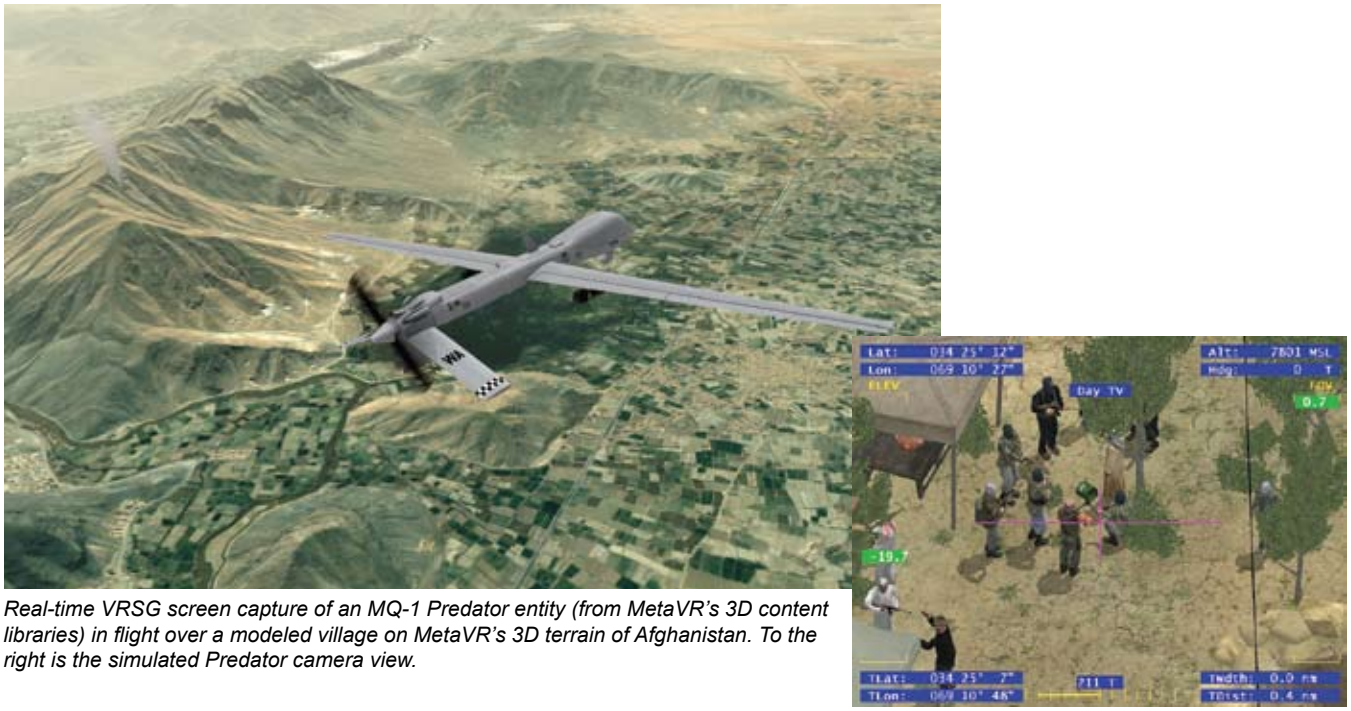
METAVR

VRSG™ Visuals in UAV Simulation

METAVR

http://www.metavr.com
sales@metavr.com
US 617-739-2667



Real-time VRSG screen capture of an MQ-1 Predator entity (from MetaVR's 3D content libraries) in flight over a modeled village on MetaVR's 3D terrain of Afghanistan. To the right is the simulated Predator camera view.

MetaVR is the largest supplier of unmanned aerial system (UAS) commercial 3D visualization software for the US military with over 1,000 active Virtual Reality Scene Generator™ (VRSG™) licenses in the field. Much of this installed base is through the Multiple Unified Simulation Environment / Air Force Synthetic Environment for Reconnaissance and Surveillance (MUSE/AFSERS) simulation system. VRSG drives the visuals for MUSE/AFSERS, which is the primary UAS training and simulation system used in the Department of Defense for command- and staff-level joint services training.

MetaVR visual systems are used in multiple UAS programs, including the embedded Shadow Crew Trainer One System Ground Control Station which used for training Shadow TUAS, Hunter, Aerosonde, and Grey Eagle unmanned aerial systems. Insitu, Inc. uses 34 MetaVR VRSG licenses for simulation training of one of its Unmanned Aerial Systems (UAS). The U.S. Army's Brigade Combat Team Modernization program (BCTM) uses VRSG to develop Class I UAV simulations.

VRSG can be configured to simulate a UAS in a variety of ways. These configurations range from using VRSG's internal camera payload model in which the telemetry of the simulated UAV is provided by a DIS or HLA entity, to fully integrated applications such as the MUSE UAV tactical trainer.

MetaVR's most recent customers who use VRSG to simulate ISR functions of their airborne platforms include Chandler May for its Fury 1500 UAS and Aurora Flight Sciences for its Orion UAS.

