Applications in defence

Professor Robert J Stone, Chair in Interactive Multimedia Systems at the University of Birmingham, offers some examples of how gaming technologies can be successfully utilised by the military…

A recent article written by the author (*Defence Management Journal*, December 2005) charted the evolution of the serious gaming community – an international body of researchers and developers who are exploiting powerful interactive content generation tools and run-time 'engines' associated with off-the-shelf games products for the benefit of 'serious' applications in defence, medicine, education and many other sectors. Serious gaming has the potential to revolutionise the use of interactive 3D, or i3D, technology (once referred to as 'Virtual Reality') for part-task training of individuals and teams, to mention but one application. However, unlike Virtual Reality, the serious gaming arena has already produced a suite of affordable, accessible and highly usable tools. These tools are capable of delivering synthetic environments of extremely high quality – in many cases outclassing simulation products more familiar to the defence arena – with underlying physics and artificial intelligence databases capable of producing highly convincing dynamic internal and external environments populated with computer generated forces. As a follow on article from that published by *DMJ* in December, this feature expands on a small selection of the projects previously mentioned that are under way within the author's own department at the University of Birmingham and within the UK's Human Factors Integration Defence Technology Centre (HFI DTC).

Interactive Trauma Trainer

A proof-of-concept demonstrator project, part funded by the HFI DTC and developed by TruSim (a division of Blitz Games, UK), in conjunction with the Royal Centre for Defence Medicine. The Interactive Trauma Trainer is the result of an intensive human factors project, based on human factors analyses conducted with the Royal Centre for Defence Medicine and Army Field Hospital specialists. The task of the user is to make appropriate decisions relating to the urgent treatment of an incoming casualty with a 'Zone 1' neck fragmentation wound. Appropriate interventions – oxygen provision, blood sampling, 'hands-on' body checks, patient visual and physiological observation, endotracheal intubation – must be applied within five to six minutes in order to save the virtual casualty's life.

Alchemy 1 & 2 uninhabited vehicle (land/air) demonstrators

'Alchemy' is an experimental human factors test bed, designed to support the development of new guidelines and standards relating to operator display and control requirements for iSTAR UAVs (Intelligence, Surveillance, Target Acquisition & Reconnaissance Unmanned Air Vehicles),

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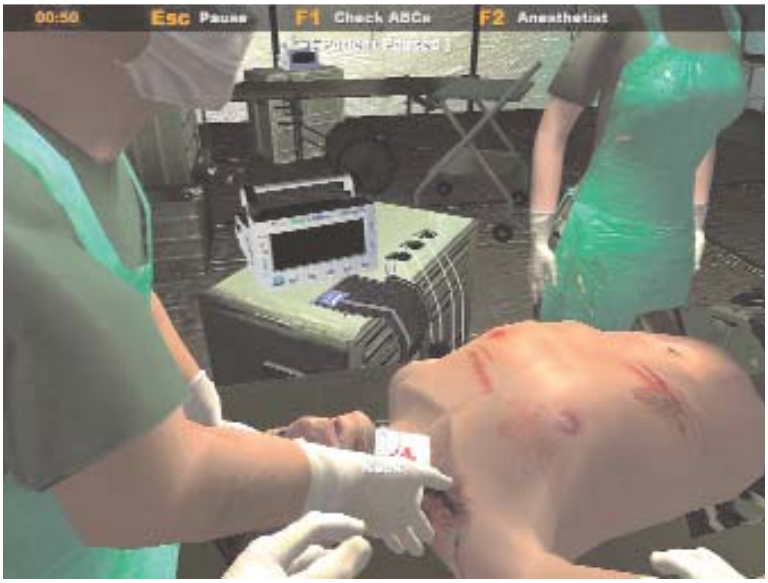
deployed in support of homeland security operations in urban environments and close combat missions in foreign environments. The original 'Alchemy 1' test bed took the form of an affordable and reconfigurable Synthetic Environment (SE) system, based on Microsoft's Managed DirectX 9.0 API, the C# .NET language and appropriate games engine technologies. More recently, with 'Alchemy 2', the test bed has been ported onto Crytek's 'CryEngine '(the power behind the game 'FarCry'), and is currently being used to support the introduction of new, urban combat UAV and single person turbofan transport concepts (Personal Air Vehicles – PAVs) for Midlands-based Kestrel Aerospace.



Part-task training for the Dillon Minigun

The M134 Dillon Minigun is an electrically powered Gatling Gun capable of delivering 3,000-plus belt-fed 7.62 rounds per minute. Following experiences in Operation TELIC, the Royal Navy has decided to fit a variant of the M134 to a number of its vessels, for close-in combat and ship protection purposes. The experimental game-based trainer being developed as part of the HFI DTC research programme is addressing a number of key issues, including the unique 'hosepipe tracking' behaviour demonstrated by the weapon aimers. Videos of tracer streams from the Minigun depict a firing pattern similar to hosepipe spraying in order to improve time-on-target. This, coupled with the fact that the aimer's ship will be undertaking extreme manoeuvres, stresses the need for an appropriate weapon skills trainer. The scope of work has been defined following a human factors analysis of Minigun aiming activities on-board HMS Roebuck in the English Channel in October 2005.

Virtual HMS Scylla

There are many potential applications for serious games to enhance the progress of activities in defence procurement cycles, such as CADMID (Concept, Assessment, Demonstration, Manufacture, In-Service, Disposal). The examples given above certainly fall within the 'C, A, D and I' components of CADMID. However, one example of a project that is exploiting serious gaming as it relates to the 'Disposal' process has recently commenced. HMS Scylla is a Batch 1 Leander Class Frigate that was scuttled in March 2004 off Whitsand Bay near Plymouth by the National Marine Aquarium (NMA) to become Europe's first artificial reef. Working together with colleagues from the NMA and the University of Plymouth, the intention of the Birmingham research team is to develop a dynamic model (exploiting an appropriate games engine) of the Scylla. The initial model will be based on her condition as she exists at this point in time, and the project will be to research, develop and apply 'Artificial Life' algorithms to model the growth, propagation and life-cycles of marine organisms over time. Birmingham University has already developed a unique software system, called the 'Seeder Engine', as part of a major Virtual Environment project to populate a topographical model of the recently discovered Mesolithic riverbed area in the southern basin of the North Sea, as it existed prior to flooding caused by glacial melting (12-13,000 years ago). Applying the present research to the 'Scylla' scenario will help not only to validate the 'Seeder Engine' effort, but also to provide predictive visualisations of what the reef might look like tens of years (and longer) into the future and, eventually, to assess the impact of possible global climate changes on the sea and other factors, such as the effects of pollution or other short-term environmental variations. It will be possible to collect regular information from the reef, either via visual records (eg. from subsea webcams – relaying information directly to Birmingham, or via regular manned or remotely operated submersible dives on the wreck) or by deploying other sensors developed by colleagues at the University of Plymouth's Faculty of Technology.

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