

RES Demo Night 2010 Abstracts

1) Title: **Combat Modeling and Model Validation**

Researcher(s): Imre Balogh, Curtis Blais, and Todd Richmond

Abstract: The MOVES Institute is engaged in research, development, and evaluation of a number of combat models in use or proposed for use in the military services. During this session, we will describe and demonstrate activities underway in several areas, including: (1) modifications to the COMBAT XXI model for the Marine Corps; (2) investigations into crowd behavior modeling using COMBAT XXI; (3) validation studies of the Battlespace Terrain Reasoning and Awareness Battle Command (BTRA-BC) Battle Engine; (4) challenges facing validation of irregular warfare models like the Peace Support Operations Model (PSOM) and the Army Cultural Geography model. As an added bonus, Todd Richmond from the University of Southern California Institute for Creative Technology will provide an overview and demonstration of their UrbanSim program.

2) SAVAGE Lab will offer a series of demos, including (but not limited to):

Title: A Scalable Cloud-Based Architecture for Physically-Based Virtual Environments

Researcher: Loren Peitso

Abstract: This dissertation describes a simulation architecture which addresses five properties: latency mitigation, scalability, multi-domain capability, repeatability and high reusability; via a homogeneous distributed peer architecture. Network latency mitigation is accomplished through projections of future motion which also reduce network traffic volume required, benefiting network scalability while providing repeatability as all necessary information is provided in the projective event packets. Scalability of simulation size is gained through an architecture designed for massive distribution and parallelism. Or additional compute resources may be used to compute in higher fidelity. The architecture also encompasses evaluation of multi-domain physics, sensor interactions with objects are treated as a form of collision within the unified collision detection system. Reusability is provided by a homogeneous shared environment providing a common baseline for shared models accessed via repositories and references to appropriate environmental data. This provides an overall software infrastructure conducive to models being formulated as components with shared consistent assumptions.

Title: Ultra-High Resolution 4K Video

Presenter: Jeff Weekley

Abstract: In 2009, through a remarkable collaboration among NTT Labs, the Monterey Bay Aquarium, the city of Monterey, CineGrid and the Naval Postgraduate School, an 8K moving image (7680 X 2160 pixels) was streamed live from the Monterey Bay Aquarium to Atkinson Hall on the campus of University of California San Diego during the annual CineGrid Workshop. Although it has been technically possible to stream 4K images and sound, very few live events have been captured and never before has an 8K image - two side-by-side, seamlessly-stitched 4K images been transmitted, because the network requirements and appliances, the cameras, the compression algorithms, and the display technologies are all new. In our presentation, we shall discuss the technical challenges and successes, and the partnerships that emerged from a broad spectrum of entities to produce the live event at the CineGrid Workshop. In addition, we shall share the artistry of capturing and exhibiting an underwater habitat in 4K, and offer a unique opportunity rarely, if ever, seen — to view undersea habitats through the lens of a two 4K cameras at 60 frames per second in ultra-high resolutions.



3) **Title: Multi-UAV Mission Control Station**

Researcher: Wolfgang Baer

Abstract: The typical ISR mission often requires the coordinated efforts of multiple UAV platforms and sensors. Effective control implies a rapid turn around between information gathered by ISR assets and new commands issued in response to that information. The PVNT based Multi-UAV Mission Control Station is a research tool designed to explore, develop, implement, and test the capabilities necessary to perform image exploitation and control of multiple ISR assets in near real time. The image exploitation system utilizes a unique ray trace engine that generates video realistic reference images in real time from GIS multi layer databases used in remote sensing applications. The reference images are used for image registration, target mensuration, database updating, and augmented reality applications. The system was originally built to support live-virtual weapons substitution in operational tests for OTC Ft. Hood TX and has been adapted for UAV operations for use in USSOCOM-NPS Field Experimentation Cooperative conducted at Camp Roberts CA.

4) Two demos taking place via Steve Lieberman and his team in both Watkins 275 and 285

Title: Modeling Social Influence in Large Populations

Researchers: Steve Lieberman

Abstract: I will demonstrate a technique for actionable representation of the patterns of communication and influence in large populations (such as nation-states). This technique uses survey and polling data to embed agents with attributes and endogenously elicit an authentic simulation social structure, resulting in a probabilistic influence network. This network can facilitate large-scale influence analysis (e.g., using topological characteristics) and be used as simulation input for multi-agent systems. I will demonstrate Java tools for manipulating network nodes and links, as well as tools for visualizing and analyzing very large populations.

Title: Web Tools for Fostering and Analyzing International Collaboration

Researchers: Steve Lieberman, Ed Rockower, Kirk Stork, Julia McClenon, Dan Wilkinson

Abstract: We will demonstrate web tools for fostering and analyzing international CT collaboration, provide a summary of the first year of research efforts and findings related to capacity building for international CT collaboration. We will demonstrate the current status of the development and deployment of web-based collaboration and engagement tools using our GlobalECCO.com website, and discuss the application of analysis techniques for studying international collaboration effectiveness.

5) **Title: Real time Online Gaming Use-case Engine for Validation of Interagency Doctrine During Emergency Operations (ROGUEVIDEO)**

Researchers: Anthony Ciavarelli, Perry McDowell

Abstract: ROGUEVIDEO is a Command Control Training and Assessment game simulation designed to provide training to command personnel who must monitor, coordinate, communicate and control first responders, across government, military and civilian agencies, in response to natural or manmade disasters. The system will also provide a capability to test, extend and challenge existing doctrines & standard operating procedures that are followed in such emergency situations (EADS, 2009).

