

Virtual Training Simulation in Support of Ground Troops Training

(Urban Warfare Operations)

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ABSTRACT-In 21st century the military operate more cutting edge, complex and networked weapon systems than ever before. The future challenges continue to grow and evolve in an extraordinary fashion of high risk conflicts, threats, and increased operational demands and tempo against a background of limited resources. Interoperability is now a priority, while stability and reconstruction operations are commonplace alongside traditional operations. With the increased emphasis on collective and combined arms skills, the technical, information processing, and decision-making challenges place unique demands on training ground forces at all levels for full spectrum operations. The advanced command and control systems are essential tactical enablers. To get the most from these systems, the military closely needs integrated operational and training solutions to maximize the ability of the human operations to be carried out.

Keywords- Virtual reality; Human factors; Game-based systems; Virtual training simulations; Domain analysis; Training methodologies; Artificial intelligence; Human behavior modeling

I. INTRODUCTION:

The military training must challenge at every turn to ensure that forces are prepared for the unexpected and complex situations in the battle field, which is able to excel in the chaos and complexity of battle. Military and other educational experience has shown [1] that training with a personal tutor is one of the most effective ways to learn, and that the level of interactivity is a key measure of training, both in terms of cost and effectiveness. Existing virtual worlds, such as military simulations and computer games, often incorporate virtual humans with varying degrees of intelligence that provide training for physical skills, team training or strategy and tactics[2]. Success in operations is achieved through a comprehensive approach to training and readiness. The critical training part is acquiring the necessary skills to act instinctively and intuitively in a high functioning collaborative environment. The virtually trained digitalized military forces are focused on enhancing the tactical skills that integrate intelligence; firepower in highly complex operations across a difficult battle space in which only best prepared armies can expect to accomplish mission successfully [3]. The most efficient way is to put realistic and cost-effective training solutions which are critical in

ensuring that troops are ready for any situation in the mission.

The typical method for building a combat scenario is to take an existing data file and edit it to meet the needs of the upcoming exercise. Menu based systems are usually more of a burden in this process than an aid. As a result the most experienced operators have returned to the text editors to work with the data. It typically requires three to four months to coordinate and build the data file. Human cognitive-perceptual processes are tuned to real world information. Consequently, the more accurately these processes are stimulated by the Virtual Simulation the greater the perceived realism, leading to more effective training.[4] When simulations like CBS, AWSIM, and TACSIM are joined together the scenarios must be built to synchronize with each other, requiring a significant amount of coordination. For some it may mean a persistent network to perform test, experimentation, and analysis. For others it is providing the interconnection of systems and networks to various assets for the purpose of performing training.[5] Graphically oriented scenario builders are needed that allow the user to work on map backgrounds and see data in graphic forms. Another great benefit would be single data sources which could contain all of the information needed by all of the simulations and could then export it in the specific formats needed by each simulation. Such a project is underway and promises significant exercise preparation saving.

Since people such as simulation operator, software debugger, database builder, military expert, and network manager are not in great supply, and to save costs, new simulations need to operate with a fraction of the current number of controllers. This requires that a simulation be self-sufficient, a database be bug free, and a controller interfaces be intuitive and powerful.

II. GENERAL METHODOLOGY:

A. Database:

A single workstation needs to be able to access and analyze all of the data stored on a distributed network of

simulation nodes. This analysis then needs to be organized into a format that is statistically accurate and oriented toward a military audience. Automated AAR has just begun to be able to collect and correlate the complex, many stepped causes of combat events. It is no longer enough to show what happened, it must be able to show the many steps that lead up to and caused the event.

B. Controller Interfaces:

The interface with the training audience is increasingly done via connections to organic computing equipment. The goal is to place commanders in simulated combat without having to change their natural operating environment at all. They should never have to learn about simulation input terminals, modeling nuances, or the limitations of their options caused by the simulation. As the military becomes more computerized this is becoming easier and much more necessary.

C. EXPLANATION OF THE NEW TECHNIQUE:

A. The Simulation

The simulation engine must become smarter and more powerful. A great deal of power can be added by networking multiple simulations together to create a more complete and realistic operating environment for the trainees. The most difficult part of these interfaces is that the original simulations were not designed to operate together. As a result, the way in which a military unit is represented in each is different. Making these matches so they can operate believably together requires much ingenuity. The military simulation world needs a standard way to represent the most common military objects, be they tanks, companies of tanks, or command posts. Computer Generated Forces (CGF) is also a hot topic right now. The

need exists to create forces which can be controlled intelligently by the computer rather than humans. This will reduce the limitations placed on exercises by the availability of experienced human controllers. Finally, there is a growing desire to join constructive simulations to virtual simulators. One benefit of this is that a constructive simulation can operate hundreds of virtual entities with a few controllers. These can then become teammates or targets for the trainees in the virtual simulators. Conversely, the detail and human decision making found in the virtual simulators can add realism to the mathematically structured events in the constructive simulation. Connecting the simulation to the trainee's organic equipment is an electrical engineer and networker's domain. Experience with the military will show what types of connections to expect and what can be done without interfering with the training audience's natural environment. The simulation section requires physical and cognitive modeling, operations research, probability, knowledge based systems, and military experience. Mathematicians are able to build the models accurately, but they cannot know what needs to be built without the expertise of a military person. Networking multiple simulations together may be similar to connecting to the trainee's equipment, or it may involve creating a parallel or distributed computer application. The structure of the data being exchanged is important in order to convey the most information with the least amount of network traffic

