EMPLOYING HUMAN ROLE-PLAYERS IN SIMULATION-BASED TRAINING FOR ASYMMETRIC AND UNCONVENTIONAL WARFARE

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An essential component of simulation-based military training is the creation of an opposing force that is sufficiently believable within the context of the immersive environment and provides positive training outcomes. Constructive systems such as OneSAF model the doctrinally-expected behaviors of the opposing forces so that soldiers and leaders can learn to anticipate and counter them. Such systems work well when enemy doctrine is relatively fixed and well-understood, but do not provide positive training when doctrine – if it can be said to exist at all -- is fluid and not well-understood.

The inherent nature of asymmetric warfare, particularly terrorism and insurgency, makes the value of such constructive OPFORs problematic. In missions such as peace-keeping, occupation, force protection, and anti-terrorist operations in Iraq, Afghanistan or the Philippines, the enemy is unpredictable, and is following an unknown and constantly shifting set of rules based on values frequently not well-understood by our forces. Moreover, the enemy is often difficult to distinguish from a local civilian population that is in itself difficult to understand. Contact with the enemy may be indirect, through analysis of transaction data, or it may be face-to-face. Simulating the behaviors of such a wide range of potential asymmetric threats only through programmatic methods is paradoxical if not impossible.

This research explores the use of human role-players in a very-large-scale, distributed, persistent, immersive virtual environment to create believable opposing forces and civilians, through the development of a system that would enable soldiers and their leaders to practice the challenges inherent to asymmetric and other unconventional missions. These challenges include: developing situational awareness based on appearance and behavior, analyzing movement, communications, and transactions over time, interpreting foreign languages, understanding cultural differences, and operational coordination among widely distributed groups, including joint, interagency and multinational contexts.

The paper describes features of the Asymmetric Warfare – Virtual Training Technology (AW-VTT) under development by the U.S. Army RDECOM STTC and Forterra Systems Inc. to support the virtual enactment of such complex scenarios as urban checkpoints where coalition forces face individuals and crowds that range from complacent to belligerent, and convoy missions in insurgent-infested areas where ambushes are common. The AW-VTT system further proposes to make the employment of live role-players cost effective by enabling the participation of individual users equipped with industry-standard personal computers connected to the internet, so that role-players can participate from any corner of the world. A key element of the system design is the creation of easy-to-use drag-and-drop scenario-creation tools to enable the rapid use of lessons-learned in distributed virtual training sessions.

AW-VTT SYSTEM OVERVIEW

The AW-VTT provides large-scale, persistent 3-D virtual environment that allows users on standard PCs, distributed over the Internet, to interact in real time at the entity level. Those users can engage in a palpably immersive exercise of blue forces interacting with a mixture of terrorist OPFOR and civilian populations. Each user is represented as a fully animated, 3D character (avatar) which models culturally appropriate behaviors and gestures. Users communicate with each other with voice, text chat, and instant messaging, which enables face-to-face interaction as well as simulation of a range of communications technologies. Integration with OneSAF Objective System entities is planned to enable external control of entities in the simulation. In addition, APIs are under development that will enable autonomous AI agents to control avatars in real-time.

REAL HUMAN INTERACTION

Asymmetric operations and military operations other-than-war require face-to-face contact with civilians and potential terrorists. State-of-the-art military simulators do not yet provide the simulation of individual characters at the entity level that could engage a trainee in anything resembling a human dialog. Constructive simulated entities are purposefully guided by programming that

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provides a repeatable, controlled learning experience. To realistically simulate an asymmetric threat, the entities must not only display believable human behavior, but must also be adaptable, observing the tactics employed by the trainees and modulating the response to them. The AW-VTT will enable live role-players to interact directly with trainees within the context of a simulation, using natural human speech in any language, and to vary the interaction as needed to learn the tactics, techniques and procedures (TTPs) being trained.

