representing the operational environment for Army training is believed that virtual world technology may be used to achieve the goals of the experiment is the first step to prove and demonstrate more than 100 players in a single mission.

Scalability Experimentation Goals

ARL/HRED/STTC has identified a need for scalability and flexibility for 2015. Scalability can be examined in three different categories: size, complexity of the environment. The next generation of training provides operational environments. This experiment will focus on the number of acceptable performance.

The majority of current simulation-based virtual environment training is limited by their ability to handle large numbers of players and complex environments. The reason for this is the inability for current systems to handle large numbers of players, which means there is limited system resources left over for opposing forces. This experiment will investigate more operationally accurate and persistent worlds for the soldiers to train in.
http://opensimulator.org

This presentation is available on-line at:
http://www.aiai.ed.ac.uk/~ai/

Thanks to Second Life, OpenSim and other VW residents for their help in collecting materials for this talk
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