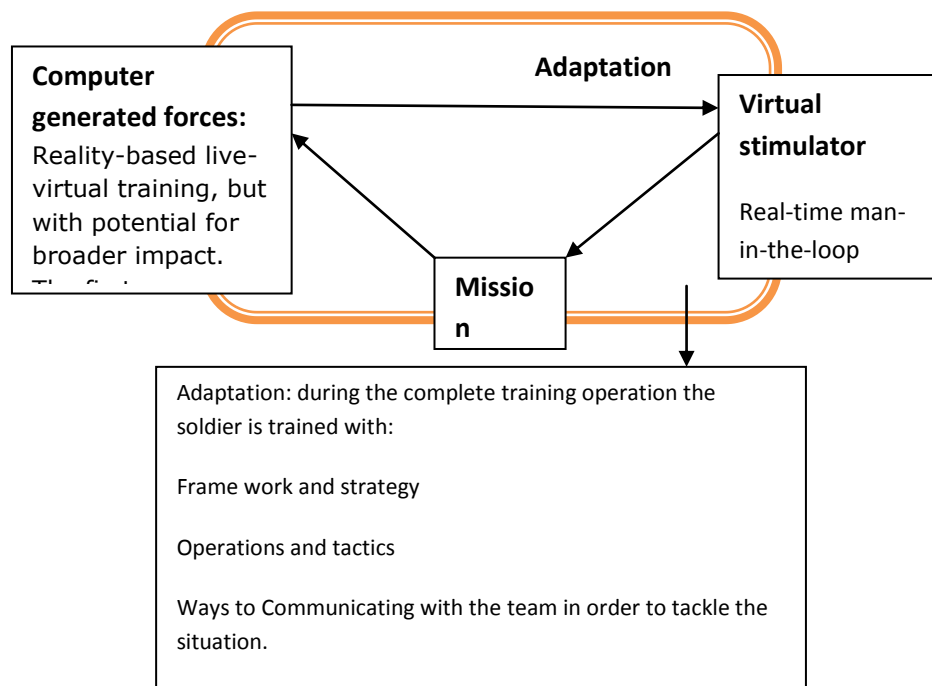


Fig.1. Stimulation and adaptability by the soldiers

D. EXPLANATION OF THIS TECHNIQUE:

A. THE VIRTUAL ENVIRONMENT:

The Army use a virtual program is able to record every single aspect of training missions that give the soldiers a video game-like replay to study how effectively the ground and air forces interact. This virtual environmental training falls into three categories live, virtual and constructive. Live is defined as real people in real locations using real equipment. Virtual simulation means real people in simulators. Constructive simulation means simulated entities in a simulated environmental training exercise and support for ground, air and remote platform training is needed.

The system provides a virtual multiple training positions networked in a 'multiplayer war-game' like simulator providing an interactive, networked environment to support individual, crew, collective and combined arms training. The system is based on virtual, realistic training environment supported by intelligent, semi-automated forces (SAF). Following the simulated battle exercise, aircrews can review and analyze their mission performance through an After Action Review debriefing process. The system uses reconfigurable simulators supporting a full mission spectrum undertaken by the services' attack, reconnaissance and utility helicopters

E. EXPECTED RESULTS:

A. ADVANTAGES:

The major advantage of this training program is by the Linking various simulation systems allows the military to conduct massive training exercises with every branch of service and coalition partners from virtually anywhere the only requirement is of space and class room environment. A class room for training can be established anywhere till there is enough space and electricity, and with computers we can conduct company-level exercises. In addition to the cost savings, and the time saved from not having to drive out to the field .There are some things that are just too dangerous to do in live training. You can do them here; no one is going to get shot.

Armies are equipped with Integrated Training Environment that is designed to cut costs, sharpen soldiers ability to

interact with various units and allow the military to more quickly train the growing ranks of troops returning from deployment. Simulation is playing an increasingly important part in delivering cost-effective training solutions across all our defense domains.

The analytical results of this program will provide evidence-based advice to the army on the critical capabilities required in order to operate in the future urban battlefield, and the most cost-effective approaches to developing the Future Force.

F. CONCLUSION:

The future of military simulation appears to be very bright. Since this type of training is an order of magnitude less expensive than live simulation, it should be a natural growth area in a shrinking defense environment. It allows the United States to train a force that is ready to perform their mission efficiently, which is an absolute necessity when the size of the force is being decreased.

This live training enables soldiers to prepare for their mission in the area of operation they are assigned. The modern military soldiers wear laser-tag vests and laser-equipped rifles to keep track of who killed who and GPS-like devices that show their location to helicopter pilots and the officers directing the exercise and called for support when required and weather, navigation, and radar warning receiver subsystems. If the officers leading the training immediately notice a problem in communication. The operation can simply pause the mission and move to the classroom for some quick instruction on the proper way to clear rooms. This provides the training is an important lesson in learning quickly by doing on-the-spot correction if the soldiers are taking a wrong step.

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