The AW-VTT technology is centered on the immersive experience of real human communication in a simulated environment. The technology enables participants to speak while piloting their avatars and to hear each other based upon their physical location, whether in close proximity or speaking over simulated communications systems. The technology synchronizes the voluntary and involuntary body movements of the speaker's avatar, including stance, gestures, facial expressions, breathing, and conversational hand waving. The technology provides an extensible set of gestures and facial expressions that can reflect both the avatars' cultural background (Arab versus Western) and state of mind (normal versus terrified). Furthermore, the AW-VTT provides extensive tools for customizing avatars' appearance to suit their roles: complexions, hair, and clothing, as shown in Figure 1.

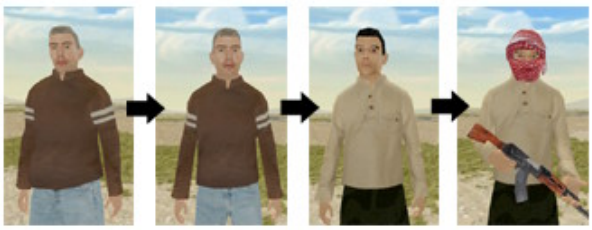

Fig. 1: Changing characters

By infusing characters with believable natural human voices and speech, believable gestures, and suitable costumes, trainers can design scenarios that encompass the realistic challenges of addressing men and women that are foreign in appearance and behavior, in a wide variety of wartime situations. The range of face-to-face encounters possible with human-piloted avatars is unlimited. By also equipping role-players with terrorist paraphernalia such as explosive device kits that can be placed and detonated in a wide variety of remote locations, the AW-VTT will give trainers the flexibility to model rapidly-changing enemy tactics.

SIMULATED HUMAN CROWDS

While providing the ideal level of believability and expertise, human role-players can be costly to deploy in a live exercise. Access to the virtual training environment via the Internet will reduce the cost of their participation by not requiring role-players to be physically present and outfitted at a training site. Still, the labor cost and scheduling logistics of live actors for very a large-scale exercise involving thousands of entities could be prohibitive.

Constructive systems such as the OneSAF Objective System (OOS) enable modeling and control of behavior of semi-automated forces above the individual entity level, to control units, companies, or more. A significant part of this research will be to link the OOS to AW-VTT, to take advantage of the aggregate entity modeling in that system. As a result, the AW-VTT architecture will allow external processes in lieu of humans to control avatars. The training commander will then have the flexibility to deploy live role-players only when they are essential. For instance, in the checkpoint operation depicted in Figure 2, the drivers of vehicles approaching a checkpoint may need to be able to converse with Soldiers and would be live role-players. However, the characters in the background – the passengers, merchants, people walking in the distance – would be automated.

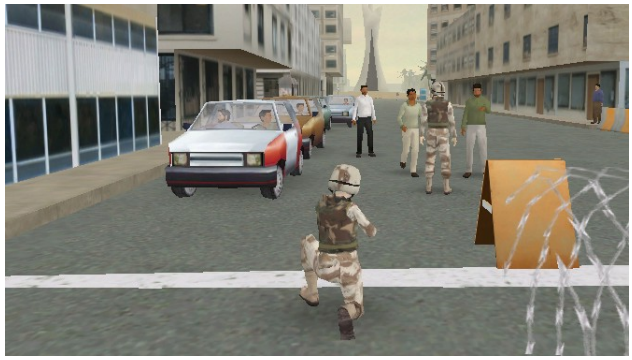

Fig. 2: Live and simulated humans at a checkpoint

ADAPTIVE BEHAVIOR

A technology such as the AW-VTT enables trainers and trainees to rapidly formulate, enact, adapt, and re-enact, each scenario. The technology holds the potential of enabling role-players to both play out doctrinally mandated roles and to perform actions that reflect recent experiences in the field. Unlike game "AI" characters that can easily be recognized as fake and whose behavior becomes predictable, live role-players, supported by a cast of simulated humans, can present the level of surprise and adaptability that is currently exhibited the enemy in theaters such as Iraq and Afghanistan. Whether addressing civilians in peace-keeping operations or battling with armed combatant terrorists, rehearsing these challenges in a simulated environment will help to prepare soldiers for the unfamiliar and the unexpected in the field.