Use of Computer Generated Imagery in Weapons Training and Tactics

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Don’t train to survive, Train to win!
Outline

- Provide an overview of emerging Computer Generated Imagery (CGI) technology.

- Discuss how this technology can be used to support advanced simulation based training and law enforcement training needs.
Law Enforcement Training

- Classroom instruction - fundamentals
- Firing range - weapon qualification
- Scenario based training
  - Role playing
  - Force on Force
  - Simulation Based Training (SBT)
- On the job training
What is Simulation Based Training?

- Any training system that uses:
  - Computers
  - Media player (video or graphics)
  - Large interactive screen
  - Specially configured weapons

- Typical law enforcement SBT systems
  - Advanced Interactive Simulation (AIS)
  - Firearms Training Systems (FATS)
  - IES Interactive Training Inc.

SBT is a training tool to augment, not replace, conventional training methods.
Video Technology

Since 1980’s
- Linear video
- Branched video
- Improved quality
- Authoring tool
Video Limitations

- Limited scenarios, students learn outcomes, reduced training value.
- Difficult to change scenario content or training objectives.
- Expensive and time consuming to develop new scenarios.
- Limited after-action review capabilities.
- Limited weapon aim point scoring accuracy.
Computer generated imagery is the rendering of 3D geometrical representations of simulated or real world environments.

Since 1990’s
- 2D/3D Graphics
- Texturing/Shading
- Real-time rendering
- Lifelike Characters
Advantages of CGI for Simulation Based Training

- Eliminates the time, expense, and limitations associated with filming video scenarios.
- Greatly enhances variability of scenarios.
- Allows the user to uniquely define the training environment.
- Provides unlimited interactive scenarios.
- Accelerates the process of developing new scenarios to meet changing requirements.
- Generates precise aim point and bullet impact location.
- Easily demonstrates best practice through multiple scenario demonstrations and various camera angles.
Simulation Based Training
(Training Value vs. Technology)

Scenario Builder Tool

Training Value

Linear & Branched Video
1980s

CGI
Mid 1990s

Advanced CGI
Early 2000s

Lifelike Characters
Mid 2000s
CGI/Gaming Technology

Rainbow Six, Ubi Soft Entertainment
CGI/Gaming Technology

America’s Army
CGI/Gaming Technology

Half-Life 2, Valve Software
Expressive Faces / Speech

- Photo texture
- Gaze control
- Blinking
- Facial control
- Speech/Lip sync
CGI Scenario Builder Tool

- Create user defined scenarios to meet specific training objectives.
  - Define training objectives.
  - Select an applicable database.
  - Define character behavior, attributes, and speech.
  - Add objects.
  - Define environmental conditions.
  - Create sound effects.
  - Build and test training scenarios in 3D work space.
Using CGI to Modify Scenarios

- Modify existing scenarios
  - Change the dynamics of the scenarios.
  - Change character response/actions.
  - Change lighting effects.
  - Add or remove additional stress factors (gun shots, radio traffic, suspects, bystanders, baby crying, woman screaming, smoke, fire, etc.)
Typical CGI Scenario Applications

- Classroom instruction.
- First responder.
- Backup.
- Communications / team tactics.
- Decision making under stress.
  - Vehicle stops.
  - Domestic disputes.
  - Airport security.
  - School shooting.
  - Bank robbery.
  - Drug enforcement.
Additional Applications of Advanced CGI

- Crime scene reconstruction.
- Gun fight reconstruction.
- Accident reconstruction.
- Driving simulator.
- Helicopter simulator.

Day or night simulation
Technology Trends

- High fidelity real-time computer generated imagery.
- Modeling of static and dynamic objects with photorealistic textures and advanced bump maps.
- Advanced simulation of lighting, mirroring, and shading.
- Simulation of physics based environmental effects.
- Fully interactive systems with voice recognition.
- Physics-base lifelike human animated characters with speech, expressive faces, and intelligent behaviors.
- Fully immersive environments.

Industry
- Military
- Gaming
- NIJ
Summary

- CGI technology is rapidly becoming an affordable and viable training solution.

- Military and gaming industry are driving CGI technology but each market is addressing their unique requirements.

- CGI can provide environmentally rich training scenarios that can be designed and modified to meet fluid training objectives.

- SBT and CGI are advanced training tools. However, effective training takes advantage of all resources and ultimately depends on an effective training program with qualified instructors.
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Teaming with NIJ

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