Images on the cover: *MetaVR VRSG real-time screen captures of a Shadow UAV, Fury 1500 UAV, simulated Shadow camera view, and Maveric micro UAV, all in scenes over MetaVR's virtual Afghanistan terrain.*

MetaVR visuals in MUSE/AFSERS UAS simulations

Since 2001, MetaVR VRSG has been the primary supplier of visual systems for the Joint Technology Center/Systems Integration Laboratory (JTC/SIL) MUSE/AFSERS simulation system, which is the largest unmanned aerial system (UAS) simulation program in the United States. The program provides the largest number of fielded simulation systems for training command and staff level training for UAS, which is used to support worldwide warfighter exercises and demonstrations.

The MUSE/AFSERS simulation system is a general intelligence collection platform simulation for airborne collection systems with electro-optical (EO), infrared (IR), and synthetic aperture radar (SAR) payloads. The MetaVR MUSE VRSG system provides the visualization system component for the MUSE, which generates synthetic payload scene video and/or imagery of the 3D battlefield with simulated target entities. This video and imagery is subsequently fed to a tactical or generic UAS/intelligence platform control station where operators perform air vehicle and payload control functions, and an air vehicle and datalink simulation.

VRSG UAS simulation features include:

- Capturing high-resolution virtual world screen images remotely. VRSG can instruct the UAV camera to capture the current image in its field of view from remote operators in the simulation environment, save the image to a file, and deliver the file for display on another computer. This feature simulates the Global Hawk large image sensor capability.
- Using VRSG as a simulated, live, virtual video feed from a UAV that is used to classify ground information from a Geographical Situational Display. Airborne or space-borne collection systems that use Ground Moving Target Indication (GMTI) and target identification devices create symbolic representations of moving entities over large

Real-time VRSG screen captures of character and vehicle entities and simulated Shadow UAV camera view from VRSG 3D content libraries. All the scenes take place on MetaVR's virtual Afghanistan terrain.

geographic areas. VRSG enables the operator to refine target identification and classification.

- Streaming real-time UAV KLV metadata multiplexed into an MPEG-2 or H.264 (MPEG-4) transport stream. Tactical exploitation systems can use this streaming MPEG feed to visualize sensor payload imagery in real time and extract the UAV metadata. VRSG can encode two types of metadata: MISB 0104.5 and EG 0601. The metadata editor GV 3.0 is an example of a system that can decode VRSG's MPEG stream and embedded UAV metadata. The MPEG stream can be transmitted live over UDP to a ROVER device (or any device that can play back video from an ISR video feed), or streamed to a file for later playback.
- Coupling VRSG with remotely operated video-enhanced receiver (ROVER) devices, which are often used by JTACs. VRSG generates the simulated 3D scene and the range and coordinates of a designated target on the ROVER's monitor.

One aspect of training UAS operators entails interacting with JTACs in joint mission training. Training together in a networked synthetic environment, the UAS operator and the JTAC on the ground work together to identify the same target in a scene.

Networked environments that do not have the bandwidth to handle VRSG's streaming MPEG (simulated UAV camera video feed) directly, set up a UAV regeneration station to capture the streaming MPEG of the VRSG-simulated UAV camera payload video in the form of data packets. These data packets are then regenerated as video, and streamed to another device on a local network, such as a ROVER. This regeneration station is a computer running another VRSG license that can receive UAV Master messages over a long-haul network from a remotely located UAV operator.

TUAS embedded visual system trainers

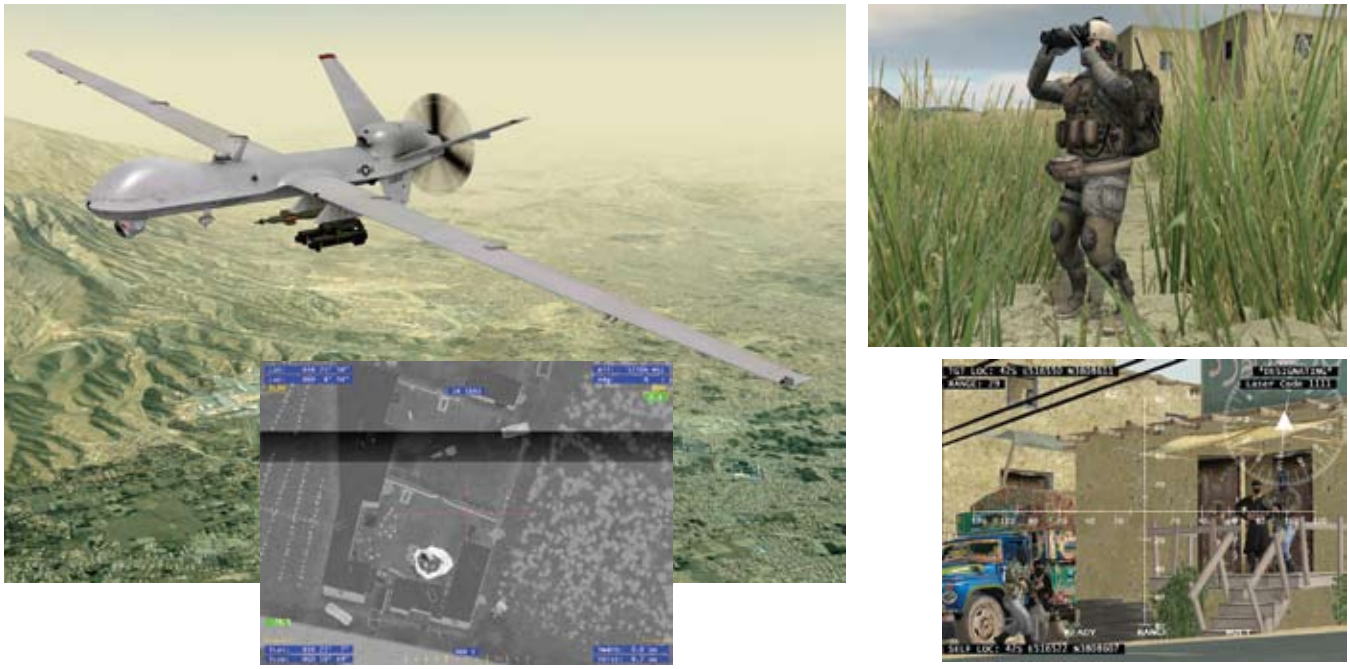
AAI uses MetaVR 3D visualization software to provide the desktop and embedded 3D synthetic payload visualization system for training Unmanned Aircraft Systems (UAS) operators on Ground Control Stations (GCS). In 2008, PEO STRI selected AAI's Shadow Training Aids, Devices, Simulators, and Simulations (TADSS) desktop training suite to support training for U.S. Army National Guard units operating the RQ-7B Shadow Tactical Unmanned Aircraft Systems (TUAS).

