

Unmanned Systems Test Bed: Enhanced Visualization for Operators

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The Unmanned Systems Test Bed (USTB) project provides a unique opportunity for the test range and unmanned systems communities. The ultimate goal for the project is to advance the capabilities for an integrated theater representative, live virtual range for test, evaluation, and training for unmanned systems utilizing existing range facilities augmented by interoperable access and robust synthetic environments.

USTB aims to provide a test and evaluation environment for developers and operators of unmanned systems. USTB facilitates the integration of unmanned system control stations, unmanned system sensor (video) data, command and control systems, range infrastructure, simulations, high fidelity terrain databases, and visualization tools and provides a unique operational testing environment for the unmanned systems community.

The USTB development efforts fall into 3 areas of focus:

1. Creation of correlated synthetic terrain datasets that can be used by applications in a distributed system, allowing each application to correctly position Live, Virtual, and Constructive (LVC) entities.
2. Integration of applications into a distributed system using the Test and Training Enabling Architecture (TENA) middleware to create an aggregate synthetic environment which includes the synthetic terrain plus LVC entities.
3. Integration of sensor video streams from unmanned vehicles and projection of video onto the synthetic terrain, thereby augmenting the aggregate synthetic environment.

The resulting USTB capability provides an augmented LVC visualization for operators of unmanned systems with the following functionality:

- Positions all entities in the synthetic environment based on the position in the TENA Time Space-Position (TSPI) objects and updates entity locations as updates are received.
- Allows the observer position to be manipulated manually to view the synthetic environment from any desired location.
- Allows the observer location to be moved to the current position of one of the entities.
- Allows the observer to be attached to any of the entities and thereby viewing the synthetic environment from the point of view of the entity.
- Projects and renders each frame of the sensor video on the synthetic terrain.

The end product of the USTB is an enhanced three dimensional view of the world that is generated by projecting the live video and entities into an augmented synthetic environment. This enhanced view provides a unique operational testing environment for the unmanned systems community. This paper will describe USTB and will highlight the functionality provided by the enhanced visualization capability.