6) **A series of MOVES student thesis project posters.**



7) **Title: BASE-IT Marine Fireteam Simulation**

Researchers: Chris Darken, Amela Sadagic, Perry McDowell

Abstract: We will demo the detailed simulation and visualization of Marine fireteams developed for ONR's BASE-IT project. The user can command the Marines to move, take up positions, clear buildings, etc. Novel features include a detailed potential threat awareness model and hierarchical movement algorithm for the simulated Marines.

8) **Title: Virtual Sand Table**

Researcher(s): Amela Sadagic, Chris Darken, Delta3D team. Presenting: student TBD (alternatively Amela Sadagic)

Abstract: This demonstration introduces a novel display platform called Virtual Sand Table, a joint research effort between the University of North Carolina at Chapel Hill, Department of Computer Science and NPS MOVES Institute. The Table is designed to support small team collaboration during their mission planning in preparation of a training exercise on real range, as well as After Action Review once the unit completes the exercise. The platform combines elements of physical world serving as a display medium (models of terrain and buildings), and elements of digital world - computer-generated projection representing the textures of terrain and objects, user annotations, and dynamic motion tracks of all Marines. User interactions are supported using painting-style interaction using wand-controlled input device. The work is a part of Behavior Analysis and Synthesis for Intelligent Training - BASE-IT project sponsored by the Office of Naval Research – ONR, with TECOM and PM TRASYS as transition customers.

9) **Title: Persistent Surveillance and Cyber Forensics**

Researcher(s): Mathias Kölsch, Justin Jones, Rob Zaborowski

Abstract: This demo shows recent efforts to utilize computer analysis in support of persistent surveillance and cyber forensics: embedded video processing in small unmanned aircraft and automatic weapon detection in potential terrorist network recruiting videos.

10) **Title: Virtual 3D Humans**

Researcher(s): Amela Sadagic, Delta3D team, Jeff Weekley. Presenting: Amela Sadagic.

Abstract: We will demonstrate Virtual 3D Humans, a segment of our research with 3D display solutions. The work is initially aimed at Mixed/Augmented Reality-based live-virtual training, but has a potential for broader impact in other domains (examples: tele-presence applications in medicine, and VR-based tele-conferencing). Our work is focused on physically present virtual humans in 3D, without the need for HMDs or special time/phase/wavelength glasses. The demo will outline a series of technology related user studies focused on usability investigations, studies of sense of presence and subjective acceptance of several different modalities of virtual 3D humans. The work is a part of “3D Display and Capture of Humans for Live-Virtual Training” project between the University of North Carolina at Chapel Hill, Department of Computer Science and NPS MOVES Institute, sponsored by the Office of Naval Research - ONR.

11) **Title: Neurophysiological Markers for Improved Simulation: Training Expert Navigation**

Researchers: CDR Joseph A. Sullivan; Dr. Ji Hyun Yang; Dr. Quinn Kennedy; Mr. Michael Day

Abstract: This project investigates the application of neurophysiological markers to cue instructional systems. Using helicopter terrain navigation as a representative task we are investigating if scan pattern provides sufficient insight into trainee’s cognitive state to indicate when and what type of instructional intervention is appropriate.

12) **Title: Task Analysis and Design of Ship Simulation: Flank Speed**

Researchers: LT Claudio Coreixas de Moraes, Mr. Michael Day, **Advisors:** Dr. Christian Darken, Dr. Tony Ciavarelli

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Abstract: The Flank Speed application is a low cost Virtual Environment PC-Game Simulator which could provide more 'hands on' training for cadets. The 'hands on' part of their training is conducted aboard three 97-ft Training Ships (equivalent to the US Naval Academy Yard Patrol Craft). For efficient instruction aboard, at least 3 hours are required for a group of 15 cadets per ship; this is a major problem when there have many parallel activities going on ashore. It's very hard to have ship instruction availability greater than 10 hours per cadet per year, but both classroom and ships create a closed circuit of theoretical and applied of knowledge. The Flank Speed simulator seeks to minimize the gap between classroom and 'hands on' training. This is a thesis by a student from the Brazilian Navy. His observations from the Brazilian Naval Academy are applicable to the U.S. Navy.

13) **Title:** Port Security

Researcher/s: Jeff Houde, Mike Day, Erik Johnson, Perry McDowell (PI)

Abstract: Port Security is a trainer currently in use at the Federal Law Enforcement Training Center's (FLETC) Maritime Training Division in Charleston, S.C. It is part of a curriculum to train personnel to properly perform inspections of port facilities to ensure that they are in compliance with applicable security regulations. The final product includes a simulation where the students visually inspect a port facility and document the problems that they discovered. It also includes a specialized version of Delta3D's STAGE tool which the instructors use to create and modify the port facilities. So far it has been used with two classes at FLETC with great success.

Title: dtDirector

Researcher/s: Jeff Houde

Abstract: dtDirector is a visual scripting language for the Delta3D open source game engine, similar to the UNREAL© Kismet™ tool. This allows non-programmers to produce incredibly rich and complex scenarios that previously could only be created by programmers. This means that games can be created faster, easier and cheaper. It also means that organizations building simulations on the Delta3D game engine can easily perform internally the kind of modifications on those sims that previously required the developer, thus lowering life cycle costs.