AAI uses 109 MetaVR VRSG licenses for its Shadow TADSS desktop training suite. In addition, AAI has purchased 396 VRSG licenses since 2002 for ongoing fielding in its embedded Shadow Crew Trainer One System Ground Control Station to support their embedded trainers in the MQ-1C Grey Eagle, Hunter, Shadow TUAS, and Aerosonde unmanned aerial systems, which are used by U.S. Army and Army National Guard units. MetaVR visuals are also used in AAI's new Universal Ground Control Station (UGCS), the next generation of One System Ground Control technology.

AAI was selected in late 1999 to provide the U.S. Army with brigade-level TUAS capabilities. Back in 2002, AAI purchased VRSG licenses initially for the GCS embedded trainer in the Shadow 200 program.

AAI produces and supports a complete family of advanced tactical unmanned aircraft systems, including Shadow systems flown by the U.S. Army, National Guard, and Marine Corps. As part of the U.S. Army's ongoing Shadow TUAS program, AAI has developed a Shadow Crew Trainer, which is an embedded component of the One System GCS.

The One System GCS is the premier ground control station of the U.S. Army and Marine Corps, used to operate multiple unmanned aircraft systems over battlefield and operations



One aspect of training UAS operators entails interacting with JTACs in joint mission training.Training together in a networked synthetic environment, the UAS operator and the JTAC on the ground work together to identify the same target in a scene. Shown above are real-time MetaVR VRSG scenes featuring a MQ-9 Reaper UAV entity flying over MetaVR's virtual Afghanistan, the Reaper's simulated camera view of an insurgent compound below it, JTAC character, and the JTAC's simulated designator view of the target scene.

areas and disseminate the valuable intelligence video collected. The One System GCS complies with STANAG 4586, a NATO standardization agreement that enables various UAS to share information through common ground stations, thus enhancing interoperability among allied military forces.

MetaVR's vizualization software is also used to train UAS operators at the Institutional Mission Simulator used at the UAS schoolhouse at Ft. Huachuca, AZ. This facility consists of mockups of the actual GCS vehicles in a class room setting.

Each TUAS system is comprised of three air vehicles, two ground control stations, two ground data terminals, a launcher, a tactical automatic landing system, and an aerial vehicle transport.

The One System GCS is a critical component of the TUAS system; in normal operation, the GCS is used to control the flight of the UAS and receive its telemetry. Each GCS is equipped with ruggedized Intel PCs running Microsoft Windows using game-level graphics cards as embedded hardware for the training system. By using any one of a number of commercial off the shelf technology PC graphics cards that support the Microsoft DirectX standards, the resulting system has true hardware independence. When the system operators are not flying the actual UAS, they can fly a simulated UAS using the same hardware they use to operate the real system — using the JTC/SIL MUSE air vehicle and datalink simulation software and MetaVR's PC-based technology. Thus, an operator does not necessarily know whether the video feed is coming from a simulator or a real camera video feed.

The GCS PCs run a variety of software, including MetaVR's UAS technology, which provides the embedded visual system within the trainer for the TUAS. With the TUAS contract extension, MetaVR's software will be delivered on future TUAS ground control stations. For field operation use, the TUAS system would have a 3D visual terrain database loaded for the same area in which operators are physically present so that they would train on the same terrain that they would fly during real missions. This same system can provide real-time situational awareness of the live UAS by depicting it in a coincident virtual world.

For more product information, pricing, and ordering, see MetaVR's web site at www.metavr.com or contact sales@metavr.com.